Alexander F. MacKinnon (SBN 146883)
alexander.mackinnon@kirkland.com
Allison Worthy Buchner (SBN 253102)
allison.buchner@kirkland.com
KIRKLAND & ELLIS LLP
333 South Hope Street
Los Angeles, California 90071
Telephone: (213) 680-8400
Facsimile: (213) 680-8500

Charanjit Brahma (SBN 204771)
KIRKLAND & ELLIS LLP
655 Fifteenth Street., N.W., Suite 1200
Washington, D.C. 20005
Telephone: (202) 879-5000
Facsimile: (202) 879-5200

Attorneys for Plaintiff
Razor USA LLC

UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

RAZOR USA LLC,

Plaintiff,

v.

HEINZ KETTLER GMBH & CO., KG and KETTLER INTERNATIONAL, INC.,

Defendants.

Case No. CV 10 6877-R (FFMx)

COMPLAINT FOR DECLARATORY JUDGMENT

JURY TRIAL DEMANDED

COMPLAINT FOR DECLARATORY JUDGMENT

Plaintiff Razor USA LLC ("Razor") for its complaint against Defendants Heinz Kettler GmbH & Co., KG ("Heinz Kettler") and Kettler International, Inc. ("Kettler International") alleges as follows:

THE PARTIES

1. Razor is a privately-held, limited liability company organized and existing under the laws of Delaware with its principal place of business in Cerritos, California.

2. Defendant Heinz Kettler is a corporation organized and existing under the laws of the Federal Republic of Germany with its principal place of business at Hauptstrasse 28, D-59469 Ense-Parsit, Germany. Upon information and belief, Heinz Kettler is owned by Dr. Karin Kettler.

3. Upon information and belief, Defendant Kettler International is a corporation organized and existing under the laws of the Commonwealth of Virginia with its principal place of business at 1355 London Bridge Road, Virginia Beach, Virginia 23453. Upon information and belief, Kettler International is fully owned by Kettler International Beteiligungsgesellschaft GmbH, which in turn is fully owned by Kettler Management GmbH, both of which share the same principal place of business as Heinz Kettler. Upon information and belief, Kettler Management GmbH is also owned by Dr. Karin Kettler.

JURISDICTION AND VENUE

4. Razor's claims seek declaratory judgment pursuant to 28 U.S.C. §§ 2201 and 2202 that various patents owned either by Heinz Kettler or Kettler International are not infringed by Razor, are invalid and are not enforeceable.

5. This Court has subject matter jurisdiction over Razor's claims pursuant to 28 U.S.C. §§ 1331, 1332, 1338 and 1367 because this action arises under the patent laws of the United States, including 35 U.S.C. § 1 *et. seq.*

6. This Court has personal jurisdiction over Defendants Heinz Kettler and

Kettler International. Upon information and belief, Heinz Kettler manufactures and sells various products, including children's tricycles, that are sold throughout the State of California and this District by Kettler International directly over the Internet and through various retailers. In addition, upon information and belief, Heinz Kettler and Kettler International have authorized others to make and sell products covered by the patents at issue throughout the State of California and this District.

7. Venue is proper in this Court pursuant to 28 U.S.C. §1391 and 1400.

BACKGROUND

8. On or about June 24, 2010, Defendants Heinz Kettler and Kettler International filed suit for patent infringement against Razor in the United States District Court for the Eastern District of Virginia.

9. The Virginia action was assigned Civil Action No. 1:10-cv-708 and is currently pending.

10. In their original complaint in the Virginia action, Defendants alleged that Razor had infringed "one of more claims of" United States Patent Nos. 6,378,884 ("'884 patent," Ex. B), 7,487,988 ("'988 patent," Ex. C), 7,156,408 ("'408 patent," Ex. D), and 6,799,772 ("'772 patent," Ex. E).

11. In their original complaint in the Virginia action, Defendants alleged that Heinz Kettler "is the sole owner of the '988 patent, '884 patent, the '772 patent, and the '408 patent," (Ex. A ¶ 11), and that Kettler International is Heinz Kettler's "exclusive United States distributor of KETTLER products," (*id.* ¶ 9).

12. On August 27, 2010, Razor moved to dismiss the claims of Kettler International in the Virginia action on the grounds that Kettler International lacked standing to sue for infringement of any of the patents-in-suit allegedly owned by Heinz Kettler. Razor also moved to transfer the Virginia action to this District. Those motions are currently pending.

13. On September 9, 2010, in an improper attempt to cure its lack of standing, Kettler International filed what it styled as an "Amended Complaint"

(attached as Ex. F) in which it alleged that ownership of the patents-in-suit had been transferred to Kettler International from Heinz Kettler by virtue of an assignment. Upon information and belief, Kettler International did not acquire any ownership interest it allegedly holds currently in the patents-in-suit until after the Defendants had filed their original complaint in the Virginia action.

14. A real and justiciable controversy exists concerning the Defendants' alleged rights in the patents-in-suit and their authority to enforce the patents-in-suit against Razor for its making, use, sale, offer for sale, or importation of allegedly infringing products.

COUNT I: DECLARATORY JUDGMENT OF NON-INFRINGEMENT

15. Razor realleges and incorporates by reference the allegations of paragraphs 1 through 14 above.

16. Razor has not and does not infringe the '884 patent or any claim therein by making, using, selling, or offering to sell in the United States or importing into the United States any product, including Razor's RipRider 360 product.

17. Razor has not and does not infringe the '988 patent or any claim therein by making, using, selling, or offering to sell in the United States or importing into the United States any product, including the Razor's RipRider 360 product.

18. Razor has not and does not infringe the '408 patent or any claim therein by making, using, selling, or offering to sell in the United States or importing into the United States any product, including the Razor's RipRider 360 product.

19. Razor has not and does not infringe the '772 patent or any claim therein by making, using, selling, or offering to sell in the United States or importing into the United States any product, including the Razor's RipRider 360 product.

20. Razor is entitled to a declaration that Razor has not infringed and does not infringe any of the patents-in-suit.

COUNT II: DECLARATORY JUDGMENT OF INVALIDITY

21. Razor realleges and incorporates by reference the allegations of

paragraphs 1 through 20 above.

22. The '884 patent and each of the claims therein is invalid for failure to meet one or more the requirements for patentability set forth in one or more of sections 101, 102, 103, 112 and 116 of Title 35 of the United States Code.

23. The '988 patent and each of the claims therein is invalid for failure to meet one or more the requirements for patentability set forth in one or more of sections 101, 102, 103, 112 and 116 of Title 35 of the United States Code.

24. The '408 patent and each of the claims therein is invalid for failure to meet one or more the requirements for patentability set forth in one or more of sections 101, 102, 103, 112 and 116 of Title 35 of the United States Code.

25. The '772 patent and each of the claims therein is invalid for failure to meet one or more the requirements for patentability set forth in one or more of sections 101, 102, 103, 112 and 116 of Title 35 of the United States Code.

26. Razor is entitled to a declaration that each of the claims of each of the patents-in-suit is invalid.

PRAYER FOR RELIEF

WHEREFORE, plaintiff Razor USA LLC respectfully requests that the Court enter an order:

Declaring that Razor has not infringed and does not infringe the '884 patent, the '998 patent, the '772 patent, or the '408 patent;

Declaring that each claim of the '884 patent, the '998 patent, the '772 patent, and the '408 patent is invalid;

Declaring that Razor does not owe monetary damages to either Heinz Kettler or Kettler international to redress any acts of infringement of the '884 patent, the '998 patent, the '772 patent or the '409 patent allegedly committed by Razor prior to June 24, 2010.

Awarding Razor its costs in this action;

Awarding Razor its attorneys' fees pursuant to 35 U.S.C. § 285; and

Awarding Razor such other and further relief as this Court may deem just and proper.

DATED: September 15, 2010

Respectfully submitted,

Alexander F. MacKinnon
Allison Worthy Buchner
KIRKLAND & ELLIS LLP
333 South Hope Street
Los Angeles, CA 90071
Telephone: (213) 680-8400
Facsimile: (213) 680-8500
alexander.mackinnon@kirkland.com
allison.buchner@kirkland.com

Charanjit Brahma
KIRKLAND & ELLIS LLP
655 Fifteenth St., N.W., Suite 1200
Washington, D.C. 20005
Telephone: (202) 879-5000
Facsimile: (202) 879-5200
charanjit.brahma@kirkland.com

Counsel for Plaintiff Razor USA LLC

Exhibit A

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
~~**Norfolk Division**~~ Alexandria

HEINZ KETTLER GMBH & CO., KG and KETTLER INTERNATIONAL, INC.

Plaintiffs,

v.

RAZOR USA, LLC

SERVE: The Corporation Trust Co.
Registered Agent
Corporation Trust Center
1209 Orange Street
Wilmington, DE 19801

Defendant.

Civil Action No.: 1:10 CV 708 TSE/JFA

JURY TRIAL DEMANDED

COMPLAINT

Plaintiffs HEINZ KETTLER GMBH & CO., KG (hereinafter referred to as "Heinz KETTLER") and KETTLER INTERNATIONAL, INC. (hereinafter referred to as "KETTLER Int.") (hereinafter collectively referred to as "KETTLER" or "Plaintiffs") submit this Complaint against Defendant Razor USA, LLC (hereinafter referred to as "Razor" or "Defendant").

THE PARTIES

1. Heinz KETTLER is a corporation, organized and existing under the laws of the Federal Republic of Germany, having its principal place of business at Hauptstrasse 28, D-59469 Ense-Parsit, Germany.

2. KETTLER Int. is a corporation established under the laws of the Commonwealth of Virginia, with its principal place of business at 1355 London Bridge Road, Virginia Beach, Virginia 23453. KETTLER Int. is owned by KETTLER International

Beteiligungsgesellschaft GmbH of Hauptstrasse 28, D-59469 Ense-Parsit, Germany, which is owned by KETTLER Management GmbH of Hauptstrasse 28, D-59469 Ense-Parsit, Germany. Both Heinz KETTLER and KETTLER Management GmbH are owned by Dr. Karin KETTLER.

3. Razor is a manufacturer of children's scooters and ride-on toys and, upon information and belief, is a limited liability company organized and existing under the laws of Delaware, with its principal place of business in Cerritos, California. Upon information and belief, Razor also has other manufacturing, sourcing and distribution facilities in Europe and Australia, and is a privately held company.

JURISDICTION AND VENUE

4. This Court has jurisdiction over the subject matter of this controversy pursuant to 28 U.S.C. §§ 1331, 1332 and 1338.

5. This Court can properly exercise personal jurisdiction over the Defendant because the Defendant and its agents have sold, continue to sell, and/or import infringing devices in the Eastern District of the Commonwealth of Virginia, including the Norfolk Division.

6. Venue for the present action properly lies against Defendant in this District and Division pursuant to 28 U.S.C. §§ 1391(c).

BACKGROUND

7. This action is based upon Defendant's unauthorized appropriation and use of KETTLER's patented technology.

8. Heinz KETTLER manufactures, among other things, numerous children's "ride-on" vehicles including various models of scooters, tricycles, bicycles, etc.

9. Heinz KETTLER's children's "ride-on" vehicles, which have won numerous awards, are sold in many countries all over the world, including the United States. KETTLER Int. is Heinz KETTLER's exclusive United States distributor of KETTLER products.

10. Heinz KETTLER has obtained patents covering various features of its trikes in countries throughout the world, including U.S. patent No. 6,378,884 (the "'884 patent"), which issued in the United States on April 30, 2002.

11. U.S. Patent No. 7,487,988 (the "'988 Patent") issued on February 10, 2009 from a continuation of application of U.S. Patent No. 7,156,408 (the "'408 patent"), issued on January 2, 2007 from a U.S. continuation application of parent U.S. Patent No. 6,799,772 (the "'772 patent"), which, in turn, issued on October 5, 2004 from a U.S. continuation application of parent U.S. patent No. 6,378,884. The '988 patent, '884 patent, the '772 patent, and the '408 patent are directed to a vehicle steering head, limited turn system, and/or steering lock system and were duly and legally issued to Heinz KETTLER. Heinz KETTLER is the sole owner of the '988 patent, '884 patent, the '772 patent, and the '408 patent. The '988 patent, '884 patent, '772 patent and the '408 patent are collectively referred to as "the patents-in-suit."

12. The patents-in-suit contain claims covering, among other things, a vehicle steering head, limited turn system, and/or steering lock system which can, among other things, prevent a child user from over-steering the vehicle and which allows an adult to lock the front wheel of a vehicle in a straight position.

13. Upon information and belief, Razor copied the vehicle steering head, limited turn system, and/or steering lock system used on one or more of KETTLER's trike models, and used such copied system in a number of Defendant's trike models, including but not limited to the Razor RipRider 360, Item Number 20036540.

14. Upon information and belief, Razor sells and imports the infringing tricycles in the United States, including to some of KETTLER's long time customers.

15. Defendant has imported, distributed, sold and offered for sale, and continues to import, distribute, sell, and offer for sale, tricycle models, through certain retailers and over the Intemet, which include a limited turning system and locking device that infringes the patents-in-suit.

16. True and correct copies of these the '988 patent, '884 patent, '772 patent and the '408 patent are attached hereto as Exhibits 1, 2, 3, and 4, respectively.

17. KETTLER has been damaged by Defendant's unauthorized use, adoption, appropriation, and/or copying of KETTLER's patented technology.

18. Additionally, Defendant knows and/or has known of the patents-in-suit and the subject matter of the patents-in-suit.

19. On information and belief, Razor knew or should have known that the above mentioned RipRider 360 model infringes the patents-in-suit and has willfully infringed the valid intellectual property of KETTER and is thus liable for damages or lost profits in an amount to be proved at trial and for that amount to be trebled.

COUNT I
(Patent Infringement)

20. KETTLER incorporates herein and realleges, as if fully set forth in this paragraph, the allegations in the foregoing paragraphs above, inclusive.

21. Razor has made, used, offered to sell, and/or sold in the United States, and/or imported into the United States, trikes or tricycles covered by one or more claims of the patents-in-suit, without KETTLER's authorization.

22. Razor continues to make, use, offer to sell, and/or sell in the United States, and/or import into the United States, trikes or tricycles covered by one or more claims of the patents-in-suit, without KETTLER's authorization.

23. One or more claims of the patents-in-suit is infringed by one or more trikes or tricycles made, used, offered for sale, sold and/or imported by Defendant, including but not limited to the Razor RipRider 360 (Item Number 20036540).

24. Defendant does not have a license to make, use, sell, offer for sale, or import products which incorporate the technology which infringes the patents-in-suit.

25. Defendant's infringement of the patents-in-suit has been, and continues to be, willful.

PRAYER FOR RELIEF.

WHEREFORE, Plaintiffs pray for the following relief and seek a judgment against Defendant:

1. Declaring that Defendant has infringed the '988 patent, '884 patent, '772 patent and the '408 patent;

2. Declaring that Defendant, its agents, servants, employees, representatives, attorneys, related companies, successors, assigns, and all others in active concert or participation with Defendant be preliminarily and permanently enjoined and restrained from further infringing the patents-in-suit pursuant to 35 U.S.C. § 283;

3. Awarding KETTLER damages for Defendant's infringement of the patents-in-suit;

4. Awarding judgment in favor of KETTLER on all counts of the Complaint;

5. Declaring that Defendant's infringement of the patents-in-suit is and has been willful;

6. Awarding KETTLER increased damages in the amount of three times the damages found or assessed in accordance with 35 U.S.C. § 284;

7. Declaring the case exceptional and awarding KETTLER their costs and attorney fees in accordance with 35 U.S.C. § 285;

8. Requiring Defendant to provide a full accounting of all tricycles, trikes, and ride-on vehicles which infringe the patents-in-suit, including but not limited to the Razor RipRider 360 (Item Number 20036540).

9. Ordering Defendant to recall all infringing products and products in the U.S. and its territories which have not been sold and/or shipped to consumers from all retailers, re-sellers and shippers, and others in possession of such products; and

10. Awarding KETTLER such other and further relief as the Court may deem just and proper.

DEMAND FOR JURY TRIAL

Pursuant to Federal Rules of Civil Procedure 38(b), KETTLER hereby demands trial by jury as to all claims in this litigation.

HEINZ KETTLER GMBH & CO., KG and
KETTLER INTERNATIONAL, INC.

By: _____
Of Counsel

John C. Lynch (VSB # 39267)
Liz S. Flowers (VSB # 78487)
TROUTMAN SANDERS LLP
222 Central Park Avenue, Suite 2000
Virginia Beach, Virginia 23462
Telephone: (757) 687-7765
Facsimile: (757) 687-1504
E-mail: john.lynch@troutmansanders.com
E-mail: liz.flowers@troutmansanders.com

Counsel for Plaintiffs Heinz KETTLER GmbH & Co., KG. and KETTLER International Inc.

400796v1

US007487988B2

(12) **United States Patent**
Kettler et al.

(10) **Patent No.: US 7,487,988 B2**
(45) **Date of Patent: *Feb. 10, 2009**

(54) **VEHICLE STEERING HEAD**

(75) Inventors: **Heinz Kettler**, Ense-Parsit (DE); **Joachim Kettler**, Werl (DE); **Reinhard Rocholl**, Werl (DE)

(73) Assignee: **Heinz Kettler GmbH & Co. KG**, Ense-Parsit (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **11/562,694**

(22) Filed: **Nov. 22, 2006**

(65) **Prior Publication Data**

US 2007/0096425 A1 May 3, 2007

Related U.S. Application Data

(63) Continuation of application No. 10/671,668, filed on Sep. 29, 2003, now Pat. No. 7,156,408, which is a continuation of application No. 10/298,002, filed on Nov. 18, 2002, now Pat. No. 6,799,772, which is a continuation of application No. 10/092,516, filed on Mar. 8, 2002, now abandoned, which is a continuation of application No. 09/584,497, filed on Jun. 1, 2000, now Pat. No. 6,378,884.

(30) **Foreign Application Priority Data**

Jul. 5, 1999 (DE) ..... 299 11 652 U

(51) **Int. Cl.**
B62K 5/02 (2006.01)

(52) **U.S. Cl.** 280/279; 280/272; 74/495

(58) **Field of Classification Search** 280/279, 280/272, 271, 282, 89; 403/354, 83; 74/495
See application file for complete search history.

(56) **References Cited**

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(Continued)

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(Continued)

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Hand made drawing page No. RF12204 of Raltrike letterhead. The drawing has a handwritten date of Jan. 21, 1987.

(Continued)

Primary Examiner—Tony H. Winner
(74) *Attorney, Agent, or Firm*—Greenblum & Bernstein, P.L.C.

(57) **ABSTRACT**

Vehicle steering head for a trike includes a hollow support. A connecting member is adapted to connect a wheel fork to a handlebar. The connecting member is rotatably mounted to the hollow support. A pin is arranged within the hollow support and is structured and arranged to move parallel to an axis of the connecting element. The vehicle steering head is structured and arranged to limit rotational movement of the connecting member in each of two directions.

24 Claims, 9 Drawing Sheets

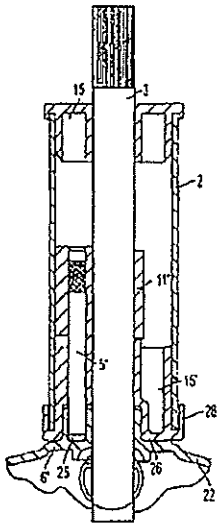

EXHIBIT
tabbies
1

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7,156,408	B2	1/2007	Kettler et al.
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Hand made drawing page No. RF12206 on Italtrike letterhead. The drawing has a handwritten date of Jan. 21, 1987.
Black and white picture allegedly showing a mold having page No. RF12208.
Black and white picture allegedly showing mold parts having page No. RF12209.
Sheet table in Italian having a stamp entitled "N. CITTON & C. s.n.s.".
Cover page of Europeo (in color) having page RF12230 and dated Feb. 1, 1991.
Four sheets with page Nos. RF12244-A, -B, -C and -D (in color) showing vaious pictures of trikes and a scooter on what appears to be notebook pages.
Four sheets with page Nos. RF12245-A, -B, -C and -D (in color) showing various pictures of trikes and a bike on what appears to be notebook pages.
Pages 1 and 2 of a 1998 Radio Flyer catalog.
Three sheets labeled "Acknowledgment".
A sheet entitled "Restricted Turning Prior Art".
A sheet entitled "Product Name: Roll N Ride".
A sheet entitled "Product Name: Grow-With-Me-Trike".
A sheet entitled "Product Name: Baby Too".
A sheet entitled "Product Name: Tough Trikes" and "Product Name: Push'n Pedal Trike".
Two sheets entitled "HBC Model 29875 CS 04G".
Two sheets entitled "Smoby Pilot Alu Plus Juguetes Pico S.A.".
Two sheets entitled "Fisher Price Rock. Roll and Ride XL".
Two sheets entitled "Charlon Baby Driver 2 39150 St. Laurent France".
Two sheets entitled "Processed Plastics West Coast Choppers".
Two sheets entitled "Processed Plastic Item 17800-2".
Two sheets entitled "Fischer Price Kawasaki (US Patent 6,651,528)".
Two sheets entitled "Mattel Hot Wheels".
Two sheets entitled "Tek-Net Toys Int'l Inc. USA 020821 Emergency 911".
Two sheets entitled "Fischer Price L&S Ride on Harley".
Two sheets entitled "Friendly Toys Item #7112 Fold-Up Trike".
Document showing Radio Flyer model #77 entitled "Restricted Turning Prior Art".
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Six Catalog pages of company Processed Plastic Company showing a TimMee toy (1997).
Four pages of assembly Instructions for Push, Pedal & Ride Trike, date unknown.
Figs. 1, 2A and 2B purporting to show the Push, Pedal & Ride Trike in a fully assembled state and a partially disassembled state, date unknown.
English language Translation of DE 29901449.
English language Abstract of GB 815456.
English language Abstract of DE 3242863.
English language Abstract of 3914050.
English language Translation of Swiss 290478.

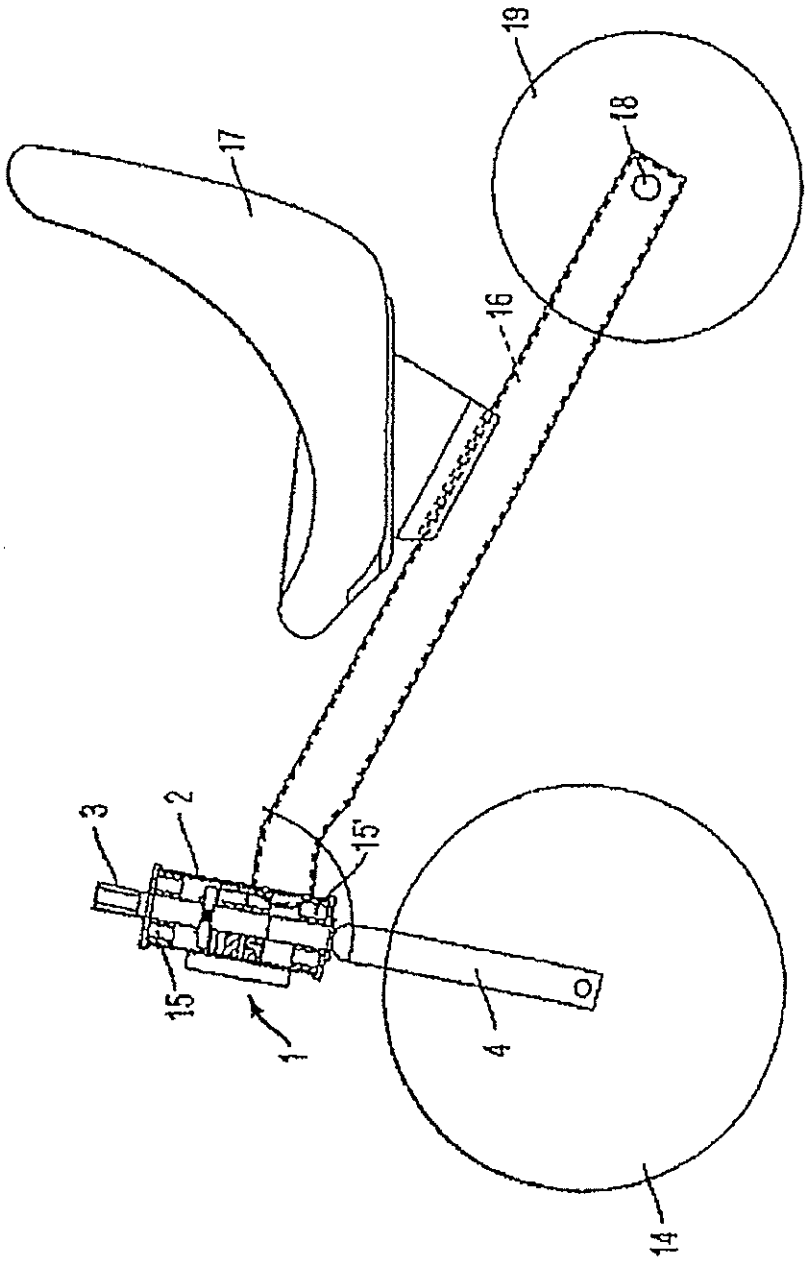


FIG. 1

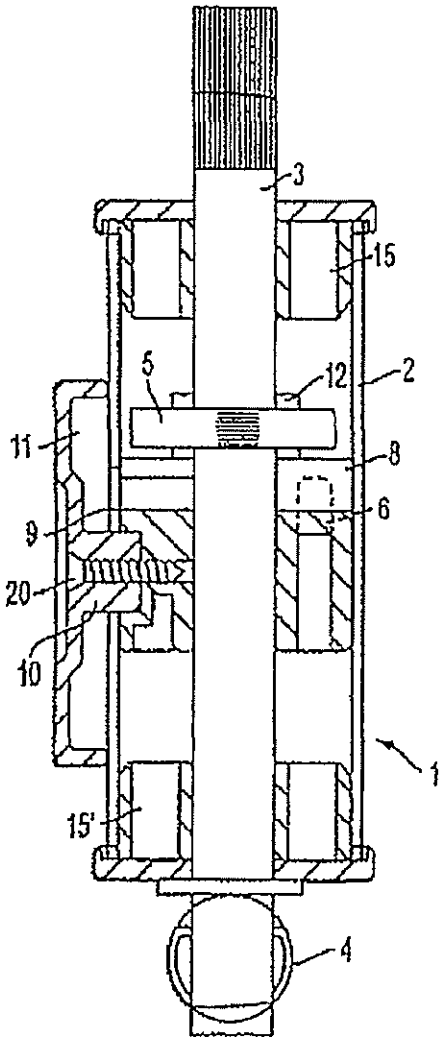


FIG. 2

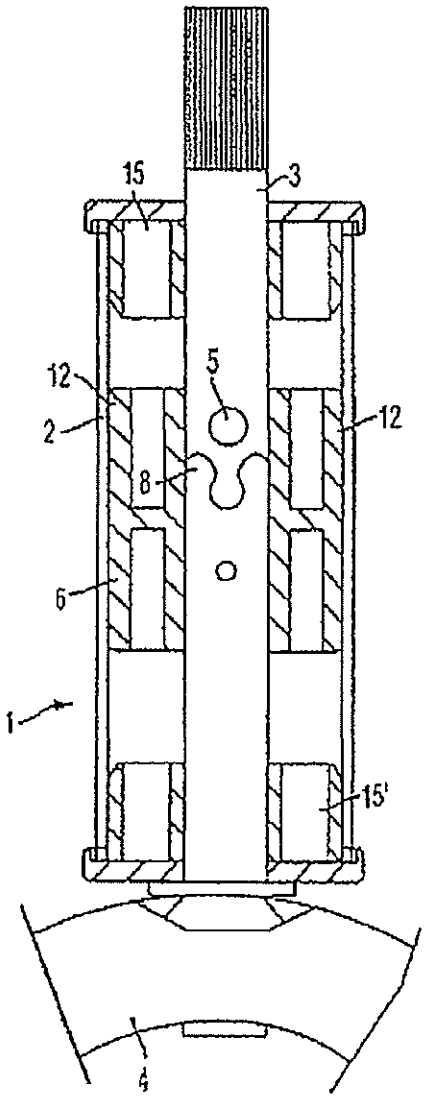


FIG. 3

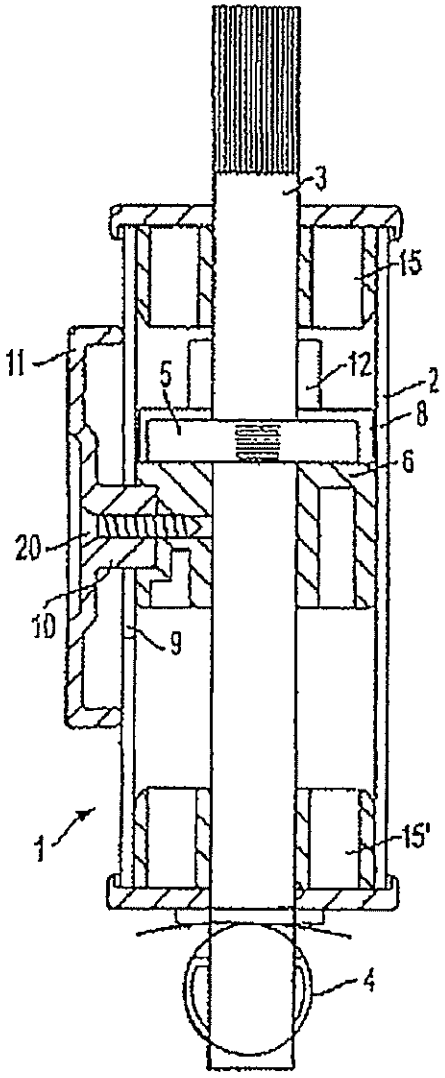


FIG. 4

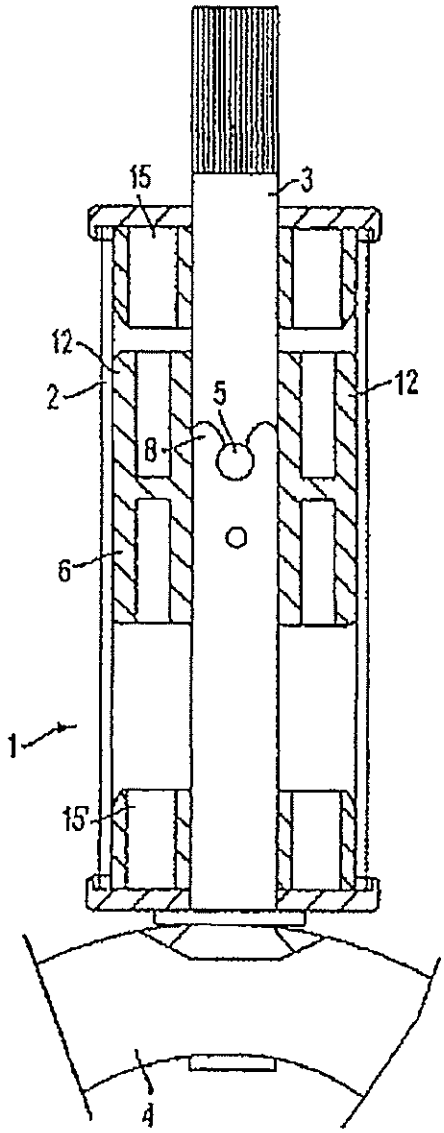


FIG. 5

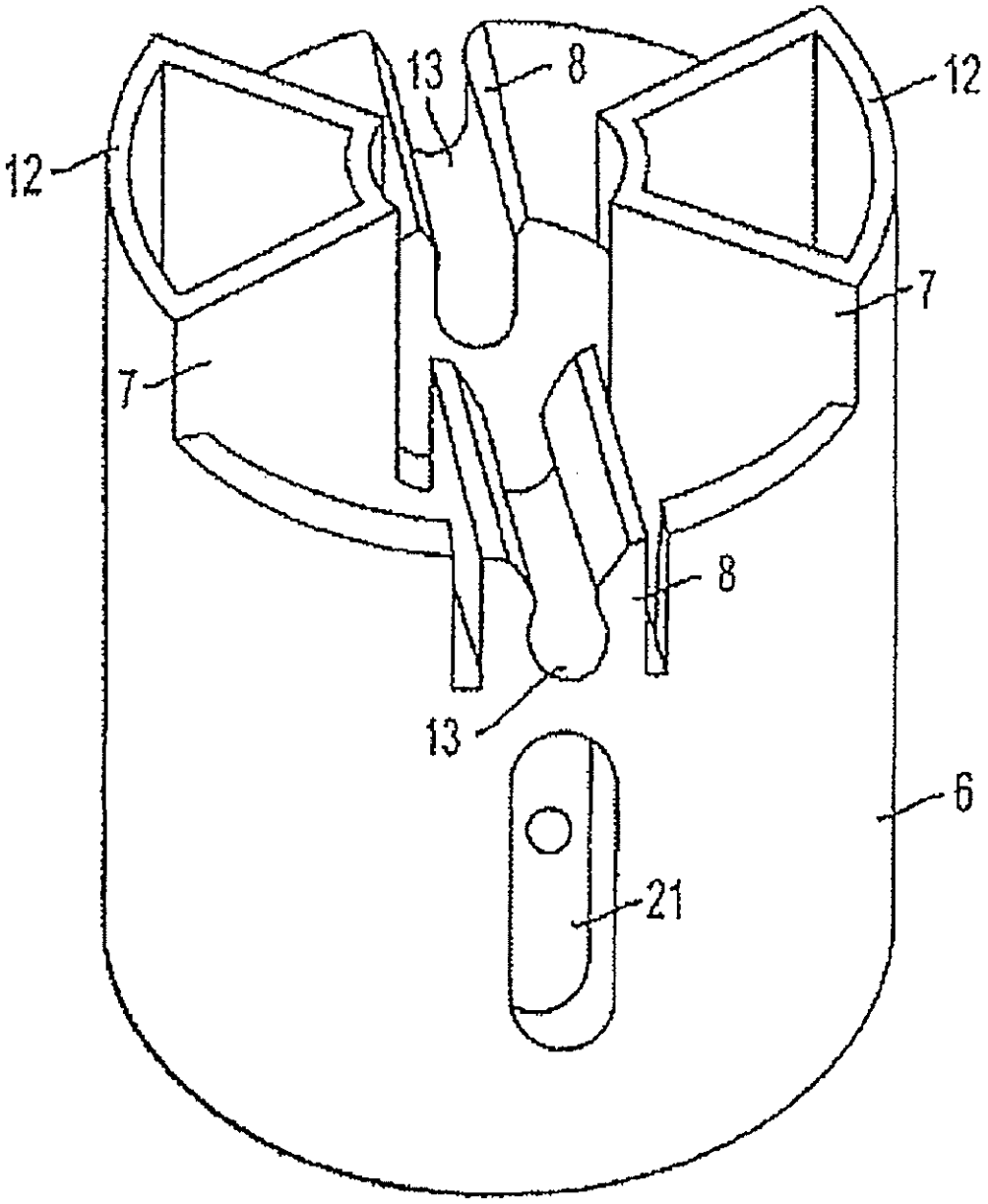


FIG. 6

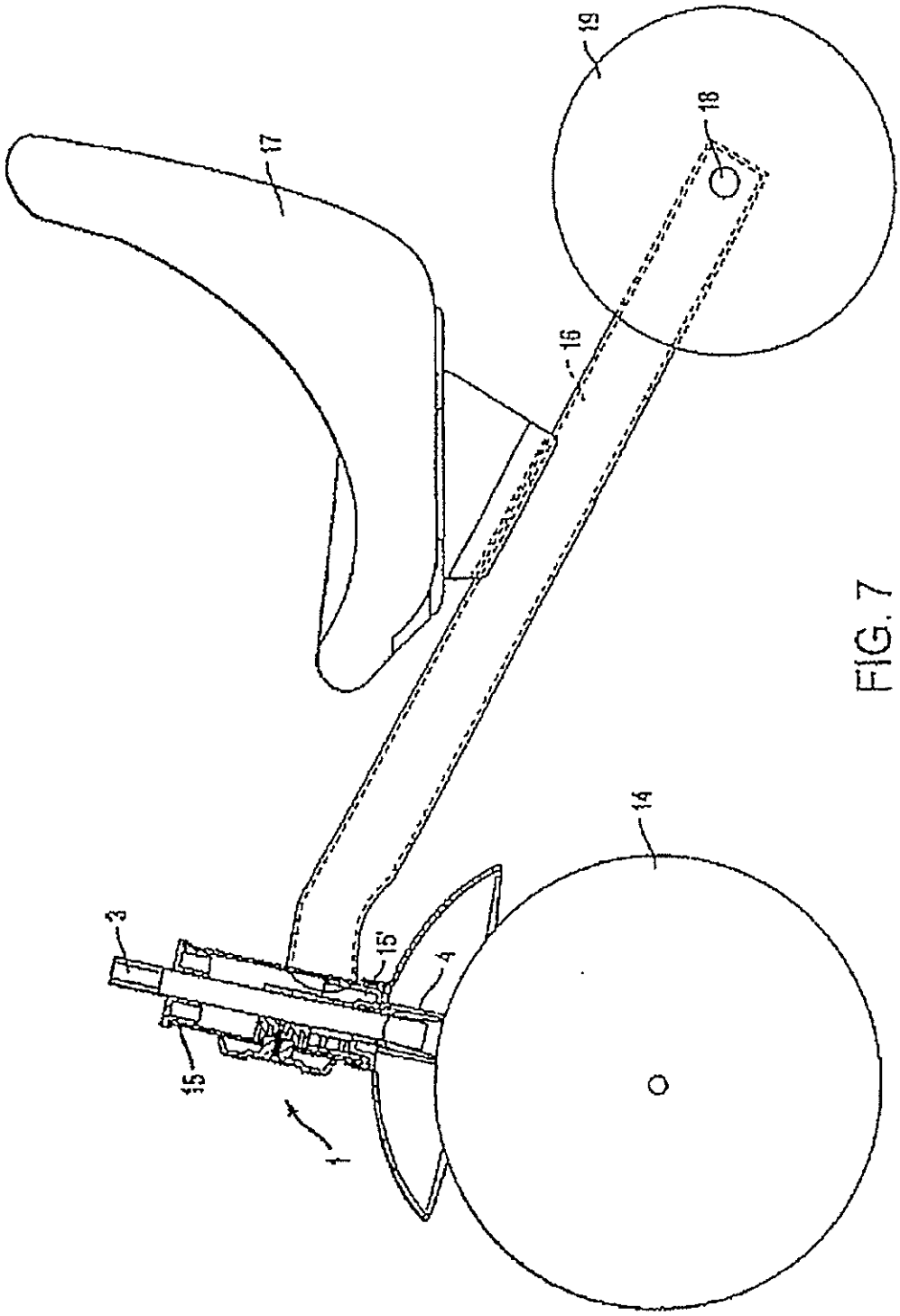


FIG. 7

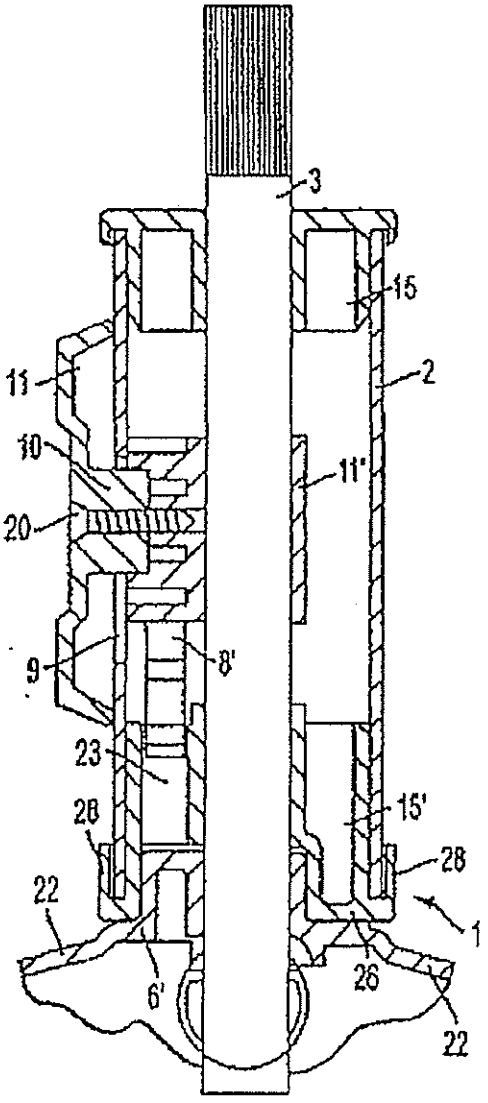
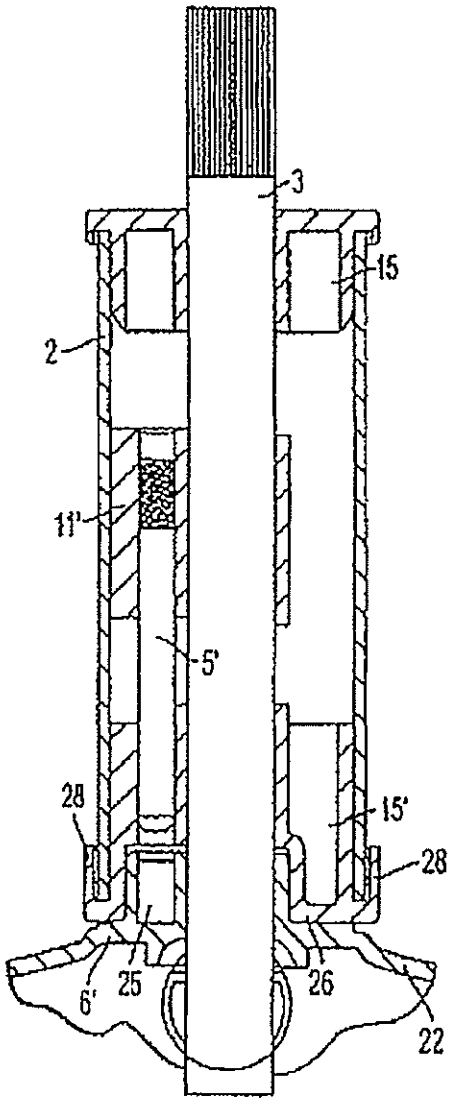

3
15
2
11
10
11'
20
9
8'
23
26
15'
28
22
1
6'
26
22

FIG. 8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15'
28
6'
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26
22

FIG. 9

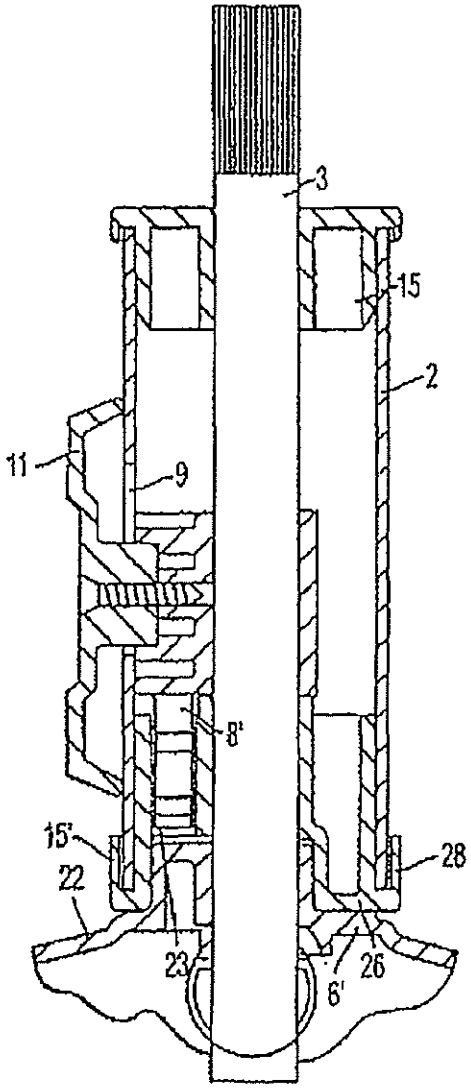

FIG. 10

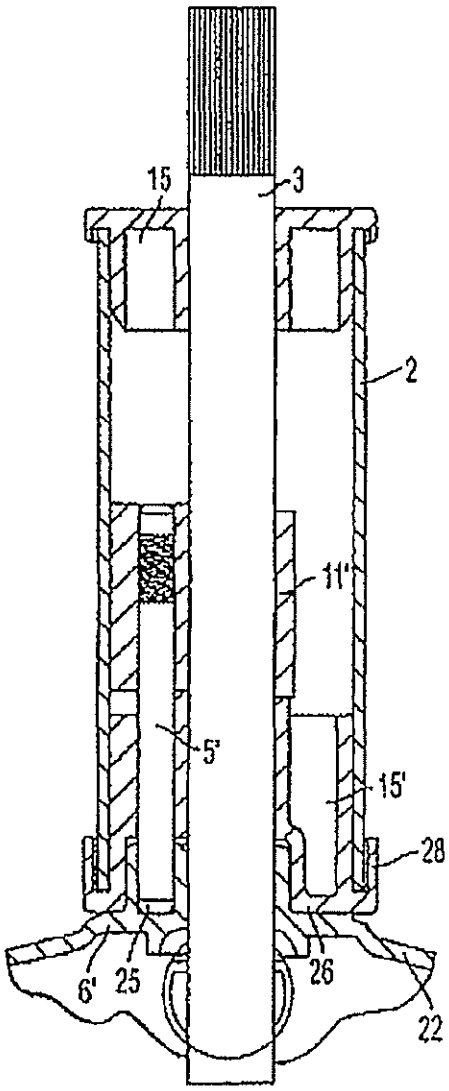

FIG. 11

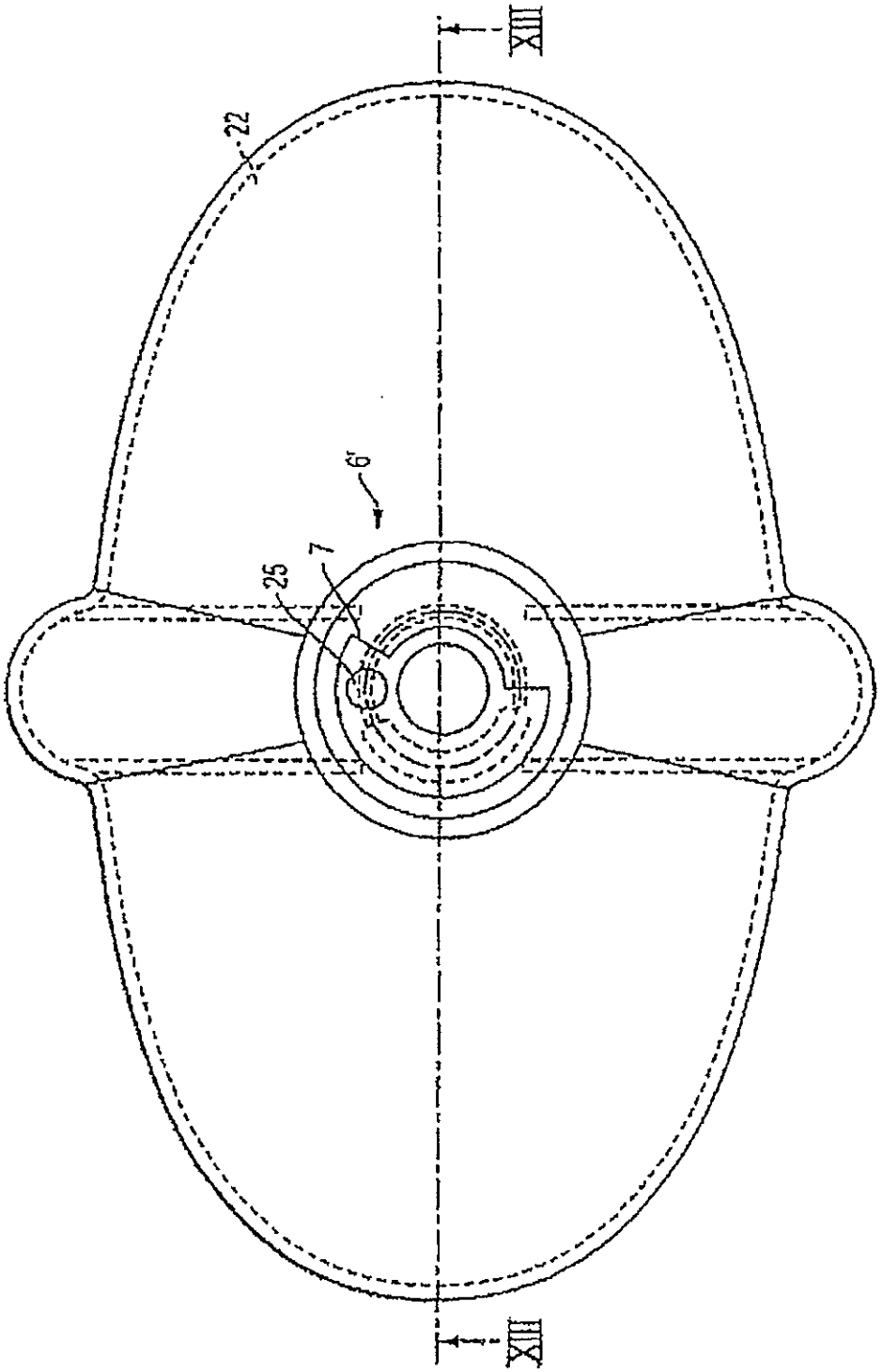

FIG. 12

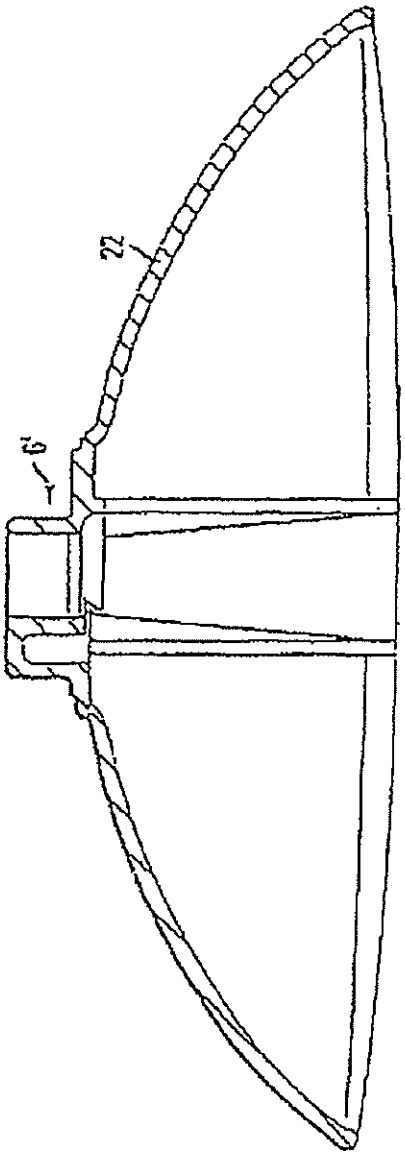

FIG. 13

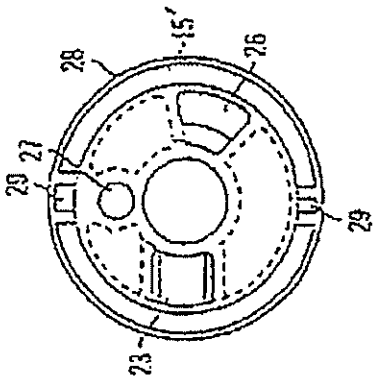

FIG. 17

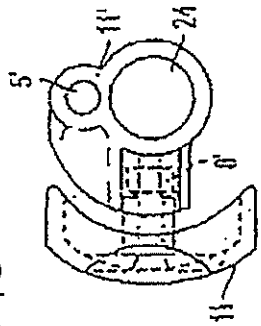

FIG. 16

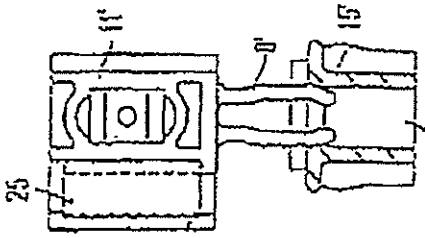

FIG. 15

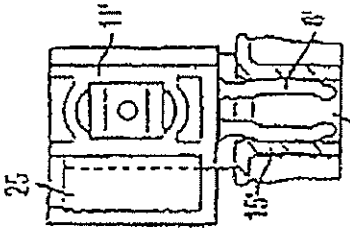

FIG. 14

VEHICLE STEERING HEAD

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of U.S. application Ser. No. 10/671,668 which was filed Sep. 29, 2003, which is a continuation of U.S. application Ser. No. 10/298,002, which was filed Nov. 18, 2002, now U.S. Pat. No. 6,799,772, which is a continuation of U.S. application Ser. No. 10/092,516 filed Mar. 8, 2002, now abandoned, which is a continuation of U.S. application Ser. No. 09/584,497 filed Jun. 1, 2000, now U.S. Pat. No. 6,378,884, the disclosures of which are expressly incorporated by reference herein in their entireties. Further, the present application claims priority under 35 U.S.C. § 119 of German Patent Application No. 299 11 652.2, filed on Jul. 5, 1999, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle steering head and in particular, to a steering head for a vehicle comprising a support tube which has rotatably supported therein a fork member to which a wheel cover and a handlebar can be secured.

2. Discussion of Background Information

Vehicle steering heads of the above-described type are in particular used in bicycles or tricycles, and in particular in tricycles or bicycles for children.

In devices of the above-described type it is desirable for safety reasons that accidents be avoided which may be caused by an excessively large handlebar deflection. It has been found that when there is an excessively large handlebar deflection (e.g., the handle bar rotates beyond a point where effective steering occurs), the vehicle may tilt to the side. Moreover, such deflections or excessive rotation may run the risk that a user impacts his body against the handlebar. Additionally, the user may get caught with his/her feet in the front wheel and may be even be injured by the pedals.

A further drawback or disadvantage of prior-art devices occurs when they are pushed with a push rod type device. In such cases, these devices have a tendency towards uncontrolled steering movements of the front wheel which cannot be mastered or effectively controlled by small children, in particular.

SUMMARY OF THE INVENTION

The present invention therefore provides a vehicle steering head of the above-mentioned type which is of a simple construction and which can operate in an easy and reliable manner. Moreover, this design avoids the drawbacks of the prior art and can in particular limit a handlebar deflection to a desired degree. The invention also has provision for locking the handlebar.

According to one aspect of the invention a latch element is secured to a fork member on a portion provided inside the support tube. A linkage element is supported in the support tube for rotation therewith. The linkage element is displaceable or moveable in a longitudinal direction of the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the latch element. Moreover, the linkage element comprises at least one locking element which is releasably connectable to the latch element.

According to another aspect of the invention a latch element is supported on the support tube. A linkage element is arranged on the fork member and connected to the tube for rotation therewith. The latch element is freely displaceable or moveable along the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the support tube. Moreover, at least one latch element is provided that is releasably connectable to the support tube.

The vehicle steering head according to the invention is characterized by a number of considerable advantages.

First of all, it is possible to install or utilize the steering head in a frame of any desired design, e.g. children's bicycles or tricycles. Ideally, the dimensions of the steering head are such that they do not interfere with the remaining structure of the frame within which it is installed. Of course, the steering head may be combined with any and all common types of frames where ever its advantageous design is desired. Accordingly, the steering head may be utilized in a variety of devices where limited deflection or rotation and/or locking are desired.

Because the invention utilizes a latch element which is arranged in the support tube, no functional parts of the steering head need be outwardly visible or accessible. Accordingly, the internal parts are less susceptible to damage. Additionally, this design is less likely to cause injury when used by children or infants.

As a result of utilizing a linkage element according to the invention, it is possible to reliably lock the fork member and thus the wheel fork and the front wheel. Such a locking provision is easily be accomplished by displacing or moving the linkage element. This design ensures a high degree of operational safety and operational reliability.

The linkage element preferably utilizes stop surfaces which cooperate with the latch element in a manner where they are brought into contact with one another. In this way, the steering angle can be limited to a particularly or desired range. This limited range of motion of the steering angle can be realized according to the invention in different ways. The invention contemplates that the available steering angle is freely selectable within a wide desired range. This is of particular advantage to vehicles for children such as tricycles, which may require a steering angle of approximately 45° to each side. Of course, other desirable steering angles can be utilized. However, by designing in the desired limited steering angle, lateral tilting of the tricycle or similar devices can be prevented or their risk significantly reduced. Additionally, the risk of injuries which may be caused by the pedals, e.g., devices which utilize pedals on the front wheel can be reduced. Finally, the risk of injury which can occur when the handlebar exceeds a controlled steering angle can be ruled out to a considerable extent.

The invention also provides for a linkage element having a locking element which is releasably connectable to the latch element. This design ensures that when a push rod is used for pushing the device, i.e., a tricycle, the front wheel thereof may be reliably locked in place during straight travel.

In an advantageous embodiment of the invention, the latch element is designed in the form of a pin which extends in a direction transverse to the fork member. The pin may extend through the fork member such that it projects at both sides of the fork member. Alternatively, the pin can project from the fork member on only one side. Moreover, the pin can be firmly connected to the fork member, e.g. by welding or other conventional attachment techniques. Additionally, it may be secured by press fitting with or without utilizing a knurled

portion. Of course, the dimensions of the pin can easily be adapted to the respective conditions of use.

It should be noted that the manufacturing costs of the steering head are reduced by the above-described construction to quite a considerable degree.

In another advantageous embodiment of the invention, the linkage element is substantially designed in the form of a hollow cylinder. Thus, the linkage element can be reliably guided in the support tube and surround the fork member Additionally, the linkage element can be designed as a single integral part or several parts which are either joined together or which cooperate together.

It is advantageous for the longitudinal displacement or movement of the linkage element to be along an axis of the support tube and the fork member. Accordingly, the support tube may comprise at least one longitudinal slot or a similar recess through which a connection element extends which is connected to the linkage element. This design also utilizes a slide which is arranged outside the support tube.

The slide facilitates the ease of handling or movement of the linkage element. In such a design, a displacement of the slide, which may additionally be provided with locking mechanism or fixing safety mechanism, effects a corresponding displacement or movement of the linkage element, The locking mechanism or fixing mechanism allows for fixing the front wheel in a single or set travel position which is preferably straight. Moreover, the invention also contemplates that the linkage element may be provided with inclined inlet surfaces or intercepting mechanisms which engage the latch element so as to initiate a locking action when the front wheel is slightly deflected angularly.

Stop surfaces on the latch element are preferably formed on at least one front attachment of the linkage element. Additionally, it is particularly advantageous when two opposite attachments or stops are in symmetry with each other and are each provided with at least one stop surface located on the linkage element. Thus, by utilizing two attachments or stops which are in symmetry with each other, this design can limit the steering angle in a symmetrical fashion to both the left and the right side.

In another advantageous embodiment of the invention, the associated stop surfaces of the attachments or stops act to limit the rotation of the fork member to a predetermined angular range at both sides. This angular range may e.g. be approximately 45° to both sides, for a total range of motion of approximately 90°.

The locking element is preferably designed in the form of at least one front recess which receives the latch element, Such an advantageous design makes it possible to grip and fix the latch element upon displacement or movement of the linkage element. Additionally, it is advantageous that the recess be retracted or set back relative to the front attachment, so that the attachments or stops can always remain in the plane of the latch element, while upon a displacement of the latch element, it is only the recess which can additionally be brought into engagement.

To implement a simple and operationally reliable structure of the steering head, it may be advantageous for the recess to be centrally arranged between the two attachments or stops.

The invention also contemplates that the fork member itself has not been changed constructionally. In other words, the invention can be adapted to work with a conventional fork member. Also, the invention makes it possible to manufacture all functional parts separately in a very simple manner. As a result, advantageous production costs can be achieved.

In a preferred design of a previously described embodiment, the linkage element is designed as part of a mudguard which extends from below into the support tube. This design allows for significant cost savings since the mudguard is normally made from plastics and is typically already included in most vehicles of the above-described type. The linkage element can thus be mounted on the mudguard or made integrally therewith, in a particularly easy way and at low costs.

A further advantage of the this embodiment is that the latch element can be designed in the form of a bolt which arranged to be parallel with the fork member. The latch element of this design can thus be given relatively large dimensions so that the diameter of the support tube itself need not be chosen with such a large size.

It may be of particular advantage when the latch element is connected to a slide which extends into the support tube so as to be able to design the lock of the front wheel in a particularly simple manner. Furthermore, the locking element may preferably be connected to the slide. Moreover, the locking element serves to reliably maintain the locked state and to prevent any unintended unlocking. The locking element also preferably engages into a recess of a bearing which supports the fork member in the support tube. As a result, it is not necessary to mount additional parts or to take installation measures on the support tube itself.

It may also be of particular advantage for the limitation of the steering angle to be accomplished by a lower bearing which supports the fork member in the support tube. This lower bearing may have formed thereon an attachment which projects in the direction of the linkage element and which can be brought into contact with the stop surfaces formed on the linkage element and thus on the mudguard. This design has the advantageous effect that the predetermined angular range can be limited at both sides as well, e.g. approximately 45° each side.

The invention provides a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured the steering head including a latch element projecting from the fork member and disposed within the support tube, and a linkage element disposed within the support tube, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member and comprises at least one stop surface for limiting a rotation of the fork member when the latch element contacts the at least one stop surface, The linkage element may further comprise at least one locking element for locking the fork member in a single position. The at least one locking element may releasably engage the latch element when the fork member is locked. The latch element may comprise a pin. The pin may project substantially perpendicular to the axis of the fork member. The linkage element may comprise a substantially cylindrical shape. The linkage element may comprise a plurality of hollow chambers separated by connecting walls. The support tube may comprise an opening which allows a connecting element to pass therethrough. The opening may comprise a longitudinal slot. The connecting element may be secured to the linkage element, The movement of the linkage element may be limited by the movement of the connecting element within the longitudinal slot. The steering head may further comprise a slide which is secured to the connecting element, the slide being disposed adjacent an outer surface of the support tube. The at least one stop surface may be disposed on at least one stop.

The at least one stop may comprise a projection which extends from the linkage element. The at least one stop may comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The at least one stop may comprise two stops which are disposed opposite one another.

Each stop may comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The two stops may define a limited range of rotational motion of the fork member in each of a clockwise and a counter-clockwise direction. The limited range of motion in the clockwise direction may be substantially equal to the range of motion in the counter-clockwise direction. The limited range of motion in one of the clockwise and counter-clockwise direction may be approximately 45 degrees.

The linkage element may further comprise at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element. The at least one recess is set back some distance from a surface of at least one stop. The at least one recess is centrally disposed between at least two stops.

The steering head may further comprise an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tuber each of the upper and lower bearings having an opening which allows the fork member to pass therethrough.

The steering head may be disposed on a tricycle frame.

The invention also provides for a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork member, and a linkage element connected to the fork member so as to rotate therewith, the linkage element comprising at least one stop surface, wherein the at least one stop surface limits the rotation of the fork member with respect to the support tube The steering head may further comprise a slide, wherein the slide is disposed within the support tube and retains the latch element. The slide may further comprise at least one locking element for releasably securing the slide to the support tube. The linkage element may comprise a mudguard. The mudguard may be disposed between one end of the support tube and a wheel fork. The latch element may comprise a rod like member which is arranged substantially parallel to the axis of the fork member. The rod like member may comprise one of a bolt and a pin. The latch element may be connected to a slide, the slide being disposed within the support tube. The slide may be moveable substantially parallel to the axis of the fork member. A locking element may be connected to the slide.

The steering head may further comprise a bearing support disposed on at least one end of the support tube. The bearing support may be disposed on a lower end of the support tube. The steering head may further comprise a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support. The bearing support may comprise at least one stop, the at least one stop comprising at least one surface which engages the linkage element. The at least one stop may comprise a projection which engages a recess in the linkage element. The projection and the recess may cooperate to limit the rotational movement of the fork member within a desired range. The range of the rotational movement may be limited by at least two stop surfaces. The at least two stop surfaces may define a limited range of rotation in one of a clockwise and a counter-clockwise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counter-clockwise direction. The limited range of rotation between the at least two stops may be approximately 45 degrees.

The steering head may be disposed on a tricycle frame.

The invention further provides for a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The fork member comprises a fork end, a handlebar, and a latch element projecting from the fork member between the fork end and the handlebar end. The latch element is disposed within the support tube and a linkage element is slidably disposed within the support tube. The linkage element comprises at least one stop surface for engaging the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element and the at least one stop cooperate to limit the rotational movement of the fork member to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element.

The invention also relates to a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The lower bearing support comprises at least one stop surface. the fork member comprising a fork end. a handlebar, and a latch element which is slidably disposed adjacent the fork member between the fork end and the handlebar end, the latch element being disposed within the support tube and a linkage element moveably disposed adjacent the lower support bearing. The linkage element comprises at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element. wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element engages only the lower bearing support and where the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork member to a second position where the latch element releasably engages a recess in the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element. The linkage element may further comprise at least one locking element for engaging a locking recess in the lower bearing support. The at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

The invention provides for a vehicle steering head including a fork member adapted to engage a handlebar, a support tube which rotatably supports the fork member, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork member from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork member to rotate with respect to the support tube in at least two directions. The latch element may comprise a rod-like member.

The invention also provides for a vehicle steering head that includes a support tube adapted to be coupled to a vehicle frame, an upper bearing support arranged at an upper end of the support tube, a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface, a cylindrical element rotatably mounted to the support tube via the upper and lower bearing supports, the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar, a latch element movably disposed within the support tube, a slide coupled to the latch element, the latch element being movable from outside the support tube, a linkage element that is rotatable with respect to the support tube, and the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube, wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, a mechanism which limits the rotational movement of the fork member in each of two directions, and a lower bearing support mounted to the support tube, wherein the mechanism and the lower bearing support cooperate to limit the rotational movement of the fork member.

The lower bearing support may be non-rotatably fixed to the support tube. The lower bearing support may comprise at least one stop surface The lower bearing support may comprise two stop surfaces. The mechanism may comprise at least one stop surface. The mechanism may comprise two stop surfaces. The mechanism may comprise a linkage element having at least one stop surface. The linkage element may rotate with the fork member. The linkage element may be arranged on a mudguard. The fork member may be cylindrically shaped. The steering head may further comprise a handlebar connected to one end of the fork member and a wheel fork connected to another end of the fork member.

The invention also provides a vehicle steering head comprising a support tube adapted to be fixed to a frame, a cylindrical member adapted to connect a wheel fork to a handlebar, the cylindrical member being rotatable with respect to the support tube, a linkage element being movable and comprising at least two stop surfaces, wherein one of the at least two stop surfaces limits the rotation of the cylindrical member in one direction, and wherein another of the at least two stop surfaces limits the rotation of the cylindrical member in another direction.

The linkage element may rotate with the cylindrical member. The linkage element may rotate with a mudguard.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a connecting element adapted to connect a wheel fork to a handlebar, the connecting element being rotatable with respect to the support tube, a linkage element being rotatable and comprising at least two stop surfaces, a mudguard that rotates with the linkage element, one of the at least two stop surfaces limiting the rotation of the connecting element in one direction, and another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, and a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

FIG. **1** is a schematic side view of a children's tricycle with one embodiment of the vehicle steering head according to the invention;

FIG. **2** is a simplified sectional side view of the steering head according to the invention in an unlocked state;

FIG. **3** is a side view, turned or oriented by 90° (a right angle) of the arrangement shown in FIG. **2**;

FIG. **4** is a sectional side view similar to FIG. **2**, in the locked state;

FIG. **5** is a side view, similar to FIG. **3**, of the view according to FIG. **4**;

FIG. **6** is a simplified perspective illustration of the linkage element according to the invention;

FIG. **7** is a schematic side view of a children's tricycle with another embodiment of the vehicle steering head according to the invention;

FIG. **8** is a sectional side view of the vehicle steering head according to the invention, in the unlocked state;

FIG. **9** is a side view, turned or oriented by 90° of the arrangement shown in FIG. **8**;

FIG. **10** is a sectional side view similar to FIG. **8**, in the locked state;

FIG. **11** is a side view, turned or oriented by 90° which is similar to FIG. **9**, in the locked state;

FIG. **12** is a top view on the linkage element according to the invention and on the associated mudguard;

FIG. **13** is a sectional view of the arrangement according to FIG. **12** along the sectional lines XIII-XIII of FIG. **12**;

FIG. **14** is an enlarged side view showing a portion of the slide and of the locking element in the locked state;

FIG. **15** is a view analogous to FIG. **14**, in the unlocked state;

FIG. **16** is a top view on the slide; and

FIG. **17** is a top view on the lower bearing.

DETAILED DESCRIPTION OF THE INVENTION

The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

A children's tricycle is shown in FIG. **1** and comprises a front wheel **14** which is supported on a wheel fork **4**. Wheel fork **4** is fixedly connected to a fork member **3**. A handlebar (not shown) can be secured to the upper end of fork member **3**.

Fork member 3 is supported in a support tube 2. This support is accomplished by utilizing slide bearings 15 and 15' which are shown in detail in FIGS. 2 to 5. The slide bearings 15 and 15' correspond to those of the prior art in this embodiment so that a detailed description is not needed.

Support tube 2 is firmly connected to a frame 16 which has mounted thereon a seat 17. The tricycle also has a rear axle 18 with rear wheels 19. Accordingly, a support tube 2 and a fork member 3 form a steering head 1.

According to the invention, support tube 2 has arranged therein a linkage element 6 which has a substantially cylindrical configuration (see also FIG. 6) and which is received with a play or clearance (so that it can slide) within support tube 2. Linkage element 6 is also provided with a central recess through which fork member 3 extends or passes.

Support tube 2 also has formed therein a longitudinal slot 9 through which a connection element 10 extends or passes. This connection element 10 is connected to a slide 11 and linkage element 6. The connection may be via a screw 4 20 (see FIGS. 2 and 4) or other conventional connecting mechanism. In the illustrated embodiment, connection element 10 is integrally connected to or formed with slide 11 and extends in a recess 21 of linkage element 6. However, connection element 10 and slide 11 may be made as separate components which are joined or secured together by any conventional attachment technique including a screw or threaded element.

On its front upper portion, linkage element 6 comprises two symmetrical opposite attachments or stops 12. Each of these stops 12 may be provided with lateral stop surfaces 7. When viewed from the top, these attachments or stops 12 are designed in a manner of a segment of a partial circle (pie shaped or wedge shaped), so that four stop surfaces 7 are formed, with each one being arranged in symmetry with one another. Of course, stops 12 may be separately formed and attached to linkage element 6 instead of being integrally formed therewith, as is shown.

In the illustrated embodiment two locking elements 8 may be utilized in which each is formed by a recess 13. These locking elements 8 are preferably provided on linkage element 6 in retracted or set back manner with respect to stops 12. As is apparent from FIG. 6, the walls of at least one recess 13 may be made resilient to ensure a releasable locking of a bolt-like latch element 5 when linkage element 6 is pushed upwards or into engagement with bolt-like latch element 5

As is apparent from FIGS. 2 to 5, fork member 3 is provided with a bolt-like or pin-like latch element 5 which extends or projects from at least one and preferably both sides of fork member 3. Of course, latch element 5 may be integrally formed with fork member. Alternatively, latch element 5 may be a threaded or partially threaded member which threads into fork member 3. However, it is preferred that latch element 5 be a pin having a centrally disposed exterior knurl which is press fit into a fork member as is shown. In its working position, latch element 5 rotates with fork member 3 when a deflection or rotation of the handlebar takes place. The deflection of the handlebar is limited by way of latch element 5 abutting on stop surfaces 7, these stop surfaces 7 defining the limited range of motion of the handlebar.

When it is desired to lock the handlebar in a set position, latch element 5 is pressed or forced into recesses 13. This engagement occurs when locking element 8, which is disposed on linkage element 6, is pushed upwards by slide 11. Recesses 13 also utilize inclined inlet surfaces because they act as guiding lead-in surfaces which facilitate entry of pin 5 into recess 13. In the locked state, which is shown in FIGS. 4 and 5, a steering movement thus becomes impossible since the handlebar or fork member 3 is locked in a single direction.

FIGS. 2 and 3 show a downwardly displaced condition of linkage element 6 in which latch element 5 is in a position which it does not cooperate with the locking element B. As a result, in this position fork member 3 and handlebar are free to rotate until latch element 5 abuts on stop surfaces 7, this range of movement or rotation corresponding to a steering angle range.

According to a preferred aspect of the invention, linkage element 6 may be made from a plastic material. Of course, other materials are also contemplated.

Another embodiment of the vehicle steering head according to the invention is described with reference to FIGS. 7 to 16. In this regard, like parts are provided with like reference numerals.

As for the description of FIG. 7, reference can be made to the description of FIG. 1 to the extent that the same features are shown. The subsequent figures are illustrations elucidating the details which have been changed.

As in FIGS. 2 to 5, FIGS. 8 and 9 and 10 and 11, respectively, are illustrations showing the vehicle steering head on an enlarged scale. Again, like parts are here also provided with like reference numerals, so that reference can be made to the preceding explanations. Slide 11 utilizes connection element 10 and screw 20. Connection element 10 also extends through a longitudinal slot 9 Moreover, slide 11 comprises an outer grip portion 11 and an interior portion 11' which is screwed to outer grip portion 11 by a screw 20. A top view of slide 11 and 11' is shown in FIG. 16, As can be seen in this figure, a central recess 24 is provided through which fork member 3 extends or passes (with a clearance which allows slide 11' to move up and down with respect to fork member 3). Furthermore, slide 11' also has a recess (see FIGS. 9, 11 and 16) which is formed so that it can accept a bolt-like latch element 5'. Of course, this latch element 5' may be pressed into this recess, threaded into the recess, or otherwise secured to slide 11' in a suitable manner. Alternatively, latch element 5' may be integrally formed with slide 11'.

As already described in conjunction with a previous embodiment, a bearing 15 which serves as a slide bearing is used on the upper portion of steering head 1.

Lower bearing 15' in this embodiment is configured such that it has an upwardly projecting contour of a linkage element 6' which can extend into bearing 15' Of course, the bearing and the upwardly projecting contour may be made as separate components which are joined together by conventional techniques rather than integrally formed as is shown. Additionally, as becomes apparent in FIG. 12, linkage element 6' may have a recess 25 into which latch element 5' can be inserted (see also FIGS. 9 and 11).

As can further be seen from the top view of FIG. 12, linkage element 6' comprises two lateral stop surfaces 7 which are angularly spaced apart from each other. This design is such that a downwardly oriented attachment or stop 26 (see FIGS. 8 to 11) of the bearing 15', which is connected to support tube 2, forms a steering limitation of plus/minus approximately 45°. Of course, as with the previous embodiment, the range of steering limitation can be designed to any desired range.

FIG. 13 shows a lateral sectional view of mudguard 22 and of linkage element 6'. Note that these components are integrally formed as a single member which reduces manufacturing costs associated with joining two separate components.

FIGS. 14 and 15 are front views of slide 11' wherein handpiece 11 has been removed to illustrate the operation of locking element 8'. Locking element 8' is U-shaped and includes two movable or flexible lateral legs which can releasably be inserted into a recess 23 of bearing 15'. Upon insertion and locking, locking element 8' is pressed against an undercut and

thereby held in position inside recess **23**. Accordingly, when it is desired to release the locked state of fork member **3'** slide **11'** must be pushed upwards which removes the legs from recess **23**. Of course, other locking mechanisms may be utilized and this embodiment is not limited to the use of this particular locking mechanism. For example, a pin may be used which has a floating ring disposed around its circumference. Alternatively, other conventional releasable locking mechanisms may be utilized.

FIG. **17** is a top view on lower bearing **15'** on an enlarged scale. The (downwardly projecting) attachment or stop **26** can be seen here as can recess **23** which receives locking element **8'**. Moreover, recess **27** is adapted to receive and guide bolt-like latch element **5'** therein. Furthermore, a surrounding collar-like edge **28** can be seen in which **29** designates two oppositely disposed attachments or projections which serve as anti-rotation engagements. These engagements are designed to engage recesses (not shown) of support tube **2**. Of course, lower bearing may be secured to support tube **2** in any conventional manner such as by bonding, welding, or screws. Moreover, this attachment may be releasable or more permanent in nature.

It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

What is claimed:

1. A vehicle steering head for a tricycle, comprising:
- a support tube adapted to be fixed to a frame;
- a connecting member adapted to connect a wheel fork to a handlebar;
- an upper bearing support mounted to an upper end of the support tube;
- a lower bearing support mounted to a lower end of the support tube and comprising a recess;
- the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports;
- a mudguard comprising an integrally formed projection; and
- a movement limiting system limiting the rotational movement of the connecting member in each of two directions when stop surfaces of the projection engage stop surfaces of the recess.

2. The steering head of claim **1**, wherein the mudguard rotates with the connecting member.

3. The steering head of claim **1**, wherein the connecting member is cylindrically shaped.

4. The steering head of claim **1**, further comprising a handlebar connected to one end of the connecting member and a wheel fork connected to another end of the connecting member.

5. The steering head of claim **4**, wherein the mudguard is arranged between the wheel fork and the lower bearing support.

6. A vehicle steering head for a tricycle, comprising:
- a hollow support;
- a connecting member adapted to connect a wheel fork to a handlebar;
- the connecting member being rotatably mounted to the hollow support; and
- a pin arranged within the hollow support and being structured and arranged to move parallel to an axis of the connecting element,
- wherein the vehicle steering head is structured and arranged to limit rotational movement of the connecting member in each of two directions.

7. The steering head of claim **6**, further comprising an upper bearing support arranged on an upper end of the hollow support.

8. The steering head of claim **7**, further comprising a lower bearing support arranged on a lower end of the hollow support.

9. The steering head of claim **8**, wherein the connecting member is rotatably mounted to the hollow support via the upper and lower bearing supports.

10. The steering head of claim **6**, wherein the connecting member is cylindrically shaped.

11. The steering head of claim **6**, further comprising a handlebar connected to one end of the connecting member and a wheel fork connected to another end of the connecting member.

12. A tricycle steering head, comprising:
- a hollow support;
- a connecting member connecting a wheel fork to a handlebar;
- the connecting member being rotatably mounted to the hollow support; and
- a pin arranged within the hollow support and being structured and arranged to move parallel to an axis of the connecting element,
- wherein the vehicle steering head is structured and arranged to limit rotational movement of the connecting member in each of two directions.

13. The steering head of claim **12**, wherein the connecting member is rotatably mounted to upper and lower bearing supports of the hollow support.

14. The steering head of claim **12**, wherein the connecting member is cylindrically shaped.

15. A vehicle steering head for a tricycle, comprising:
- a support tube adapted to be fixed to a frame;
- a connecting member adapted to connect a wheel fork to a handlebar;
- an upper bearing support mounted to an upper end of the support tube;
- a lower bearing support mounted to a lower end of the support tube and comprising a recess;
- the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports;
- a mudguard; and
- a projection which rotates with the connecting member, is oriented upwardly, and extends into the recess of the lower bearing support,
- wherein the projection and recess limit rotational movement of the connecting member in each of two directions.

16. The steering head of claim **15**, wherein an upper portion of the projection extends into the support tube.

17. The steering head of claim **15**, wherein the recess is an arcuate recess.

18. The steering head of claim 15, wherein the mudguard is arranged between the wheel fork and the lower bearing support and the lower bearing support is non-rotatably mounted to the lower end of the support tube.

19. The steering head of claim 15, further comprising a locking system for preventing rotational movement of the connecting member.

20. A vehicle steering head for a tricycle, comprising:

a support tube adapted to be fixed to a frame;

a connecting member adapted to connect a wheel fork to a handlebar;

an upper bearing support mounted to an upper end of the support tube;

a lower bearing support mounted to a lower end of the support tube and comprising an arcuate recess;

the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports;

a projection which rotates with the connecting member, extends upwardly, and is oriented to extend into the recess of the lower bearing support,

wherein the projection and recess limit rotational movement of the connecting member in each of two directions.

21. The steering head of claim 20, wherein an upper portion of the projection extends into the support tube.

22. The steering head of claim 20, further comprising a mudguard and a locking system for preventing rotational movement of the connecting member.

23. The steering head of claim 20, further comprising a locking system for preventing rotational movement of the connecting member.

24. The steering head of claim 20, wherein the lower bearing support is non-rotatably mounted to the lower end of the support tube.

* * * * *

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(12) **United States Patent**
Kettler

(10) **Patent No.: US 6,378,884 B1**
(45) **Date of Patent: Apr. 30, 2002**

(54) **VEHICLE STEERING HEAD**

(75) Inventor: **Heinz Kettler**, Ense-Parsit (DE)

(73) Assignee: **Heinz Kettler GmbH & Co.**, Ense-Parsit (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 09/584,497

(22) Filed: Jun. 1, 2000

(30) **Foreign Application Priority Data**

Jul. 5, 1999 (DE) 299 11 652

(51) **Int. Cl.**[7] B62K 5/02
(52) **U.S. Cl.** 280/279; 74/495; 280/272
(58) **Field of Search** 280/279, 272, 280/271, 282, 89; 403/354, 83; 74/495

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Primary Examiner—Avraham Lerner
Assistant Examiner—Tony Winner
(74) *Attorney, Agent, or Firm*—Greenblum & Bernstein P.L.C.

(57) **ABSTRACT**

A vehicle steering head including a fork tube adapted to engage a handlebar, a support tube which rotatably supports the fork tube, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork tube from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork tube to rotate with respect to the support tube in at least two directions.

58 Claims, 9 Drawing Sheets

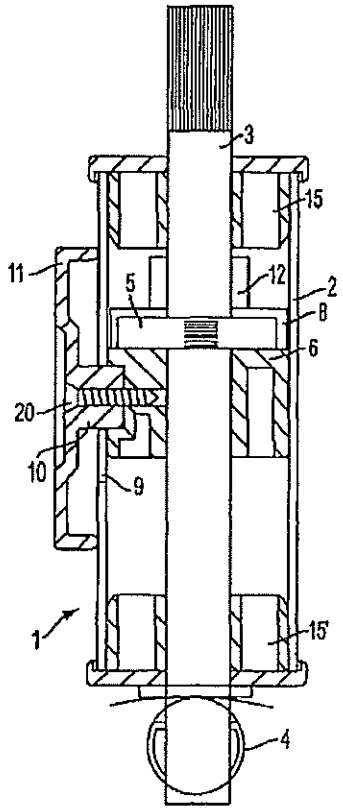


EXHIBIT
2

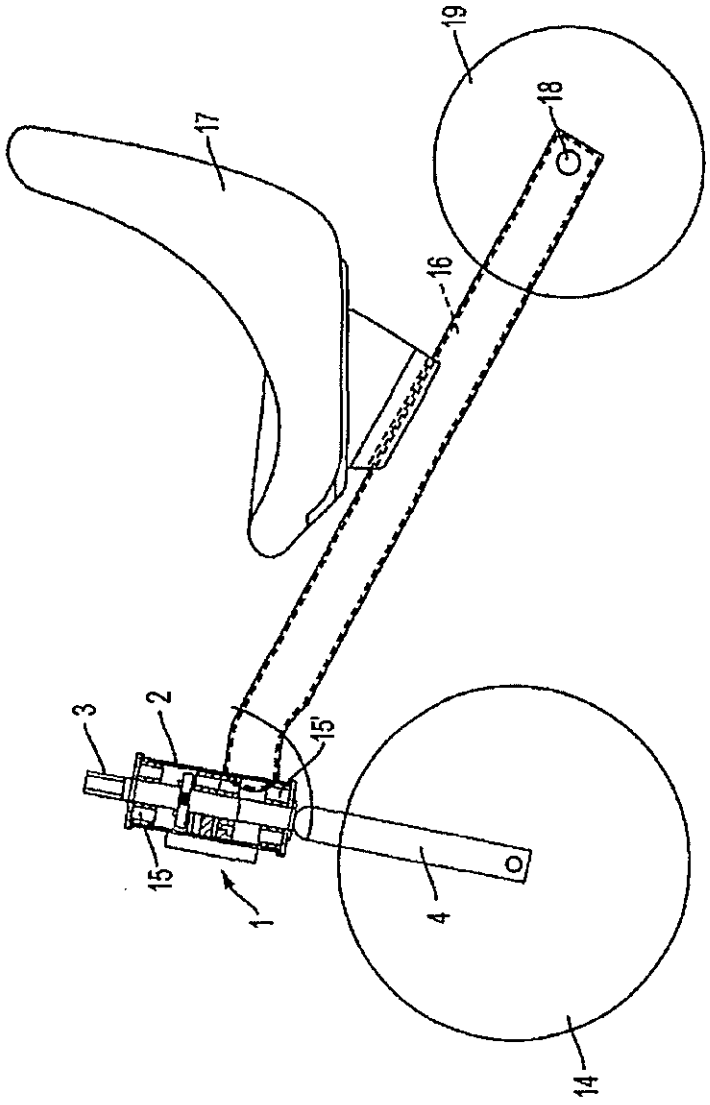


FIG. 1

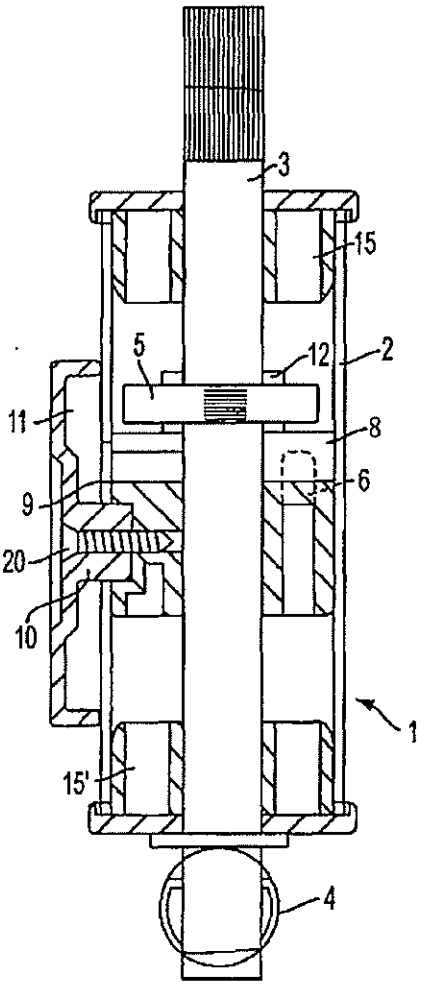


FIG. 2

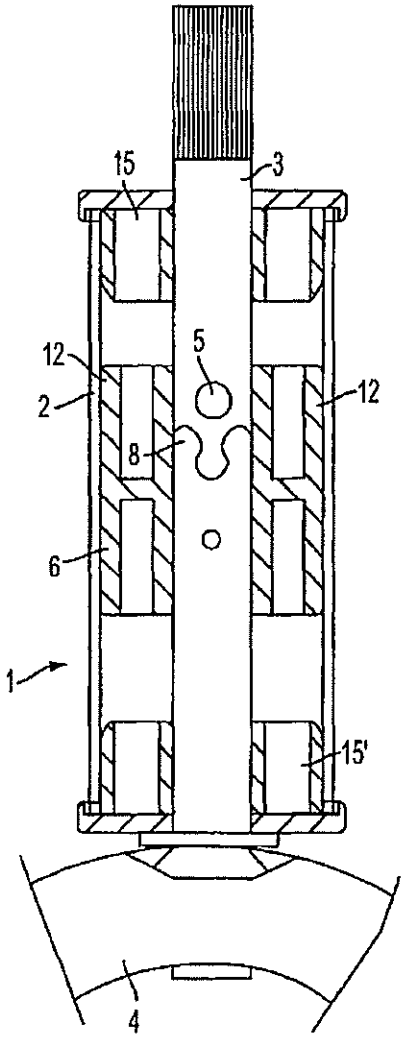


FIG. 3

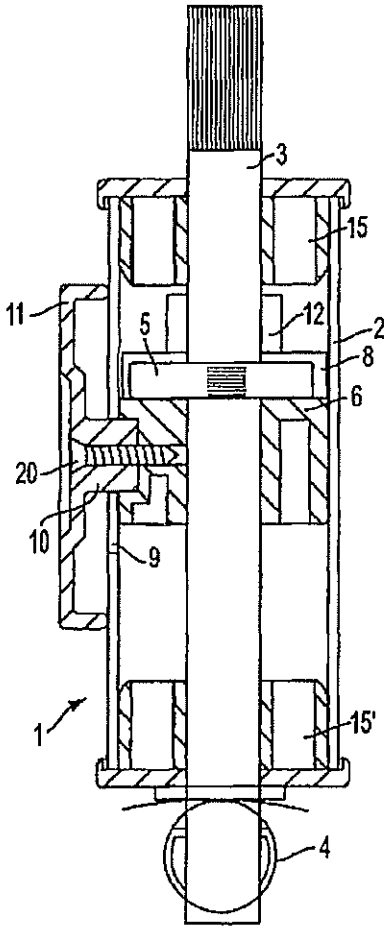


FIG. 4

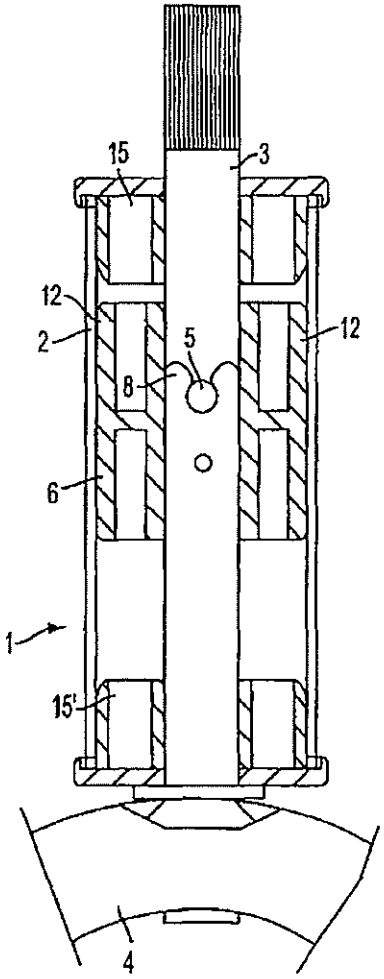


FIG. 5

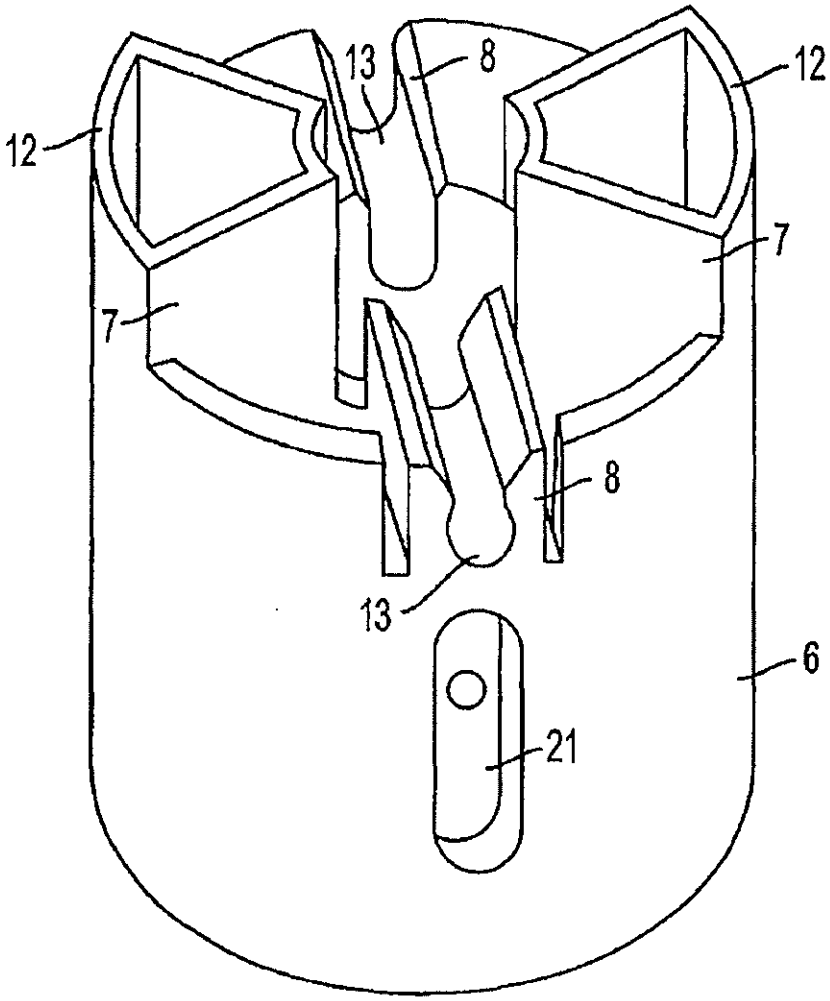


FIG. 6

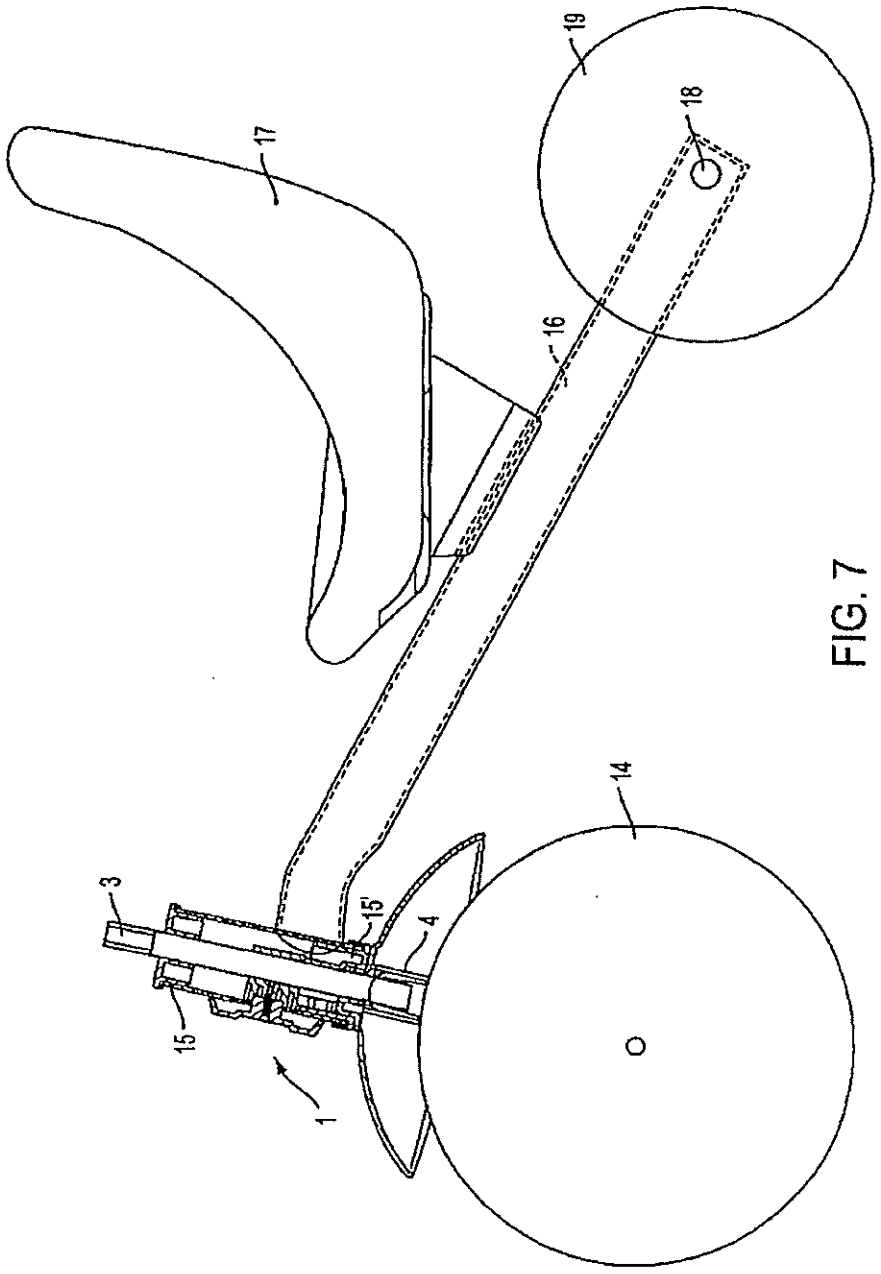


FIG. 7

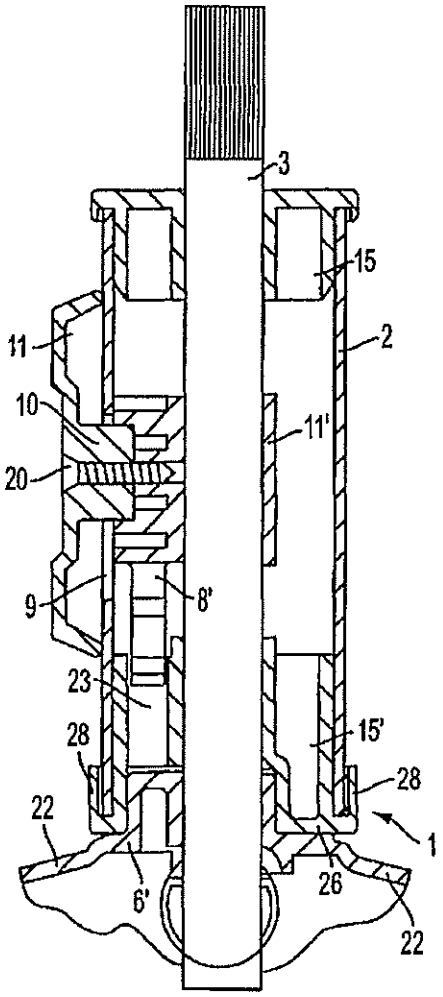

3
15
2
11
10
11'
20
9
8'
23
28
15'
28
22
1
6'
26
22

FIG. 8

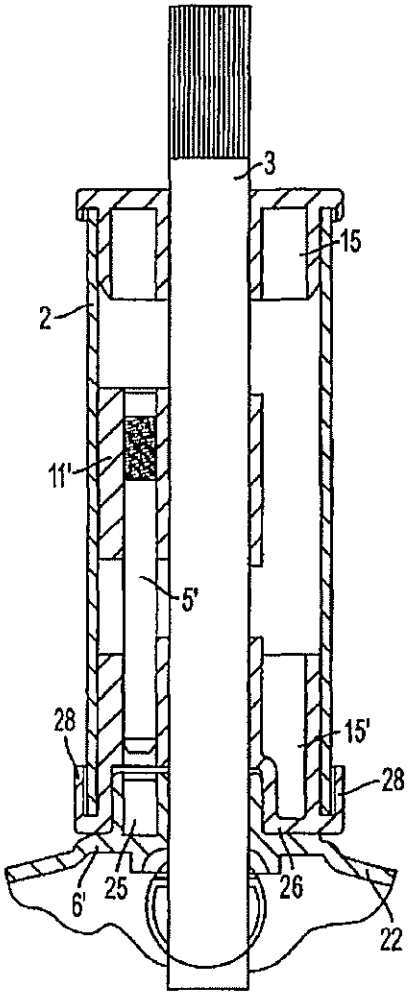

3
15
2
11'
5'
28
15'
28
6'
25
26
22

FIG. 9

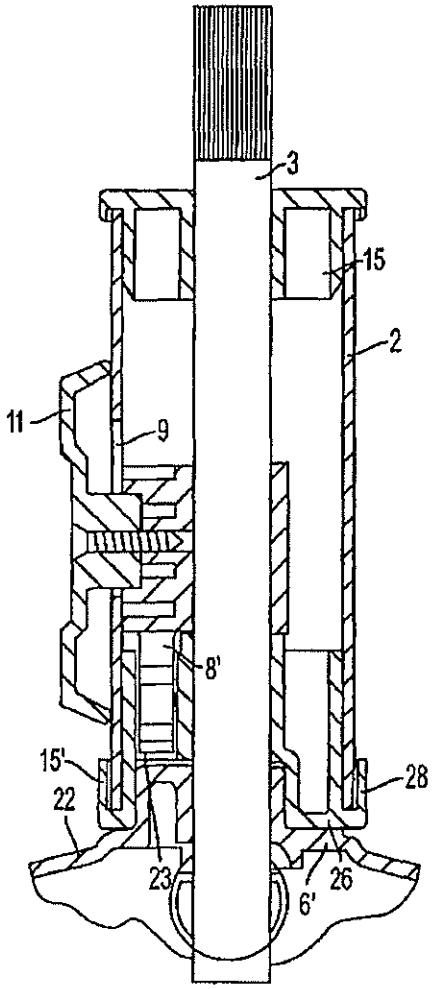


FIG. 10

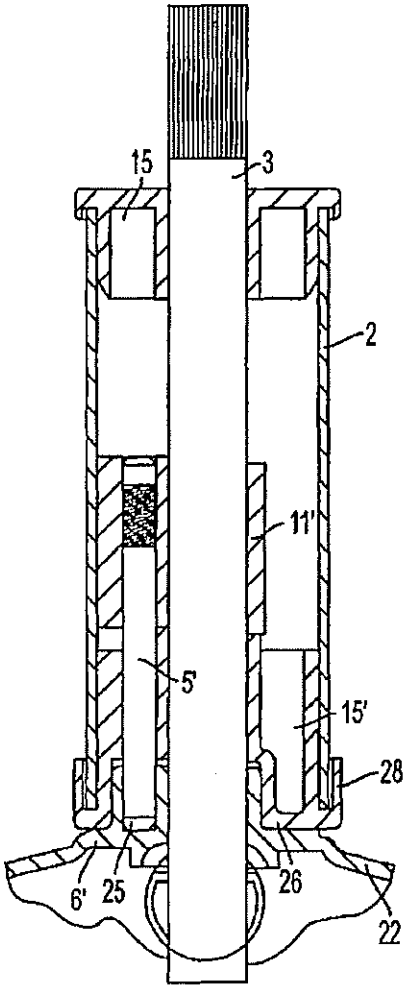


FIG. 11

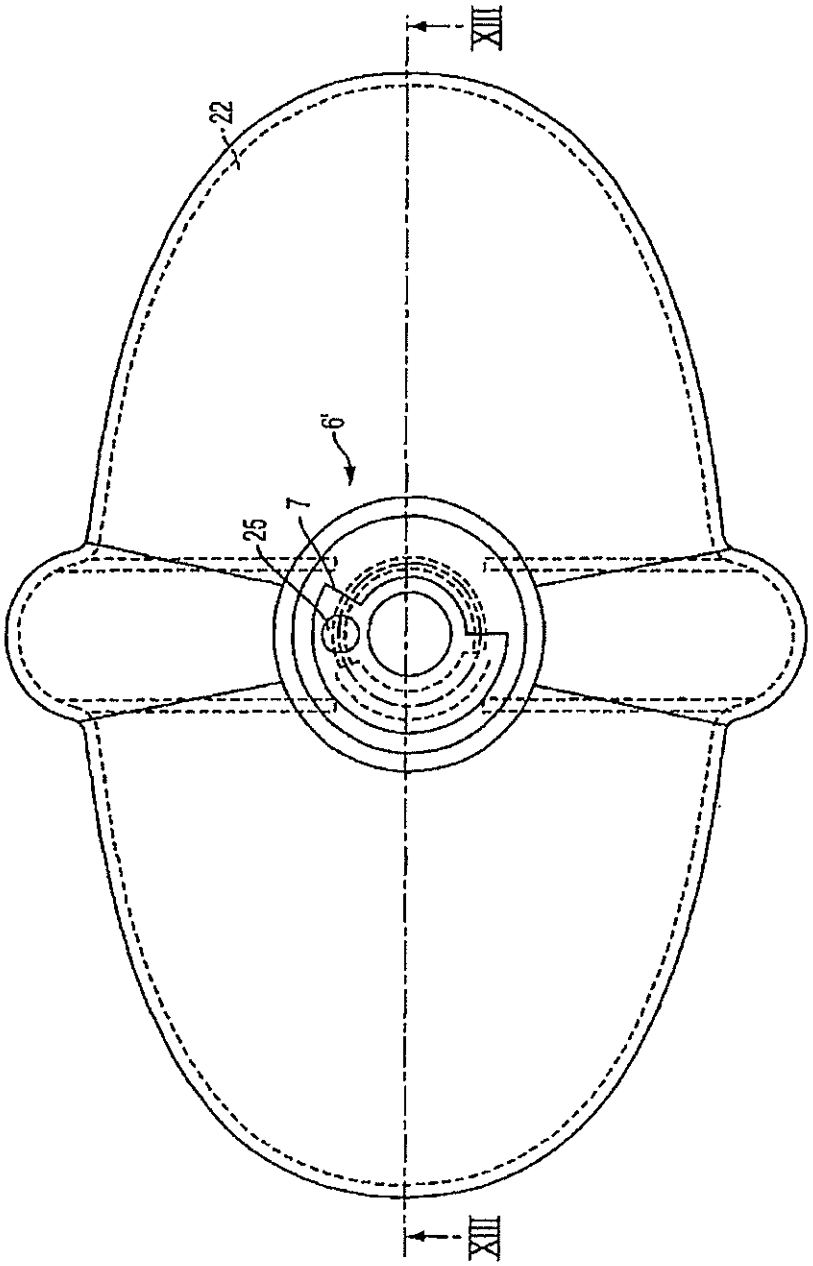


FIG. 12

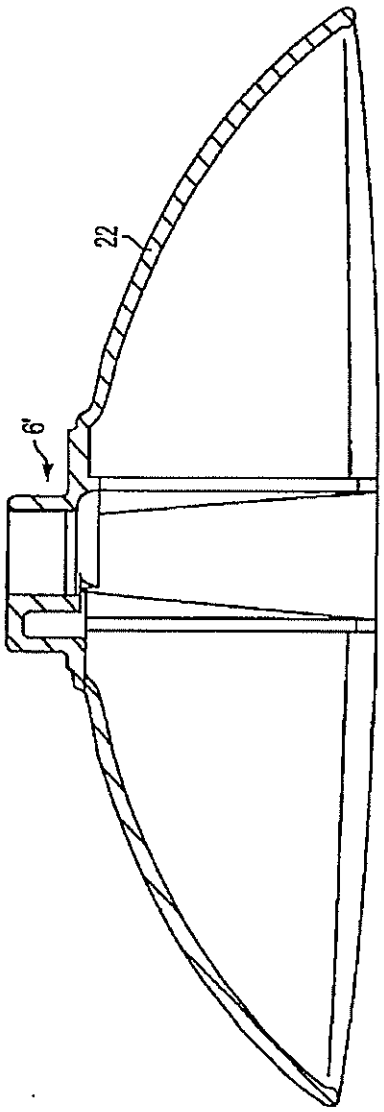


FIG. 13

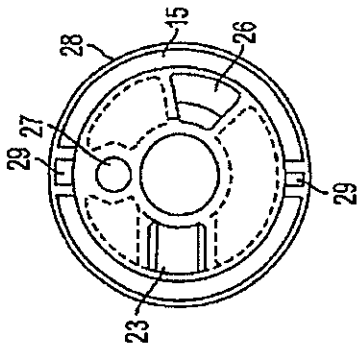


FIG. 17

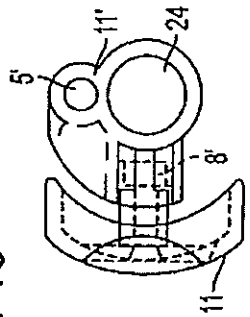


FIG. 16

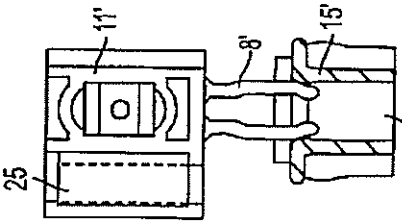


FIG. 15

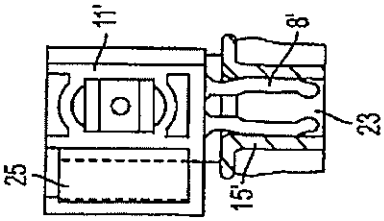


FIG. 14

VEHICLE STEERING HEAD

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims priority under 35 U.S.C. §119 of German Patent Application No. 299 11 652.2, filed on Jul. 5, 1999, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle steering head and in particular, to a steering head for a vehicle comprising a support tube which has rotatably supported therein a fork tube to which a wheel cover and a handlebar can be secured.

2. Discussion of Background Information

Vehicle steering heads of the above-described type are in particular used in bicycles or tricycles, and in particular in tricycles or bicycles for children.

In devices of the above-described type it is desirable for safety reasons that accidents be avoided which may be caused by an excessively large handlebar deflection. It has been found that when there is an excessively large handlebar deflection (e.g., the handle bar rotates beyond a point where effective steering occurs), the vehicle may tilt to the side. Moreover, such deflections or excessive rotation may run the risk that a user impacts his body against the handlebar. Additionally, the user may get caught with his/her feet in the front wheel and may be even be injured by the pedals.

A further drawback or disadvantage of prior-art devices occurs when they are pushed with a push rod type device. In such cases, these devices have a tendency towards uncontrolled steering movements of the front wheel which cannot be mastered or effectively controlled by small children, in particular.

SUMMARY OF THE INVENTION

The present invention therefore provides a vehicle steering head of the above-mentioned type which is of a simple construction and which can operate in an easy and reliable manner. Moreover, this design avoids the drawbacks of the prior art and can in particular limit a handlebar deflection to a desired degree. The invention also has provision for locking the handlebar.

According to one aspect of the invention a latch element is secured to a fork tube on a portion provided inside the support tube. A linkage element is supported in the support tube for rotation therewith. The linkage element is displaceable or moveable in a longitudinal direction of the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork tube and can be brought into contact with the latch element. Moreover, the linkage element comprises at least one locking element which is releasably connectable to the latch element.

According to another aspect of the invention a latch element is supported on the support tube. A linkage element is arranged on the fork tube and connected to the tube for rotation therewith. The latch element is freely displaceable or moveable along the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork tube and can be brought into contact with the support tube. Moreover, at least one latch element is provided that is releasably connectable to the support tube.

The vehicle steering head according to the invention is characterized by a number of considerable advantages.

First of all, it is possible to install or utilize the steering head in a frame of any desired design, e.g. children's bicycles or tricycles. Ideally, the dimensions of the steering head are such that they do not interfere with the remaining structure of the frame within which it is installed. Of course, the steering head may be combined with any and all common types of frames where ever its advantageous design is desired. Accordingly, the steering head may be utilized in a variety of devices where limited deflection or rotation and/or locking are desired.

Because the invention utilizes a latch element which is arranged in the support tube, no functional parts of the steering head need be outwardly visible or accessible. Accordingly, the internal parts are less susceptible to damage. Additionally, this design is less likely to cause injury when used by children or infants.

As a result of utilizing a linkage element according to the invention, it is possible to reliably lock the fork tube and thus the wheel fork and the front wheel. Such a locking provision is easily be accomplished by displacing or moving the linkage element. This design ensures a high degree of operational safety and operational reliability.

The linkage element preferably utilizes stop surfaces which cooperate with the latch element in a manner where they are brought into contact with one another. In this way, the steering angle can be limited to a particularly or desired range. This limited range of motion of the steering angle can be realized according to the invention in different ways. The invention contemplates that the available steering angle is freely selectable within a wide desired range. This is of particular advantage to vehicles for children such as tricycles, which may require a steering angle of approximately 45° to each side. Of course, other desirable steering angles cab be utilized. However, by designing in the desired limited steering angle, lateral tilting of the tricycle or similar devices can be prevented or its risk significantly reduced. Additionally, the risk of injuries which may be caused by the pedals, e.g., devices which utilize pedals on the front wheel can be reduced. Finally, the risk of injury which can occur when the handlebar exceeds a controlled steering angle can be ruled out to a considerable extent.

The invention also provides for a linkage element having a locking element which is releasably connectable to the latch element. This design ensures that when a push rod is used for pushing the device, i.e., a tricycle, the front wheel thereof may be reliably locked in place during straight travel.

In an advantageous embodiment of the invention, the latch element is designed in the form of a pin which extends in a direction transverse to the fork tube. The pin may extend through the fork tube such that it projects at both sides of the fork tube. Alternatively, the pin can project from the fork tube on only one side. Moreover, the pin can be firmly connected to the fork tube, e.g. by welding or other conventional attachment techniques. Additionally, it may be secured by press fitting with or without utilizing a knurled portion. Of course, the dimensions of the pin can easily be adapted to the respective conditions of use.

It should be noted that the manufacturing costs of the steering head are reduced by the above-described construction to quite a considerable degree.

In another advantageous embodiment of the invention, the linkage element is substantially designed in the form of a hollow cylinder. Thus, the linkage element can be reliably guided in the support tube and surround the fork tube. Additionally, the linkage element can be designed as a single

integral part or several parts which are either joined together or which cooperate together.

It is advantageous for the longitudinal displacement or movement of the linkage element to be along an axis of the support tube and the fork tube. Accordingly, the support tube may comprise at least one longitudinal slot or a similar recess through which a connection element extends which is connected to the linkage element. This design also utilizes a slide which is arranged outside the support tube.

The slide facilitates the ease of handling or movement of the linkage element. In such a design, a displacement of the slide, which may additionally be provided with locking mechanism or fixing safety mechanism, effects a corresponding displacement or movement of the linkage element. The locking mechanism or fixing mechanism allows for fixing the front wheel in a single or set travel position which is preferably straight. Moreover, the invention also contemplates that the linkage element may be provided with inclined inlet surfaces or intercepting mechanisms which engage the latch element so as to initiate a locking action when the front wheel is slightly deflected angularly.

Stop surfaces on the latch element are preferably formed on at least one front attachment of the linkage element. Additionally, it is particularly advantageous when two opposite attachments or stops are in symmetry with each other and are each provided with at least one stop surface located on the linkage element. Thus, by utilizing two attachments or stops which are in symmetry with each other, this design can limit the steering angle in a symmetrical fashion to both the left and the right side.

In another advantageous embodiment of the invention, the associated stop surfaces of the attachments or stops act to limit the rotation of the fork tube to a predetermined angular range at both sides. This angular range may e.g. be approximately 45° to both sides, for a total range of motion of approximately 90°.

The locking element is preferably designed in the form of at least one front recess which receives the latch element. Such an advantageous design makes it possible to grip and fix the latch element upon displacement or movement of the linkage element. Additionally, it is advantageous that the recess is retracted or set back relative to the front attachment, so that the attachments or stops can always remain in the plane of the latch element, while upon a displacement of the latch element, it is only the recess which can additionally be brought into engagement.

To implement a simple and operationally reliable structure of the steering head, it may be of advantage that the recess be centrally arranged between the two attachments or stops.

The invention also contemplates that the fork tube itself has not been changed constructionally. In other words, the invention can be adapted to work with a conventional fork tube. Also, the invention makes it possible to manufacture all functional parts separately in a very simple manner. As a result, advantageous production costs can be achieved.

In a preferred design of a previously described embodiment, the linkage element is designed as part of a mudguard which extends from below into the support tube. This design allows for significant cost savings since the mudguard is normally made from plastics and is typically already included in most vehicles of the above-described type. The linkage element can thus be mounted on the mudguard or made integrally therewith, in a particularly easy way and at low costs.

A further advantage of the this embodiment is that the latch element can be designed in the form of a bolt which arranged to be parallel with the fork tube. The latch element of this design can thus be given relatively large dimensions so that the diameter of the support tube itself need not be chosen with such a large size.

It may be of particular advantage when the latch element is connected to a slide which extends into the support tube so as to be able to design the lock of the front wheel in a particularly simple manner. Furthermore, the locking element may preferably be connected to the slide. Moreover, the locking element serves to reliably maintain the locked state and to prevent any unintended unlocking. The locking element also preferably engages into a recess of a bearing which supports the fork tube in the support tube. As a result, it is not necessary to mount additional parts or to take installation measures on the support tube itself.

It may also be of particular advantage for the limitation of the steering angle to be accomplished by a lower bearing which supports the fork tube in the support tube. This lower bearing may have formed thereon an attachment which projects in the direction of the linkage element and which can be brought into contact with the stop surfaces formed on the linkage element and thus on the mudguard. This design has the advantageous effect that the predetermined angular range can be limited at both sides as well, e.g. approximately 45° each side.

The invention provides of a vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head including a latch element projecting from the fork tube and disposed within the support tube, and a linkage element disposed within the support tube, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube and comprises at least one stop surface for limiting a rotation of the fork tube when the latch element contacts the at least one stop surface. The linkage element may further comprise at least one locking element for locking the fork tube in a single position. The at least one locking element may releasably engage the latch element when the fork tube is locked. The latch element may comprises a pin. The pin may project substantially perpendicular to the axis of the fork tube. The linkage element may comprise a substantially cylindrical shape. The linkage element may comprise a plurality of hollow chambers separated by connecting walls. The support tube may comprise an opening which allows a connecting element to pass therethrough. The opening may comprise a longitudinal slot. The connecting element may be secured to the linkage element. The movement of the linkage element may be limited by the movement of the connecting element within the longitudinal slot. The steering head may further comprise a slide which is secured the connecting element, the slide being disposed adjacent an outer surface of the support tube. The at least one stop surface may be disposed on at least one stop.

The at least one stop may comprise a projection which extends from the linkage element. The at least one stop may comprise wedge-shaped hollow projection having two angled lateral stop surfaces. The at least one stop may comprise two stops which are disposed opposite one another. Each stop may comprise wedge-shaped hollow projection having two angled lateral stop surfaces. The two stops may define a limited range of rotational motion of the fork tube in each of a clockwise and a counter-clockwise direction. The limited range of motion in the clockwise direction may be substantially equal to the range of motion in the counter-clockwise direction. The limited range of motion in one of the clockwise and counter-clockwise direction may be approximately 45 degrees.

The linkage element may further comprise at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element. The at least one recess is set back some distance from a surface of at least one stop. The at least one recess is centrally disposed between at least two stops.

The steering head may further comprise an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tube, each of the upper and lower bearings having an opening which allows the fork tube to pass therethrough.

The steering head may be disposed on a tricycle frame.

The invention also provides for a vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head including a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube, and a linkage element connected to the fork tube so as to rotate therewith, the linkage element comprising at least one stop surface, wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube. The steering head may further comprise a slide, wherein the slide is disposed within the support tube and retains the latch element. The slide may further comprise at least one locking element for releasably securing the slide to the support tube. The linkage element may comprise a mudguard. The mudguard may be disposed between one end of the support tube and a wheel fork. The latch element may comprise a rod like member which is arranged substantially parallel to the axis of the fork tube. The rod like member may comprise one of a bolt and a pin. The latch element may be connected to a slide, the slide being disposed within the support tube. The slide may be moveable substantially parallel to the axis of the fork tube. A locking element may be connected to the slide.

The steering head may further comprise a bearing support disposed on at least one end of the support tube. The bearing support may be disposed on a lower end of the support tube. The steering head may further comprise a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support. The bearing support may comprise at least one stop, the at least one stop comprising at least one surface which engages the linkage element. The at least one stop may comprise a projection which engages a recess in the linkage element. The projection and the recess may cooperate to limit the rotational movement of the fork tube within a desired range. The range of the rotational movement may be limited by at least two stop surfaces. The at least two stop surfaces may define a limited range of rotation in one of a clockwise and a counter-clockwise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counter-clockwise direction. The limited range of rotation between the at least two stops may be approximately 45 degrees.

The steering head may be disposed on a tricycle frame.

The invention further provides for a vehicle steering head including a support tube and fork tube which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube, a lower bearing support disposed at a lower end of the support tube, the fork tube comprising a fork end, a handlebar, and a latch element projecting from the fork tube between the fork end and the handlebar end, the latch element being disposed within the support tube, a linkage element slidable disposed within the support tube, the linkage element comprising at least one stop surface for engaging the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube from a first position where the latch element and the at least one stop cooperate to limit the rotational movement of the fork tube to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork tube is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element.

The invention also relates to a vehicle steering head including a support tube and fork tube which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube, a lower bearing support disposed at a lower end of the support tube, the lower bearing support comprising at least one stop surface, the fork tube comprising a fork end, a handlebar, and a latch element which is slidably disposed adjacent the fork tube between the fork end and the handlebar end, the latch element being disposed within the support tube, a linkage element moveably disposed adjacent the lower support bearing, the linkage element comprising at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube from a first position where the latch element engages only the lower bearing support and where the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork tube to a second position where the latch element releasably engages a recess in the linkage element whereby the fork tube is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element. The linkage element may further comprise at least one locking element for engaging a locking recess in the lower bearing support. The at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

The invention provides for a vehicle steering head including a fork tube adapted to engage a handlebar, a support tube which rotatably supports the fork tube, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork tube from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork tube to rotate with respect to the support tube in at least two directions. The latch element may comprise a rod-like member.

The invention also provides for a vehicle steering head that includes a support tube adapted to be coupled to a vehicle frame, an upper bearing support arranged at an upper end of the support tube, a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface, a cylindrical element rotatably mounted to the support tube via the upper and

lower bearing supports, the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar, a latch element movably disposed within the support tube, a slide coupled to the latch element, the latch element being movable from outside the support tube, a linkage element that is rotatable with respect to the support tube, and the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube, wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of exemplary embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

FIG. 1 is a schematic side view of a children's tricycle with one embodiment of the vehicle steering head according to the invention;

FIG. 2 is a simplified sectional side view of the steering head according to the invention in an unlocked state;

FIG. 3 is a side view, turned or oriented by 90° (a right angle) of the arrangement shown in FIG. 2;

FIG. 4 is a sectional side view similar to FIG. 2, in the locked state;

FIG. 5 is a side view, similar to FIG. 3, of the view according to FIG. 4;

FIG. 6 is a simplified perspective illustration of the linkage element according to the invention;

FIG. 7 is a schematic side view of a children's tricycle with another embodiment of the vehicle steering head according to the invention;

FIG. 8 is a sectional side view of the vehicle steering head according to the invention, in the unlocked state;

FIG. 9 is a side view, turned or oriented by 90° of the arrangement shown in FIG. 8;

FIG. 10 is a sectional side view similar to FIG. 8, in the locked state;

FIG. 11 is a side view, turned or oriented by 90° which is similar to FIG. 9, in the locked state;

FIG. 12 is a top view on the linkage element according to the invention and on the associated mudguard;

FIG. 13 is a sectional view of the arrangement according to FIG. 12 along the sectional lines XIII—XIII of FIG. 12;

FIG. 14 is an enlarged side view showing a portion of the slide and of the locking element in the locked state;

FIG. 15 is a view analogous to FIG. 14, in the unlocked state;

FIG. 16 is a top view on the slide; and

FIG. 17 is a top view on the lower bearing.

DETAILED DESCRIPTION OF THE INVENTION

The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

A children's tricycle is shown in FIG. 1 and comprises a front wheel 14 which is supported on a wheel fork 4. Wheel fork 4 is fixedly connected to a fork tube 3. A handlebar (not shown) can be secured to the upper end of fork tube 3.

Fork tube 3 is supported in a support tube 2. This support is accomplished by utilizing slide bearings 15 and 15' which are shown in detail in FIGS. 2 to 5. The slide bearings 15 and 15' correspond to those of the prior art in this embodiment so that a detailed description is here not needed.

Support tube 2 is firmly connected to a frame 16 which has mounted thereon a seat 17. The tricycle also has a rear axle 18 with rear wheels 19. Accordingly, it is support tube 2 and fork tube 3 which form a steering head 1.

According to the invention, support tube 2 has arranged therein a linkage element 6 which has a substantially cylindrical configuration (see also FIG. 6) and which is received with a play or clearance (so that it can slide) within support tube 2. Linkage element 6 is also provided with a central recess through which fork tube 3 extends or passes.

Support tube 2 also has formed therein a longitudinal slot 9 through which a connection element 10 extends or passes. This connection element 10 is connected to a slide 11 and linkage element 6. The connection may be via a screw 20 (see FIGS. 2 and 4) or other conventional connecting mechanism. In the illustrated embodiment, connection element 10 is integrally connected to or formed with slide 11 and extends in a recess 21 of linkage element 6. However, connection element 10 and slide 11 may be made as separate components which are joined or secured together by any conventional attachment technique including a screw or threaded element.

On its front upper portion, linkage element 6 comprises two symmetrical opposite attachments or stops 12. Each of these stops 12 may be provided with lateral stop surfaces 7. When viewed from the top, these attachments or stops 12 are designed in a manner of a segment of a partial circle (pie shaped or wedge shaped), so that four stop surfaces 7 are formed, with each one being arranged in symmetry with one another. Of course, stops 12 may be separately formed and attached to linkage element 6 instead of being integrally formed therewith, as is shown.

In the illustrated embodiment two locking elements 8 may be utilized in which each is formed by a recess 13. These locking elements 8 are preferably provided on linkage element 6 in retracted or set back manner with respect to stops 12. As becomes apparent from FIG. 6, the walls of at least one recess 13 may be made resilient to ensure a releasable locking of a bolt-like latch element 5 when linkage element 6 is pushed upwards or into engagement with bolt-like latch element 5.

As becomes apparent from FIGS. 2 to 5, fork tube 3 is provided with a bolt-like or pin-like latch element 5 which extends or projects from at least one and preferably both sides of fork tube 3. Of course, latch element 5 may be integrally formed with fork tube. Alternatively, latch element 5 may be a threaded or partially threaded member which threads into fork tube 3. However, it is preferred that latch element 5 is a pin having a centrally disposed exterior knurl which is press fit into fork tube as is shown. In its working position, latch element 5 rotates with fork tube 3

when a deflection or rotation of the handlebar takes place. The deflection of the handlebar is limited by way of latch element 5 abutting on stop surfaces 7, these stop surfaces 7 defining the limited range of motion of the handlebar.

When it is desired to lock the handlebar in a set position, latch element 5 is pressed or forced into recesses 13. This engagement occurs when locking element 8, which is disposed on linkage element 6, is pushed upwards by slide 11. Recesses 13 also utilize inclined inlet surfaces because they act as guiding lead-in surfaces which facilitate entry of pin 5 into recess 13. In the locked state, which is shown in FIGS. 4 and 5, a steering movement thus becomes impossible since the handlebar or fork tube 3 is locked in a single direction. FIGS. 2 and 3 show a downwardly displaced condition of linkage element 6 in which latch element 5 is in a position which it does not cooperate with the locking element 8. As a result, in this position fork tube 3 and handlebar are free to rotate until latch element 5 abuts on stop surfaces 7, this range of movement or rotation corresponding to a steering angle range.

According to a preferred aspect of the invention, linkage element 6 may be made from a plastic material. Of course, other materials are also contemplated.

Another embodiment of the vehicle steering head according to the invention is described with reference to FIGS. 7 to 16. In this regard, like parts are provided with like reference numerals.

As for the description of FIG. 7, reference can be made to the description of FIG. 1 to the extent that the same features are shown. The subsequent figures are illustrations elucidating the details which have been changed.

As in FIGS. 2 to 5, FIGS. 8 and 9 and 10 and 11, respectively, are illustrations showing the vehicle steering head on an enlarged scale. Again, like parts are here also provided with like reference numerals, so that reference can be made to the preceding explanations. Slide 11 utilizes connection element 10 and screw 20. Connection element 10 also extends through a longitudinal slot 9. Moreover, slide 11 comprises an outer grip portion 11 and an interior portion 11' which is screwed to outer grip portion 11 by a screw 20. A top view of slide 11 and 11' is shown in FIG. 16. As can be seen in this figure, a central recess 24 is provided through which fork tube 3 extends or passes (with a clearance which allows slide 11' to move up and down with respect to fork tube 3). Furthermore, slide 11' also has a recess (see FIGS. 9, 11 and 16) which is formed so that it can accept a bolt-like latch element 5'. Of course, this latch element 5' may be pressed into this recess, threaded into the recess, or otherwise secured to slide 11' in a suitable manner. Alternatively, latch element 5' may be integrally formed with slide 11'.

As already described in conjunction with a previous embodiment, a bearing 15 which serves as a slide bearing is used on the upper portion of steering head 1.

Lower bearing 15' in this embodiment is configured such that it has an upwardly projecting contour of a linkage element 6' which can extend into bearing 15'. Of course, the bearing and the upwardly projecting contour may be made as separate components which are joined together by conventional techniques rather than integrally formed as is shown. Additionally, as becomes apparent in FIG. 12, linkage element 6' may have a recess 25 into which latch element 5' can be inserted (see also FIGS. 9 and 11).

As can further be seen from the top view of FIG. 12, linkage element 6' comprises two lateral stop surfaces 7 which are angularly spaced apart from each other. This design is such that a downwardly oriented attachment or stop 26 (see FIGS. 8 to 11) of the bearing 15', which is connected to support tube 2, forms a steering limitation of plus/minus approximately 45°. Of course, as with the previous embodiment, the range of steering limitation can be designed to any desired range.

FIG. 13 shows a lateral sectional view of mudguard 22 and of linkage element 6'. Note that these components are integrally formed as a single member which reduces manufacturing costs associated with joining two separate components.

FIGS. 14 and 15 are front views of slide 11' wherein handpiece 11 has been removed to illustrate the operation of locking element 8'. Locking element 8' comprises a U-shaped and includes two movable or flexible lateral legs which can releasably be inserted into a recess 23 of bearing 15'. Upon insertion and locking, locking element 8' is pressed against an undercut and thereby held in position inside recess 23. Accordingly, when it is desired to release the locked state of fork tube 3, slide 11' must be pushed upwards which removes the legs from recess 23. Of course, other locking mechanisms may be utilized and this embodiment is not limited to the use of this particular locking mechanism. For example, a pin may be used which has a floating ring disposed around its circumference. Alternatively, other conventional releasable locking mechanisms may be utilized.

FIG. 17 is a top view on lower bearing 15' on an enlarged scale. The (downwardly projecting) attachment or stop 26 can here be seen as well as recess 23 which receives locking element 8'. Moreover, recess 27 is adapted to receive and guide bolt-like latch element 5' therein. Furthermore, a surrounding collar-like edge 28 can be seen in which 29 designates two oppositely disposed attachments or projections which serve as anti-rotation engagements. These engagements are designed to engage recesses (not shown) of support tube 2. Of course, lower bearing may be secured to support tube 2 in any conventional manner such as by bonding, welding, or screws. Moreover, this attachment may be releasable or more permanent in nature.

It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

What is claimed:

1. A vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element projecting from the fork tube and disposed within the support tube; and

a linkage element disposed within the support tube,

wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube

and comprises at least one stop surface for limiting a rotation of the fork tube when the latch element contacts the at least one stop surface.

2. The steering head of claim 1, wherein the linkage element further comprises at least one locking element for locking the fork tube in a single position.

3. The steering head of claim 2, wherein the at least one locking element releasably engages the latch element when the fork tube is locked.

4. The steering head of claim 1, wherein the latch element comprises a pin.

5. The steering head of claim 4, wherein the pin projects substantially perpendicular to the axis of the fork tube.

6. The steering head of claim 1, wherein the linkage element comprises a substantially cylindrical shape.

7. The steering head of claim 6, wherein the linkage element comprises a plurality of hollow chambers separated by connecting walls.

8. The steering head of claim 1, wherein the support tube comprises an opening which allows a connecting element to pass therethrough.

9. The steering head of claim 8, wherein the opening comprises a longitudinal slot.

10. The steering head of claim 9, wherein the connecting element is secured to the linkage element.

11. The steering head of claim 10, wherein the movement of the linkage element is limited by the movement of the connecting element within the longitudinal slot.

12. The steering head of claim 10, further comprising a slide which is secured the connecting element, the slide being disposed adjacent an outer surface of the support tube.

13. The steering head of claim 1, wherein the at least one stop surface is disposed on at least one stop.

14. The steering head of claim 13, wherein the at least one stop comprises a projection which extends from the linkage element.

15. The steering head of claim 14, wherein the at least one stop comprises wedge-shaped hollow projection having two angled lateral stop surfaces.

16. The steering head of claim 13, wherein the at least one stop comprises two stops which are disposed opposite one another.

17. The steering head of claim 16, wherein each stop comprises wedge-shaped hollow projection having two angled lateral stop surfaces.

18. The steering head of claim 16, wherein the two stops define a limited range of rotational motion of the fork tube in each of a clockwise and a counter-clockwise direction.

19. The steering head of claim 18, wherein the limited range of motion in the clockwise direction is substantially equal to the range of motion in the counter-clockwise direction.

20. The steering head of claim 18, wherein the limited range of motion in one of the clockwise and counter-clockwise direction is approximately 45 degrees.

21. The steering head of claim 1, wherein the linkage element further comprises at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element.

22. The steering head of claim 21, wherein the at least one recess is set back some distance from a surface of at least one stop.

23. The steering head of claim 21, wherein the at least one recess is centrally disposed between at least two stops.

24. The steering head of claim 1, further comprising an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tube, each of the upper and lower bearings having an opening which allows the fork tube to pass therethrough.

25. The steering head of claim 1, wherein the steering head is disposed on a tricycle frame.

26. A vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element that is rotatable with the fork tube, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

wherein the latch element is connected to a slide, the slide being disposed within the support tube.

27. The steering head of claim 26, wherein the slide is moveable substantially parallel to the axis of the fork tube.

28. The steering head of claim 26, further comprising a locking element connected to the slide.

29. The steering head of claim 26, wherein the steering head is disposed on a tricycle frame. mudguard.

30. A vehicle steering head including a support tube which rotatable supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element that is rotatable with the fork tube, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

a slide that is disposed within the support tube and retains the latch element.

31. The steering head of claim 30, wherein the slide further comprises at least one locking element for releasable securing the slide to the support tube.

32. A vehicle steering head including a support tube which rotatable supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element that is rotatable with the fork tube, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

wherein the linkage element comprises a mudguard.

33. The steering head of claim 32, wherein the mudguard is disposed between one end of the support tube and a wheel fork.

34. A vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element connected to the fork tube so as to rotate therewith, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

wherein the latch element comprises a rod like member which is arranged substantially parallel to the axis of the fork tube.

35. The steering head of claim 34, wherein the rod like member comprises one of a bolt and a pin.

36. A vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element that is rotatable with the fork tube, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

a bearing support disposed on at least one end of the support tube.

37. The steering head of claim 36, wherein the bearing support is disposed on a lower end of the support tube.

38. The steering head of claim 36, further comprising a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support.

39. The steering head of claim 36, wherein the bearing support comprises at least one stop, the at least one stop comprising at least one surface which engages the linkage element.

40. The steering head of claim 38, wherein the at least one stop comprises a projection which engages a recess in the linkage element.

41. The steering head of claim 39, wherein the projection and the recess cooperate to limit the rotational movement of the fork tube within a desired range.

42. The steering head of claim 40, wherein the range of the rotational movement is limited by at least two stop surfaces.

43. The steering head of claim 41, wherein the at least two stop surfaces define a limited range of rotation in one of a clockwise and a counter-clockwise direction.

44. The steering head of claim 42, wherein the at least two stop surfaces define a limited range of rotation in each of a clockwise and a counter-clockwise direction.

45. The steering head of claim 42, wherein the limited range of rotation between the at least two stops is approximately 45 degrees.

46. A vehicle steering head including a support tube and fork tube which is rotatably mounted with respect to the support tube, the steering head comprising:

an upper bearing support disposed at an upper end of the support tube;

a lower bearing support disposed at a lower end of the support tube;

the fork tube comprising a fork end and a handlebar engaging end;

a latch element projecting from the fork tube between the fork end and the handlebar engaging end, the latch element being disposed within the support tube; and

a linkage element slidable disposed within the support tube, the linkage element comprising at least one stop surface for engaging the latch element;

wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube from a first position, wherein the latch element and the at least one stop cooperate to limit the rotational movement of the fork tube, to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork tube is prevented from rotating in any direction.

47. The steering head of claim 46, wherein the linkage element is moveable from outside the support tube via a slide.

48. The steering head of claim 47, wherein the slide is connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube.

49. The steering head of claim 48, wherein the longitudinal slot limits the movement of the linkage element.

50. A vehicle steering head including a support tube and fork tube which is rotatably mounted with respect to the support tube, the steering head comprising:

an upper bearing support disposed at an upper end of the support tube;

a lower bearing support disposed at a lower end of the support tube, the lower bearing support comprising at least one stop surface;

the fork tube comprising a fork end and a handlebar engaging end;

a latch element slidably disposed adjacent the fork tube between the fork end and the handlebar engaging end, the latch element being disposed within the support tube; and

a linkage element moveably disposed adjacent the lower support bearing, the linkage element comprising at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element,

wherein the latch element is moveable in a direction which is substantially parallel to an axis of the fork tube from a first position where the latch element engages only the lower bearing support, wherein the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork tube, to a second position where the latch element releasably engages a recess in the linkage element whereby the fork tube is prevented from rotating in any direction.

51. The steering head of claim 50, wherein the latch element is moveable from outside the support tube via a slide.

52. The steering head of claim 51, wherein the slide is connected to the latch element via a connection element, the connection element passing through a longitudinal slot in the support tube.

53. The steering head of claim 52, wherein the longitudinal slot limits the movement of one of the latch element or the slide.

54. The steering head of claim 52, further comprising a least one locking element for engaging a locking recess in the lower bearing support.

55. The steering head of claim 54, wherein the at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

56. A vehicle steering head comprising:

a fork tube adapted to engage a handlebar;

a support tube which rotatably supports the fork tube;

a latch element disposed within the support tube;

a slide which is moveable with respect to the support tube; and

a linkage element;

wherein the slide is moveable from at least one position wherein the linkage element prevents the fork tube from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork tube to rotate with respect to the support rube in at least two directions, and

wherein the slide is adapted to move the latch element from outside the support tube.

57. The steering head of claim 56, wherein the latch element comprises a rod-like member.

58. A vehicle steering head comprising:

a support tube adapted to be coupled to a vehicle frame;

an upper bearing support arranged at an upper end of the support tube;

a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface;

a cylindrical element rotatably mounted to the support tube via the upper and lower bearing supports;

the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar;

a latch element movably disposed within the support tube;

a slide coupled to the latch element;

the latch element being movable from outside the support tube;

a linkage element that is rotatable with respect to the support tube; and

the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube,

wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,378,884 B1
DATED : April 30, 2002
INVENTOR(S) : H. Kettler

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

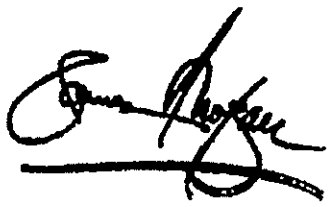
Column 12,
Line 23, delete "mudguard".
Lines 25 and 41, replace "rotatable" with -- rotatably --.

Column 13,
Line 30, the claim dependency should be changed from "38" to -- 39 --.
Line 33, the claim dependency should be changed from "39" to -- 40 --.
Line 36, the claim dependency should be changed from "40" to -- 41 --.
Line 39, the claim dependency should be changed from "41" to -- 42 --.
Line 61, replace "slidable" with -- slidably --.

Column 14,
Line 10, insert -- slot -- between the words "longitudinal" and "in".
Line 14, replace "rube" with -- tube --.
Line 57, the claim dependency should be changed from "52" to -- 50 --.

Signed and Sealed this

Twenty-fifth Day of February, 2003



JAMES E. ROGAN
Director of the United States Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE
Certificate

Patent No. 6,378,884 B1 Patented: April 30, 2002

On petition requesting issuance of a certificate for correction of inventorship pursuant to 35 U.S.C. 256, it has been found that the above identified patent, through error and without any deceptive intent, improperly sets forth the inventorship.

Accordingly, it is hereby certified that the correct inventorship of this patent is: Heinz Kettler, Ense-Parsit (DE); Joachim Kettler, Ense-Parsit, (DE); and Reinhard Rocholl, Werl, (DE).

Signed and Sealed this Third Day of April 2007.

ANDRES KASHNIKOW
Supervisory Patent Examiner
Art Unit 3993

(12) **EX PARTE REEXAMINATION CERTIFICATE** (6008th)

United States Patent
Kettler et al.

(10) **Number: US 6,378,884 C1**
(45) **Certificate Issued: Nov. 13, 2007**

(54) **VEHICLE STEERING HEAD**

(75) Inventors: **Heinz Kettler**, Ense-Parsit (DE); **Joachim Kettler**, Ense-Parsit (DE); **Reinhard Rocholl**, Werl (DE)

(73) Assignee: **Heinz Kettler GmbH & Co. KG**, Ense-Parsit (DE)

Reexamination Request:
No. 90/007,243, Oct. 8, 2004

Reexamination Certificate for:

Patent No.:	6,378,884
Issued:	Apr. 30, 2002
Appl. No.:	09/584,497
Filed:	Jun. 1, 2000

Certificate of Correction issued Feb. 25, 2003.

Certificate of Correction issued Apr. 3, 2007.

(30) **Foreign Application Priority Data**

Jul. 5, 1999 (DE) ..... 299 11 652 U

(51) **Int. Cl.**
B62K 5/02 (2006.01)

(52) **U.S. Cl.** 280/279; 280/272; 74/495

(58) **Field of Classification Search** ..... None
See application file for complete search history.

(56) **References Cited**

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(Continued)

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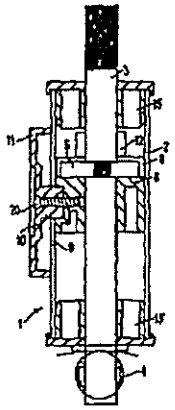
Six Catalog pages of company Processed Plastic Company showing a TimMee toy (1997).
Assembly Instructions for Push, Pedal & Ride Trike (4 pages).

(Continued)

Primary Examiner—David O. Reip

(57) **ABSTRACT**

A vehicle steering head including a fork tube adapted to engage a handlebar, a support tube which rotatably supports the fork tube, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork tube from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork tube to rotate with respect to the support tube in at least two directions.



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Figs. 1, 2A and 2B purporting to show the Push, Pedal & Ride Trike in a fully assembled state and a partially disassembled state.

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English Language Abstract of DE 39 14 050.

Document showing Radio Flyer model #77 entitled "Restricted Turning Prior Art".

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Hand made drawing p. No. RF12204 on ITALTRIKE letterhead. The drawing has a handwritten date of Jan. 21, 1987.

Black and while picture allegedly showing a mold having p. No. RF12208.

Black and white picture allegedly showing mold parts having p. No. RF12209.

Sheet table in Italian having a stamp entitled "N. CITTON & C, s.a.s.".

Cover page of Europeo (in color) having p. RF12230 and dated Feb. 1, 1991.

Four sheets with p. Nos. RF12244–A, –B, –C and –D (in color) showing various pictures of trikes and a scooter on what appears to be notebook pages.

Four sheets with p. Nos. RF12245–A, –B, –C and –D (in color) showing various pictures of trikes and a bike on what appears to be notebook pages.

English Language Translation of Swiss No. 290478.

Hand made drawing p. No. RF12206 on ITALTRIKE letterhead. The drawing has a handwritten date of Jan. 21, 1987.

Pages 1 and 2 of a 1998 Radio Flyer catalog.

Three sheets labeled "ACKNOWLEDGMENT" which Radio Flyer alleges to be evidence that the Radio Flyer model No. 77 was sold during 1998.

A sheet entitled "Restricted Turning Prior Art" which Radio Flyer alleges to be evidence that the Radio Flyer model No. 77 was released Feb. 19, 1998.

A sheet entitled "Product Name: Roll N Ride" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Grow–With–Me–Trike" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Baby Too" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Tough Trikes" and "Product Name: Push'n Pedal Trike" which Radio Flyer alleges to be evidence that the products shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "HBC Model 29875 CS 04G" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Smoby Pilot Alu Plus Juguetes Pico S.A." which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Fisher Price Rock, Roll and Ride XL" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Charton Baby Driver 2 39150 St. Laurent France" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Processed Plastics West Coast Choppers" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Processed Plastic Item 17800–2" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Fischer Price Kawasaki (US Patent 6,651,528)" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Mattel Hot Wheels" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Tek–Net Toys Int'l Inc. USA 020821 Emergency 911" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Fischer Price L&S Ride on Harley" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Friendly Toys Item #7112 Fold–Up Trike" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

EX PARTE
REEXAMINATION CERTIFICATE
ISSUED UNDER 35 U.S.C. 307

THE PATENT IS HEREBY AMENDED AS INDICATED BELOW.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

The patentability of claims 26–45 and 50–58 is confirmed.

Claims 1–25 and 46–49 are cancelled.

* * * * *

US006799772B2

(12) **United States Patent**
Kettler et al.

(10) **Patent No.: US 6,799,772 B2**
(45) **Date of Patent: *Oct. 5, 2004**

(54) **VEHICLE STEERING HEAD**

(75) Inventors: **Heinz Kettler**, Ense-Parsit (DE); **Joachim Kettler**, Werl (DE); **Reinhard Rocholl**, Werl (DE)

(73) Assignee: **Heinz Kettler GmbH & Co.**, Ense-Parsit (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/298,002**

(22) Filed: **Nov. 18, 2002**

(65) **Prior Publication Data**

US 2003/0132597 A1 Jul. 17, 2003

Related U.S. Application Data

(63) Continuation of application No. 10/092,516, filed on Mar. 8, 2002, now abandoned, which is a continuation of application No. 09/584,497, filed on Jun. 1, 2000, now Pat. No. 6,378,884.

(30) **Foreign Application Priority Data**

Jul. 5, 1999 (DE) ..... 299 11 652 U

(51) **Int. Cl.**[7] **B62K 5/02**
(52) **U.S. Cl.** 280/279; 280/272; 74/495
(58) **Field of Search** 280/279, 272, 280/271, 282, 89; 403/354, 83; 74/495

(56) **References Cited**

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4,608,729	A	9/1986	Huang	
4,674,761	A	6/1987	Kassai	
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Primary Examiner—Lesley D. Morris
Assistant Examiner—Tony Winner
(74) *Attorney, Agent, or Firm*—Greenblum & Bernstein, P.L.C.

(57) **ABSTRACT**

Vehicle steering head including a connecting element adapted to engage a handlebar. A support tube rotatably supports the connecting element. A fork member adapted to connect a wheel fork to a handlebar. The fork member is rotatable with respect to the support tube. A mechanism limits the rotational movement of the fork member in each of two directions. A lower bearing support is mounted to the support tube. The mechanism and the lower bearing support cooperate to limit the rotational movement of the fork member.

69 Claims, 9 Drawing Sheets

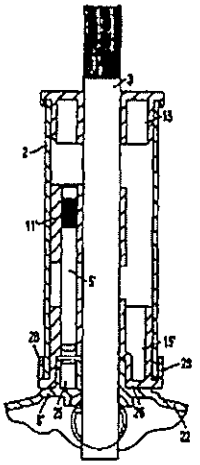


EXHIBIT
tabbies
3

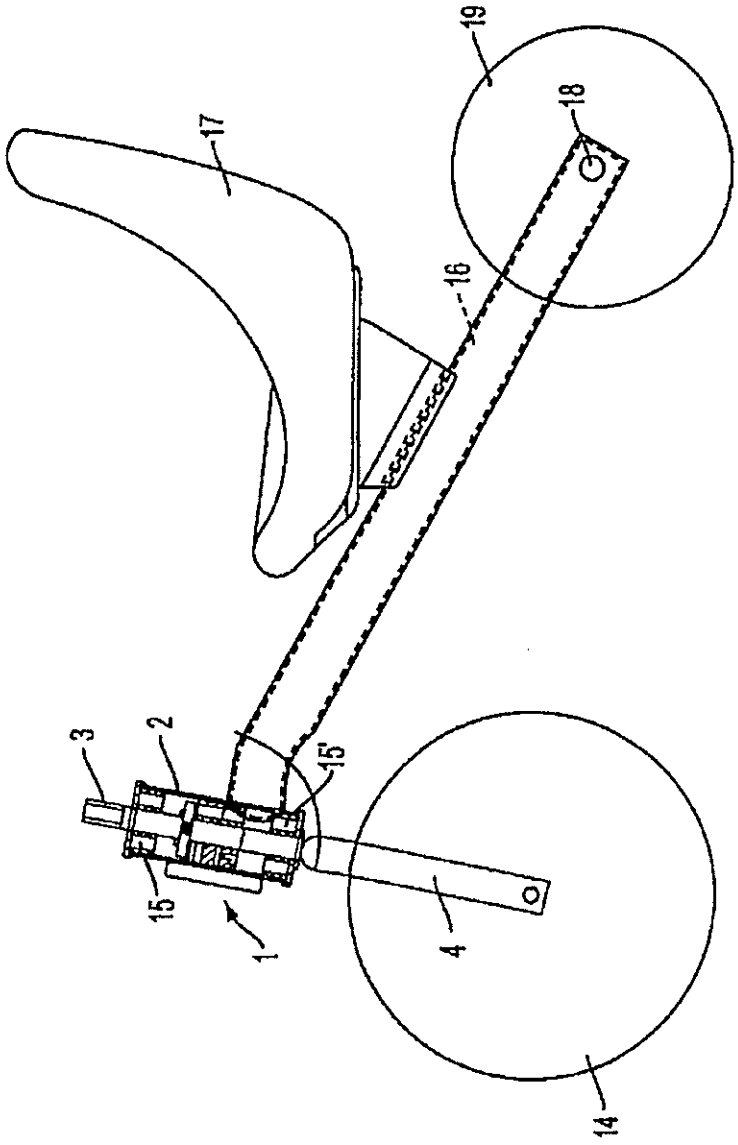


FIG. 1

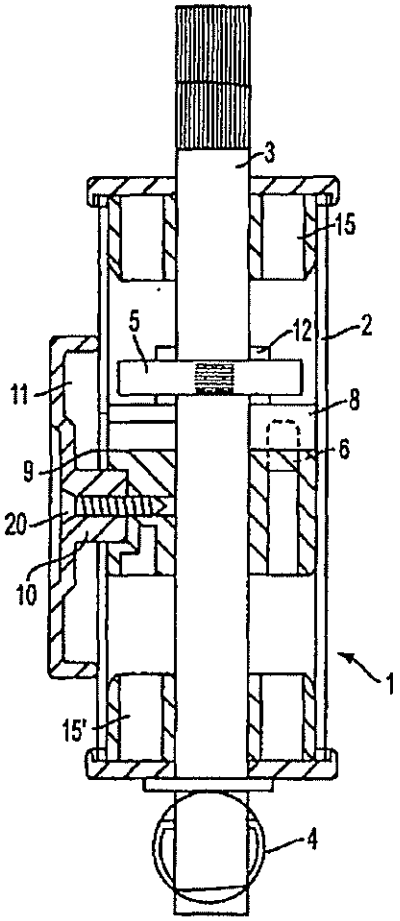


FIG. 2

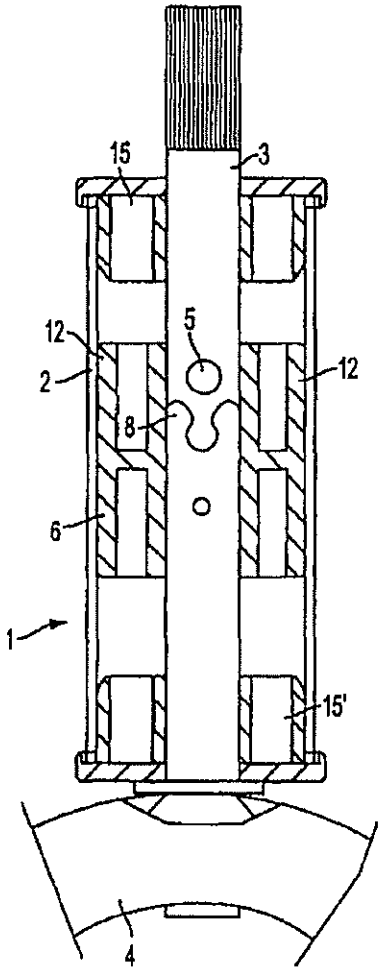


FIG. 3

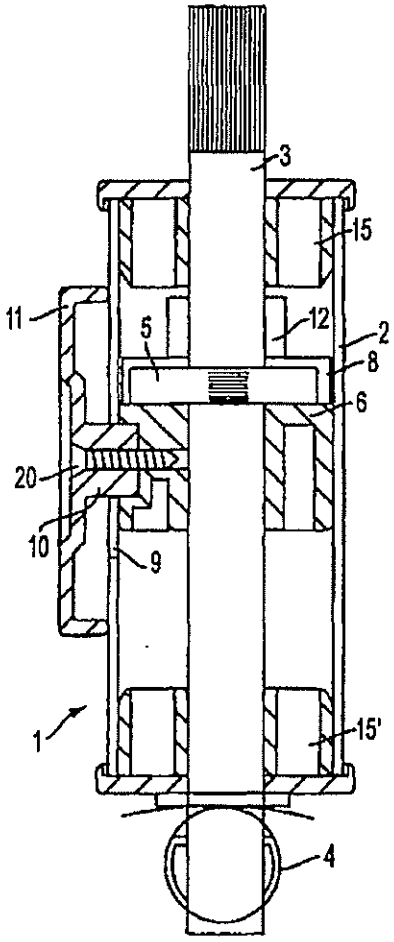


FIG. 4

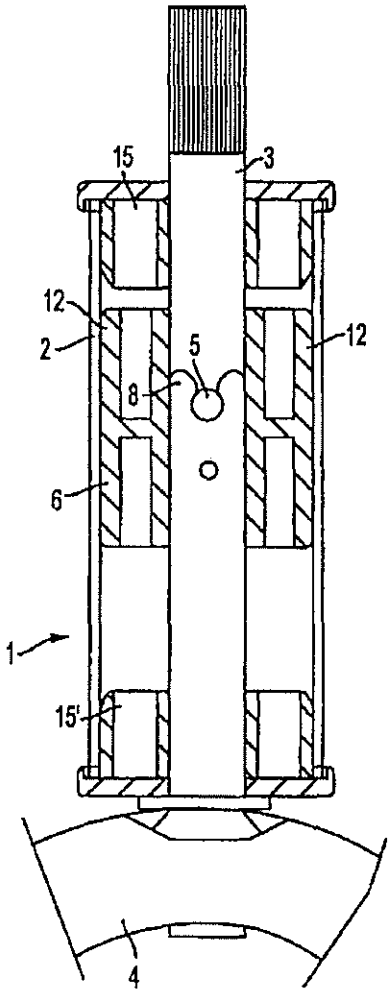


FIG. 5

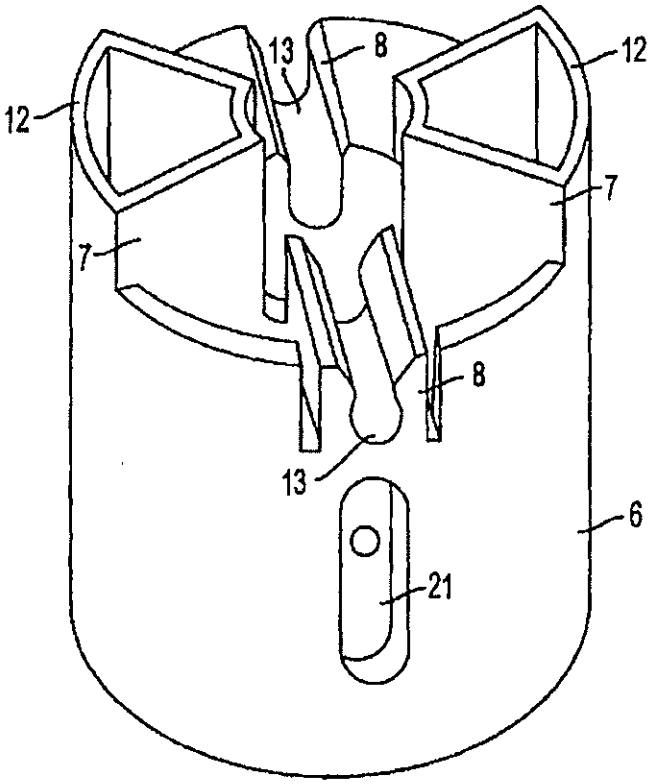


FIG. 6

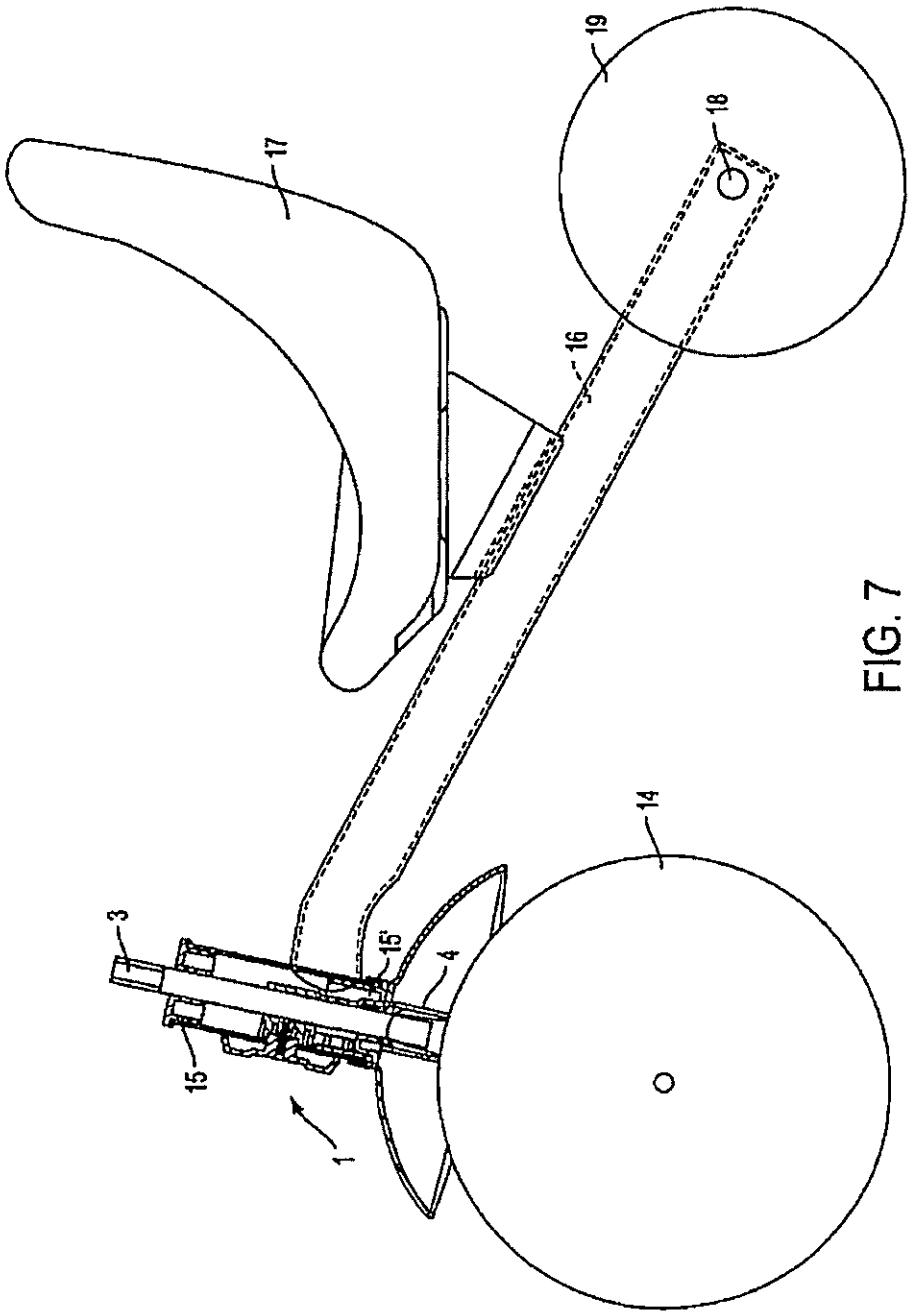


FIG. 7

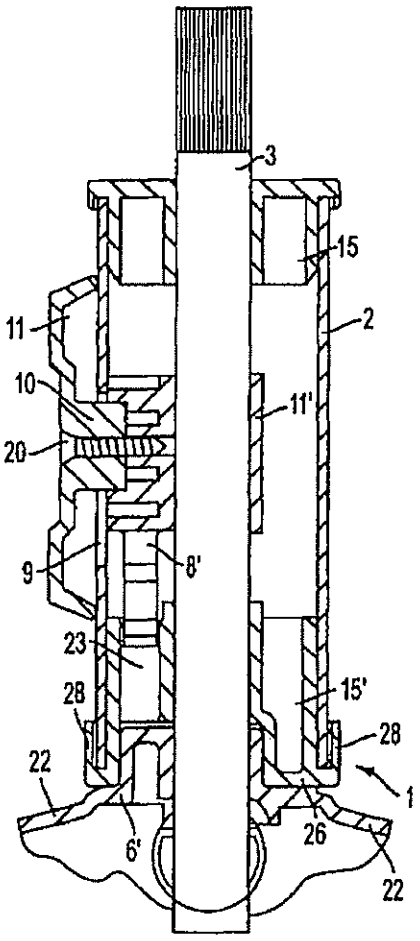
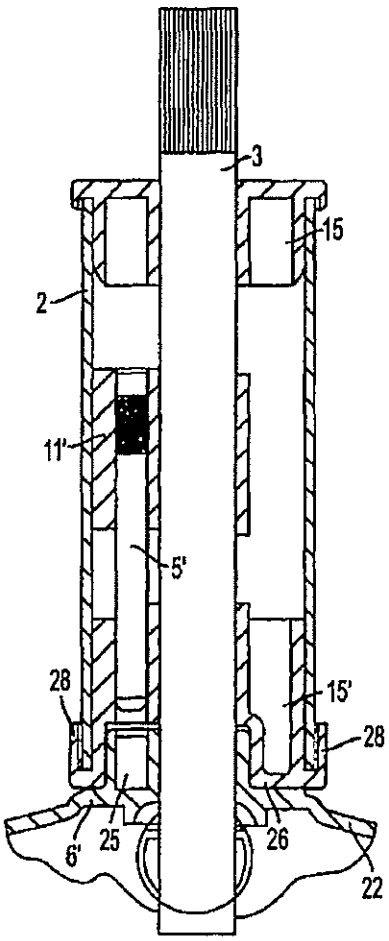

3
15
2
11
10
11'
20
9
8'
23
28
15'
28
22
1
6'
26
22

FIG. 8


3
15
2
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15'
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6'
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26
22

FIG. 9

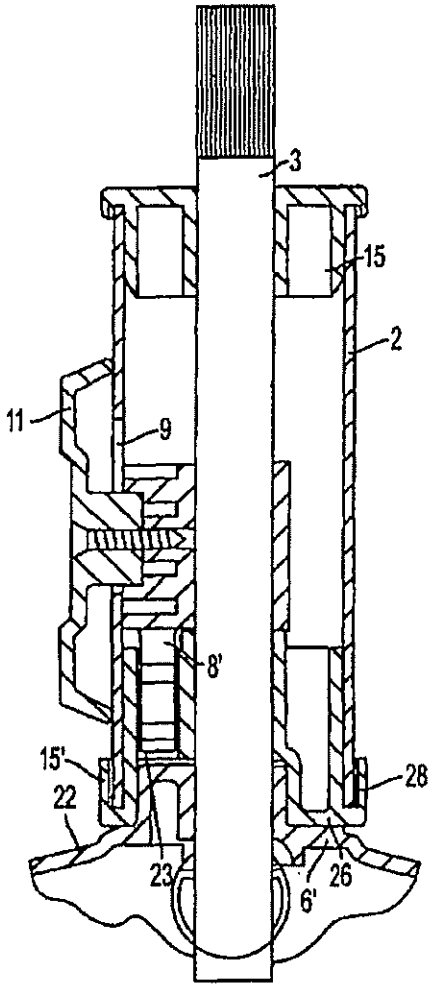

FIG. 10

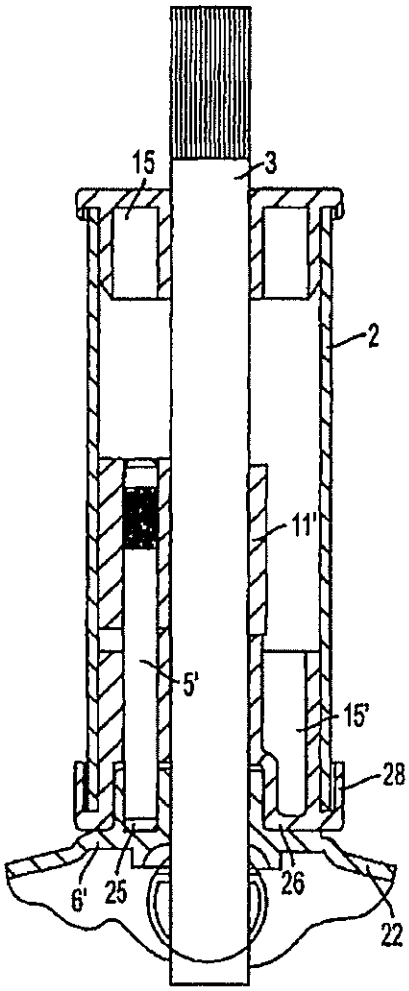

FIG. 11

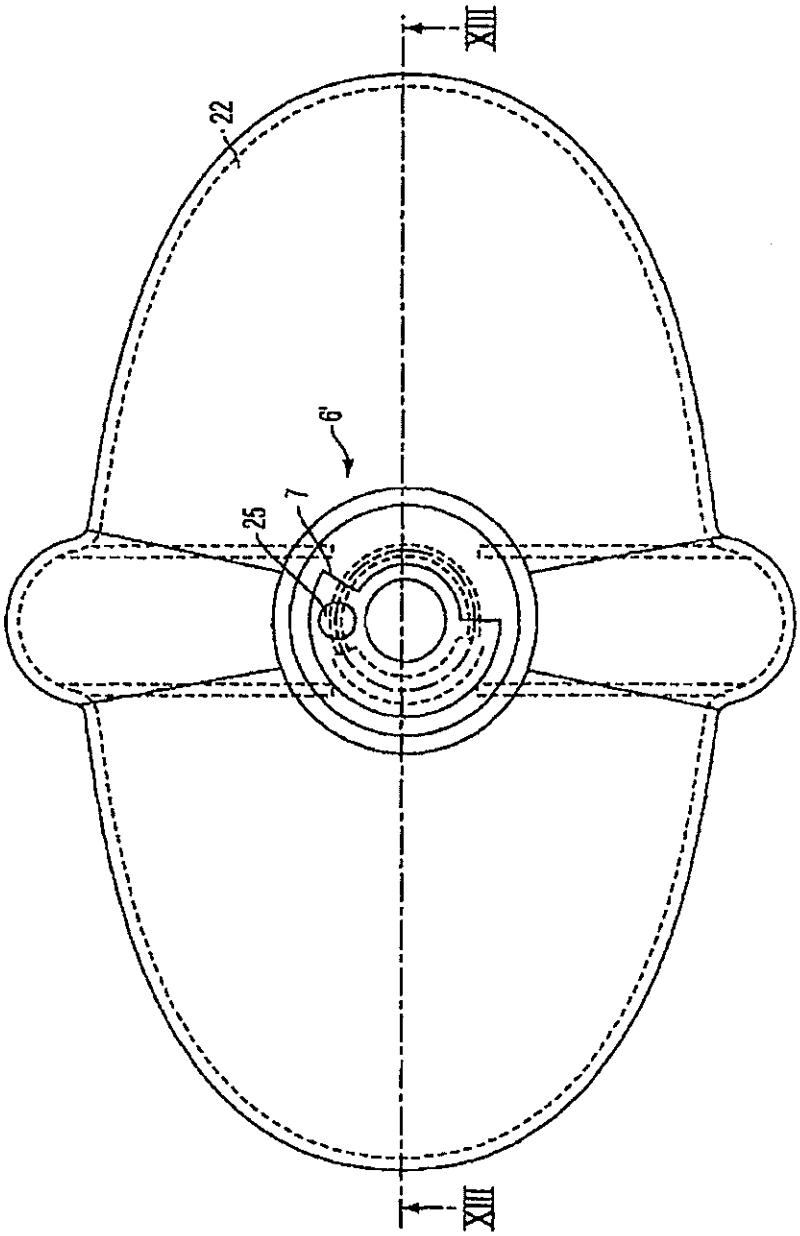

FIG. 12

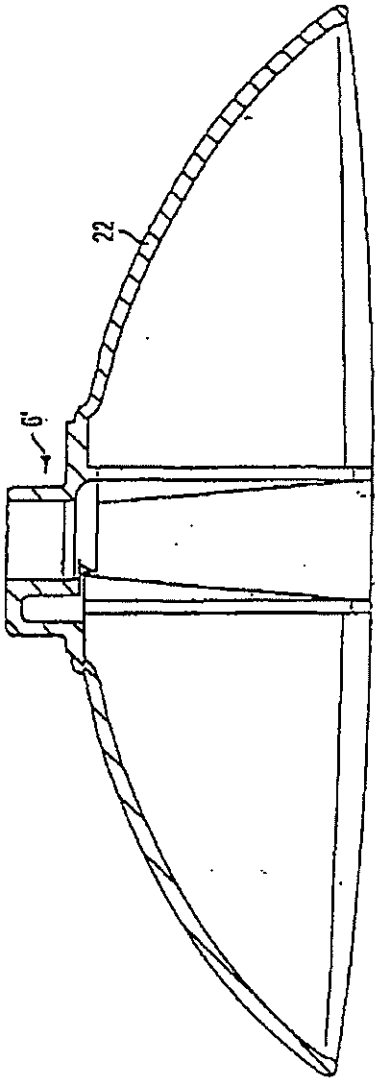

FIG. 13

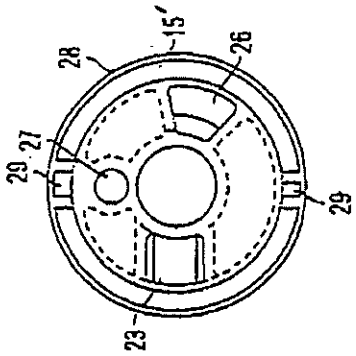

FIG. 17

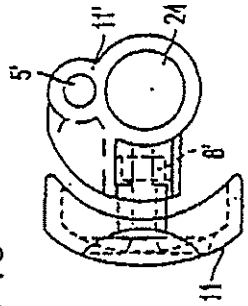

FIG. 16

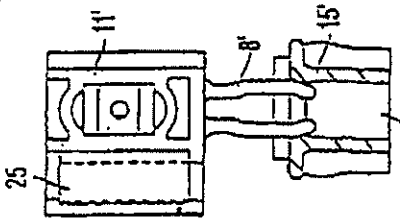

FIG. 15

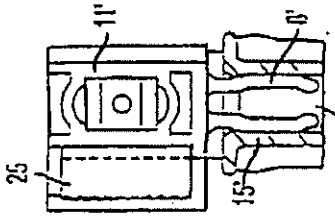

FIG. 14

VEHICLE STEERING HEAD

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of U.S. application Ser. No. 10/092,516 filed Mar. 8, 2002 now abandoned, which is a continuation of U.S. application Ser. No. 09/584,497 filed Jun. 1, 2000, now U.S. Pat. No. 6,378,884, the disclosures of which are expressly incorporated by reference herein in their entireties. Further, the present application claims priority under 35 U.S.C. § 119 of German Patent Application No. 299 11 652.2, filed on Jul. 5, 1999, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle steering head and in particular, to a steering head for a vehicle comprising a support tube which has rotatably supported therein a fork member to which a wheel cover and a handlebar can be secured.

2. Discussion of Background Information

Vehicle steering heads of the above-described type are in particular used in bicycles or tricycles, and in particular in tricycles or bicycles for children.

In devices of the above-described type it is desirable for safety reasons that accidents be avoided which may be caused by an excessively large handlebar deflection. It has been found that when there is an excessively large handlebar deflection (e.g., the handle bar rotates beyond a point where effective steering occurs), the vehicle may tilt to the side. Moreover, such deflections or excessive rotation may run the risk that a user impacts his body against the handlebar. Additionally, the user may get caught with his/her feet in the front wheel and may be even be injured by the pedals.

A further drawback or disadvantage of prior-art devices occurs when they are pushed with a push rod type device. In such cases, these devices have a tendency towards uncontrolled steering movements of the front wheel which cannot be mastered or effectively controlled by small children, in particular.

SUMMARY OF THE INVENTION

The present invention therefore provides a vehicle steering head of the above-mentioned type which is of a simple construction and which can operate in an easy and reliable manner. Moreover, this design avoids the drawbacks of the prior art and can in particular limit a handlebar deflection to a desired degree. The invention also has provision for locking the handlebar.

According to one aspect of the invention a latch element is secured to a fork member on a portion provided inside the support tube. A linkage element is supported in the support tube for rotation therewith. The linkage element is displaceable or moveable in a longitudinal direction of the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the latch element. Moreover, the linkage element comprises at least one locking element which is releasably connectable to the latch element.

According to another aspect of the invention a latch element is supported on the support tube. A linkage element is arranged on the fork member and connected to the tube for rotation therewith. The latch element is freely displaceable or moveable along the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the support tube. Moreover, at least one latch element is provided that is releasably connectable to the support tube.

The vehicle steering head according to the invention is characterized by a number of considerable advantages.

First of all, it is possible to install or utilize the steering head in a frame of any desired design, e.g. children's bicycles or tricycles. Ideally, the dimensions of the steering head are such that they do not interfere with the remaining structure of the frame within which it is installed. Of course, the steering head may be combined with any and all common types of frames where ever its advantageous design is desired. Accordingly, the steering head may be utilized in a variety of devices where limited deflection or rotation and/or locking are desired.

Because the invention utilizes a latch element which is arranged in the support tube, no functional parts of the steering head need be outwardly visible or accessible. Accordingly, the internal parts are less susceptible to damage. Additionally, this design is less likely to cause injury when used by children or infants.

As a result of utilizing a linkage element according to the invention, it is possible to reliably lock the fork member and thus the wheel fork and the front wheel. Such a locking provision is easily be accomplished by displacing or moving the linkage element. This design ensures a high degree of operational safety and operational reliability.

The linkage element preferably utilizes stop surfaces which cooperate with the latch element in a manner where they are brought into contact with one another. In this way, the steering angle can be limited to a particularly or desired range. This limited range of motion of the steering angle can be realized according to the invention in different ways. The invention contemplates that the available steering angle is freely selectable within a wide desired range. This is of particular advantage to vehicles for children such as tricycles, which may require a steering angle of approximately 45° to each side. Of course, other desirable steering angles can be utilized. However, by designing in the desired limited steering angle, lateral tilting of the tricycle or similar devices can be prevented or their risk significantly reduced. Additionally, the risk of injuries which may be caused by the pedals, e.g., devices which utilize pedals on the front wheel can be reduced. Finally, the risk of injury which can occur when the handlebar exceeds a controlled steering angle can be ruled out to a considerable extent.

The invention also provides for a linkage element having a locking element which is releasably connectable to the latch element. This design ensures that when a push rod is used for pushing the device, i.e., a tricycle, the front wheel thereof may be reliably locked in place during straight travel.

In an advantageous embodiment of the invention, the latch element is designed in the form of a pin which extends in a direction transverse to the fork member. The pin may extend through the fork member such that it projects at both sides of the fork member. Alternatively, the pin can project from the fork member on only one side. Moreover, the pin can be firmly connected to the fork member, e.g. by welding or other conventional attachment techniques. Additionally, it may be secured by press fitting with or without utilizing a knurled portion. Of course, the dimensions of the pin can easily be adapted to the respective conditions of use.

It should be noted that the manufacturing costs of the steering head are reduced by the above-described construction to quite a considerable degree.

In another advantageous embodiment of the invention, the linkage element is substantially designed in the form of a hollow cylinder. Thus, the linkage element can be reliably guided in the support tube and surround the fork member. Additionally, the linkage element can be designed as a single integral part or several parts which are either joined together or which cooperate together.

It is advantageous for the longitudinal displacement or movement of the linkage element to be along an axis of the support tube and the fork member. Accordingly, the support tube may comprise at least one longitudinal slot or a similar recess through which a connection element extends which is connected to the linkage element. This design also utilizes a slide which is arranged outside the support tube.

The slide facilitates the ease of handling or movement of the linkage element. In such a design, a displacement of the slide, which may additionally be provided with locking mechanism or fixing safety mechanism, effects a corresponding displacement or movement of the linkage element. The locking mechanism or fixing mechanism allows for fixing the front wheel in a single or set travel position which is preferably straight. Moreover, the invention also contemplates that the linkage element may be provided with inclined inlet surfaces or intercepting mechanisms which engage the latch element so as to initiate a locking action when the front wheel is slightly deflected angularly.

Stop surfaces on the latch element are preferably formed on at least one front attachment of the linkage element. Additionally, it is particularly advantageous when two opposite attachments or stops are in symmetry with each other and are each provided with at least one stop surface located on the linkage element. Thus, by utilizing two attachments or stops which are in symmetry with each other, this design can limit the steering angle in a symmetrical fashion to both the left and the right side.

In another advantageous embodiment of the invention, the associated stop surfaces of the attachments or stops act to limit the rotation of the fork member to a predetermined angular range at both sides. This angular range may e.g. be approximately 45° to both sides, for a total range of motion of approximately 90°.

The locking element is preferably designed in the form of at least one front recess which receives the latch element. Such an advantageous design makes it possible to grip and fix the latch element upon displacement or movement of the linkage element. Additionally, it is advantageous that the recess be retracted or set back relative to the front attachment, so that the attachments or stops can always remain in the plane of the latch element, while upon a displacement of the latch element, it is only the recess which can additionally be brought into engagement.

To implement a simple and operationally reliable structure of the steering head, it may be advantageous for the recess to be centrally arranged between the two attachments or stops.

The invention also contemplates that the fork member itself has not been changed constructionally. In other words, the invention can be adapted to work with a conventional fork member. Also, the invention makes it possible to manufacture all functional parts separately in a very simple manner. As a result, advantageous production costs can be achieved.

In a preferred design of a previously described embodiment, the linkage element is designed as part of a

mudguard which extends from below into the support tube. This design allows for significant cost savings since the mudguard is normally made from plastics and is typically already included in most vehicles of the above-described type. The linkage element can thus be mounted on the mudguard or made integrally therewith, in a particularly easy way and at low costs.

A further advantage of the this embodiment is that the latch element can be designed in the form of a bolt which arranged to be parallel with the fork member. The latch element of this design can thus be given relatively large dimensions so that the diameter of the support tube itself need not be chosen with such a large size.

It may be of particular advantage when the latch element is connected to a slide which extends into the support tube so as to be able to design the lock of the front wheel in a particularly simple manner. Furthermore, the locking element may preferably be connected to the slide. Moreover, the locking element serves to reliably maintain the locked state and to prevent any unintended unlocking. The locking element also preferably engages into a recess of a bearing which supports the fork member in the support tube. As a result, it is not necessary to mount additional parts or to take installation measures on the support tube itself.

It may also be of particular advantage for the limitation of the steering angle to be accomplished by a lower bearing which supports the fork member in the support tube. This lower bearing may have formed thereon an attachment which projects in the direction of the linkage element and which can be brought into contact with the stop surfaces formed on the linkage element and thus on the mudguard. This design has the advantageous effect that the predetermined angular range can be limited at both sides as well, e.g. approximately 45° each side.

The invention provides a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element projecting from the fork member and disposed within the support tube, and a linkage element disposed within the support tube, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member and comprises at least one stop surface for limiting a rotation of the fork member when the latch element contacts the at least one stop surface. The linkage element may further comprise at least one locking element for locking the fork member in a single position. The at least one locking element may releasably engage the latch element when the fork member is locked. The latch element may comprise a pin. The pin may project substantially perpendicular to the axis of the fork member. The linkage element may comprise a substantially cylindrical shape. The linkage element may comprise a plurality of hollow chambers separated by connecting walls. The support tube may comprise an opening which allows a connecting element to pass therethrough. The opening may comprise a longitudinal slot. The connecting element may be secured to the linkage element. The movement of the linkage element may be limited by the movement of the connecting element within the longitudinal slot. The steering head may further comprise a slide which is secured to the connecting element, the slide being disposed adjacent an outer surface of the support tube. The at least one stop surface may be disposed on at least one stop.

The at least one stop may comprise a projection which extends from the linkage element. The at least one stop may comprise a wedge-shaped hollow projection having two

angled lateral stop surfaces. The at least one stop may comprise two stops which are disposed opposite one another. Each stop may comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The two stops may define a limited range of rotational motion of the fork member in each of a clockwise and a counter-clockwise direction. The limited range of motion in the clockwise direction may be substantially equal to the range of motion in the counter-clockwise direction. The limited range of motion in one of the clockwise and counter-clockwise direction may be approximately 45 degrees.

The linkage element may further comprise at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element. The at least one recess is set back some distance from a surface of at least one stop. The at least one recess is centrally disposed between at least two stops.

The steering head may further comprise an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tube, each of the upper and lower bearings having an opening which allows the fork member to pass therethrough.

The steering head may be disposed on a tricycle frame.

The invention also provides for a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork member, and a linkage element connected to the fork member so as to rotate therewith, the linkage element comprising at least one stop surface, wherein the at least one stop surface limits the rotation of the fork member with respect to the support tube. The steering head may further comprise a slide, wherein the slide is disposed within the support tube and retains the latch element. The slide may further comprise at least one locking element for releasably securing the slide to the support tube. The linkage element may comprise a mudguard. The mudguard may be disposed between one end of the support tube and a wheel fork. The latch element may comprise a rod like member which is arranged substantially parallel to the axis of the fork member. The rod like member may comprise one of a bolt and a pin. The latch element may be connected to a slide, the slide being disposed within the support tube. The slide may be moveable substantially parallel to the axis of the fork member. A locking element may be connected to the slide.

The steering head may further comprise a bearing support disposed on at least one end of the support tube. The bearing support may be disposed on a lower end of the support tube. The steering head may further comprise a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support. The bearing support may comprise at least one stop, the at least one stop comprising at least one surface which engages the linkage element. The at least one stop may comprise a projection which engages a recess in the linkage element. The projection and the recess may cooperate to limit the rotational movement of the fork member within a desired range. The range of the rotational movement may be limited by at least two stop surfaces. The at least two stop surfaces may define a limited range of rotation in one of a clockwise and a counter-clockwise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counter-clockwise direction. The limited range of rotation between the at least two stops may be approximately 45 degrees.

The steering head may be disposed on a tricycle frame.

The invention further provides for a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The fork member comprises a fork end, a handlebar, and a latch element projecting from the fork member between the fork end and the handlebar end. The latch element is disposed within the support tube and a linkage element is slidably disposed within the support tube. The linkage element comprises at least one stop surface for engaging the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element and the at least one stop cooperate to limit the rotational movement of the fork member to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element.

The invention also relates to a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The lower bearing support comprises at least one stop surface, the fork member comprising a fork end, a handlebar, and a latch element which is slidably disposed adjacent the fork member between the fork end and the handlebar end, the latch element being disposed within the support tube and a linkage element moveably disposed adjacent the lower support bearing. The linkage element comprises at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element engages only the lower bearing support and where the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork member to a second position where the latch element releasably engages a recess in the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element. The linkage element may further comprise at least one locking element for engaging a locking recess in the lower bearing support. The at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

The invention provides for a vehicle steering head including a fork member adapted to engage a handlebar, a support tube which rotatably supports the fork member, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage

element prevents the fork member from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork member to rotate with respect to the support tube in at least two directions. The latch element may comprise a rod-like member.

The invention also provides for a vehicle steering head that includes a support tube adapted to be coupled to a vehicle frame, an upper bearing support arranged at an upper end of the support tube, a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface, a cylindrical element rotatably mounted to the support tube via the upper and lower bearing supports, the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar, a latch element movably disposed within the support tube, a slide coupled to the latch element, the latch element being movable from outside the support tube, a linkage element that is rotatable with respect to the support tube, and the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube, wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, a mechanism which limits the rotational movement of the fork member in each of two directions, and a lower bearing support mounted to the support tube, wherein the mechanism and the lower bearing support cooperate to limit the rotational movement of the fork member.

The lower bearing support may be non-rotatably fixed to the support tube. The lower bearing support may comprise at least one stop surface. The lower bearing support may comprise two stop surfaces. The mechanism may comprise at least one stop surface. The mechanism may comprise two stop surfaces. The mechanism may comprise a linkage element having at least one stop surface. The linkage element may rotate with the fork member. The linkage element may be arranged on a mudguard. The fork member may be cylindrically shaped. The steering head may further comprise a handlebar connected to one end of the fork member and a wheel fork connected to another end of the fork member.

The invention also provides a vehicle steering head comprising a support tube adapted to be fixed to a frame, a cylindrical member adapted to connect a wheel fork to a handlebar, the cylindrical member being rotatable with respect to the support tube, a linkage element being movable and comprising at least two stop surfaces, wherein one of the at least two stop surfaces limits the rotation of the cylindrical member in one direction, and wherein another of the at least two stop surfaces limits the rotation of the cylindrical member in another direction.

The linkage element may rotate with the cylindrical member. The linkage element may rotate with a mudguard.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a connecting element adapted to connect a wheel fork to a handlebar, the connecting element being rotatable with respect to the support tube, a linkage element being rotatable and comprising at least two stop surfaces, a mudguard that rotates with the linkage element, one of the at least two stop surfaces limiting the rotation of the connecting element in one direction, and another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, and a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

FIG. **1** is a schematic side view of a children's tricycle with one embodiment of the vehicle steering head according to the invention;

FIG. **2** is a simplified sectional side view of the steering head according to the invention in an unlocked state;

FIG. **3** is a side view, turned or oriented by 90° (a right angle) of the arrangement shown in FIG. 2;

FIG. **4** is a sectional side view similar to FIG. 2, in the locked state;

FIG. **5** is a side view, similar to FIG. 3, of the view according to FIG. 4;

FIG. **6** is a simplified perspective illustration of the linkage element according to the invention;

FIG. **7** is a schematic side view of a children's tricycle with another embodiment of the vehicle steering head according to the invention;

FIG. **8** is a sectional side view of the vehicle steering head according to the invention, in the unlocked state;

FIG. **9** is a side view, turned or oriented by 90° of the arrangement shown in FIG. 8;

FIG. **10** is a sectional side view similar to FIG. 8, in the locked state;

FIG. **11** is a side view, turned or oriented by 90° which is similar to FIG. 9, in the locked state;

FIG. **12** is a top view on the linkage element according to the invention and on the associated mudguard;

FIG. **13** is a sectional view of the arrangement according to FIG. 12 along the sectional lines XIII—XIII of FIG. 12;

FIG. **14** is an enlarged side view showing a portion of the slide and of the locking element in the locked state;

FIG. **15** is a view analogous to FIG. 14, in the unlocked state;

FIG. **16** is a top view on the slide; and

FIG. **17** is a top view on the lower bearing.

DETAILED DESCRIPTION OF THE INVENTION

The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is

made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

A children's tricycle is shown in FIG. 1 and comprises a front wheel 14 which is supported on a wheel fork 4. Wheel fork 4 is fixedly connected to a fork member 3. A handlebar (not shown) can be secured to the upper end of fork member 3.

Fork member 3 is supported in a support tube 2. This support is accomplished by utilizing slide bearings 15 and 15' which are shown in detail in FIGS. 2 to 5. The slide bearings 15 and 15' correspond to those of the prior art in this embodiment so that a detailed description is not needed.

Support tube 2 is firmly connected to a frame 16 which has mounted thereon a seat 17. The tricycle also has a rear axle 18 with rear wheels 19. Accordingly, a support tube 2 and a fork member 3 form a steering head 1.

According to the invention, support tube 2 has arranged therein a linkage element 6 which has a substantially cylindrical configuration (see also FIG. 6) and which is received with a play or clearance (so that it can slide) within support tube 2. Linkage element 6 is also provided with a central recess through which fork member 3 extends or passes.

Support tube 2 also has formed therein a longitudinal slot 9 through which a connection element 10 extends or passes. This connection element 10 is connected to a slide 11 and linkage element 6. The connection may be via a screw 20 (see FIGS. 2 and 4) or other conventional connecting mechanism. In the illustrated embodiment, connection element 10 is integrally connected to or formed with slide 11 and extends in a recess 21 of linkage element 6. However, connection element 10 and slide 11 may be made as separate components which are joined or secured together by any conventional attachment technique including a screw or threaded element.

On its front upper portion, linkage element 6 comprises two symmetrical opposite attachments or stops 12. Each of these stops 12 may be provided with lateral stop surfaces 7. When viewed from the top, these attachments or stops 12 are designed in a manner of a segment of a partial circle (pie shaped or wedge shaped), so that four stop surfaces 7 are formed, with each one being arranged in symmetry with one another. Of course, stops 12 may be separately formed and attached to linkage element 6 instead of being integrally formed therewith, as is shown.

In the illustrated embodiment two locking elements 8 may be utilized in which each is formed by a recess 13. These locking elements 8 are preferably provided on linkage element 6 in retracted or set back manner with respect to stops 12. As is apparent from FIG. 6, the walls of at least one recess 13 may be made resilient to ensure a releasable locking of a bolt-like latch element 5 when linkage element 6 is pushed upwards or into engagement with bolt-like latch element 5.

As is apparent from FIGS. 2 to 5, fork member 3 is provided with a bolt-like or pin-like latch element 5 which extends or projects from at least one and preferably both sides of fork member 3. Of course, latch element 5 may be integrally formed with fork member. Alternatively, latch element 5 may be a threaded or partially threaded member which threads into fork member 3. However, it is preferred that latch element 5 be a pin having a centrally disposed exterior knurl which is press fit into a fork member as is shown. In its working position, latch element 5 rotates with fork member 3 when a deflection or rotation of the handlebar takes place. The deflection of the handlebar is limited by way of latch element 5 abutting on stop surfaces 7, these stop surfaces 7 defining the limited range of motion of the handlebar.

When it is desired to lock the handlebar in a set position, latch element 5 is pressed or forced into recesses 13. This engagement occurs when locking element 8, which is disposed on linkage element 6, is pushed upwards by slide 11. Recesses 13 also utilize inclined inlet surfaces because they act as guiding lead-in surfaces which facilitate entry of pin 5 into recess 13. In the locked state, which is shown in FIGS. 4 and 5, a steering movement thus becomes impossible since the handlebar or fork member 3 is locked in a single direction. FIGS. 2 and 3 show a downwardly displaced condition of linkage element 6 in which latch element 5 is in a position which it does not cooperate with the locking element 8. As a result, in this position fork member 3 and handlebar are free to rotate until latch element 5 abuts on stop surfaces 7, this range of movement or rotation corresponding to a steering angle range.

According to a preferred aspect of the invention, linkage element 6 may be made from a plastic material. Of course, other materials are also contemplated.

Another embodiment of the vehicle steering head according to the invention is described with reference to FIGS. 7 to 16. In this regard, like parts are provided with like reference numerals.

As for the description of FIG. 7, reference can be made to the description of FIG. 1 to the extent that the same features are shown. The subsequent figures are illustrations elucidating the details which have been changed.

As in FIGS. 2 to 5, FIGS. 8 and 9 and 10 and 11, respectively, are illustrations showing the vehicle steering head on an enlarged scale. Again, like parts are here also provided with like reference numerals, so that reference can be made to the preceding explanations. Slide 11 utilizes connection element 10 and screw 20. Connection element 10 also extends through a longitudinal slot 9. Moreover, slide 11 comprises an outer grip portion 11 and an interior portion 11' which is screwed to outer grip portion 11 by a screw 20. A top view of slide 11 and 11' is shown in FIG. 16. As can be seen in this figure, a central recess 24 is provided through which fork member 3 extends or passes (with a clearance which allows slide 11' to move up and down with respect to fork member 3). Furthermore, slide 11' also has a recess (see FIGS. 9, 11 and 16) which is formed so that it can accept a bolt-like latch element 5'. Of course, this latch element 5' may be pressed into this recess, threaded into the recess, or otherwise secured to slide 11' in a suitable manner. Alternatively, latch element 5' may be integrally formed with slide 11'.

As already described in conjunction with a previous embodiment, a bearing 15 which serves as a slide bearing is used on the upper portion of steering head 1.

Lower bearing 15' in this embodiment is configured such that it has an upwardly projecting contour of a linkage element 6' which can extend into bearing 15'. Of course, the bearing and the upwardly projecting contour may be made as separate components which are joined together by conventional techniques rather than integrally formed as is shown. Additionally, as becomes apparent in FIG. 12, linkage element 6' may have a recess 25 into which latch element 5' can be inserted (see also FIGS. 9 and 11).

As can further be seen from the top view of FIG. 12, linkage element 6' comprises two lateral stop surfaces 7

which are angularly spaced apart from each other. This design is such that a downwardly oriented attachment or stop 26 (see FIGS. 8 to 11) of the bearing 15', which is connected to support tube 2, forms a steering limitation of plus/minus approximately 45°. Of course, as with the previous embodiment, the range of steering limitation can be designed to any desired range.

FIG. 13 shows a lateral sectional view of mudguard 22 and of linkage element 6'. Note that these components are integrally formed as a single member which reduces manufacturing costs associated with joining two separate components.

FIGS. 14 and 15 are front views of slide 11' wherein handpiece 11 has been removed to illustrate the operation of locking element 8'. Locking element 8' is U-shaped and includes two movable or flexible lateral legs which can releasably be inserted into a recess 23 of bearing 15'. Upon insertion and locking, locking element 8' is pressed against an undercut and thereby held in position inside recess 23. Accordingly, when it is desired to release the locked state of fork member 3, slide 11' must be pushed upwards which removes the legs from recess 23. Of course, other locking mechanisms may be utilized and this embodiment is not limited to the use of this particular locking mechanism. For example, a pin may be used which has a floating ring disposed around its circumference. Alternatively, other conventional releasable locking mechanisms may be utilized.

FIG. 17 is a top view on lower bearing 15' on an enlarged scale. The (downwardly projecting) attachment or stop 26 can be seen here as can recess 23 which receives locking element 8'. Moreover, recess 27 is adapted to receive and guide bolt-like latch element 5' therein. Furthermore, a surrounding collar-like edge 28 can be seen in which 29 designates two oppositely disposed attachments or projections which serve as anti-rotation engagements. These engagements are designed to engage recesses (not shown) of support tube 2. Of course, lower bearing may be secured to support tube 2 in any conventional manner such as by bonding, welding, or screws. Moreover, this attachment may be releasable or more permanent in nature.

It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

What is claimed:

1. A vehicle steering head comprising:
- a support tube adapted to be fixed to a frame;
- a fork member adapted to connect a wheel fork to a handlebar;
- the fork member being rotatable with respect to the support tube;
- a latch element movably disposed within the support tube; and
- a linkage element being movable and comprising at least one stop surface,
- wherein the at least one stop surface limits the rotation of the fork member with respect to the support tube, and
- wherein the latch element moves in a direction parallel to an axis of the fork member.

2. The steering head of claim 1, wherein the latch element is connected to a slide, the slide being disposed within the support tube.

3. The steering head of claim 2, wherein the slide is moveable substantially parallel to the axis of the fork member.

4. The steering head of claim 1, further comprising a locking element connected to one of a slide and the linkage element.

5. The steering head of claim 1, wherein the linkage element rotates with the fork member.

6. The steering head of claim 1, wherein the fork member is cylindrical.

7. The steering head of claim 1, further comprising a handlebar connected to one end of the fork member and a wheel fork connected to another end of the fork member.

8. A vehicle steering head comprising:
- a support tube adapted to be fixed to a frame;
- a cylindrical member adapted to connect a wheel fork to a handlebar;
- the cylindrical member being rotatable with respect to the support tube;
- a latch element movably disposed within the support tube; and
- a linkage element being movable and comprising at least two stop surfaces,
- wherein one of the at least two stop surfaces limits the rotation of the cylindrical member in one direction,
- wherein another of the at least two stop surfaces limits the rotation of the cylindrical member in another direction,
- wherein the latch element is connected to a slide, the slide being disposed within the support tube, and
- wherein the slide is moveable substantially parallel to the axis of the cylindrical member.

9. The steering head of claim 8, further comprising a locking element connected to one of a slide and the linkage element.

10. The steering head of claim 8, wherein the latch element moves in a direction parallel to an axis of the cylindrical member.

11. The steering head of claim 8, wherein the linkage element rotates with the cylindrical member.

12. A vehicle steering head comprising:
- a support tube adapted to be fixed to a frame;
- a connecting element adapted to connect a wheel fork to a handlebar;
- the connecting element being rotatable with respect to the support tube;
- a linkage element being movable and comprising at least two stop surfaces;
- one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;
- another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and
- a latch element that is movable parallel to an axis of the connecting element between at least a first position and at least a second position,

wherein, when the latch element is in the first position, the connecting element is rotatable, and wherein, when the latch element is in the second position, the connecting element is prevented from rotating.

13. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mechanism is coupled to the mudguard.

14. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mechanism and the mudguard comprise a one-piece structure.

15. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a device that engages the mechanism to prevent movement thereof,

wherein the device that engages the mechanism comprises a pin, and

wherein the pin is movable.

16. The vehicle steering head of claim 15, wherein the pin can move parallel to an axis of the connecting element.

17. The vehicle steering head of claim 16, wherein the pin engages an opening in the mechanism in a locking position.

18. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mudguard comprises the mechanism.

19. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mudguard;

a first stop surface limiting the rotation of the connecting element in one direction;

a second stop surface limiting the rotation of the connecting element in another direction; and

a device that engages the mudguard to prevent movement thereof,

wherein the device that engages the mudguard comprises a pin, and

wherein the pin is movably mounted.

20. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mudguard;

a first stop surface limiting the rotation of the connecting element in one direction;

a second stop surface limiting the rotation of the connecting element in another direction; and

a device that engages the mudguard to prevent movement thereof,

wherein the device that engages the mudguard comprises a pin, and

wherein the pin can move parallel to an axis of the connecting element.

21. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mudguard;

a first stop surface limiting the rotation of the connecting element in one direction;

a second stop surface limiting the rotation of the connecting element in another direction; and

a device that engages the mudguard to prevent movement thereof,

wherein the device that engages the mudguard comprises a pin, and

wherein the pin engages an opening in the mudguard.

22. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mudguard;

a first stop surface limiting the rotation of the connecting element in one direction;

a second stop surface limiting the rotation of the connecting element in another direction; and

a device that engages an opening that moves when the mudguard moves, wherein, when the device engages the opening, the mudguard is prevented from moving.

23. The vehicle steering head of claim 22, wherein the device that engages the opening comprises a pin.

24. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatable with respect to the support tube; and

a system which limits the rotational movement of the fork member in each of two directions,

wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member, and

wherein the one part which is non-rotatably mounted to the support tube comprises a lower bearing support.

25. The vehicle steering head of claim 24, wherein the other part which rotates with the fork member comprises a mechanism that has two stop surfaces.

26. The vehicle steering head of claim 25, wherein the mechanism that has two stop surfaces comprises a mudguard.

27. The vehicle steering head of claim 25, wherein the mechanism that has two stop surfaces is coupled to a mudguard.

28. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatable with respect to the support tube; and

a system which limits the rotational movement of the fork member in each of two directions,

wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member, and

a device that engages an opening that moves when the fork member moves, wherein, when the device engages the opening, the fork member is prevented from moving.

29. The vehicle steering head of claim 28, wherein the device that engages the opening comprises a pin.

30. The vehicle steering head of claim 29, wherein the pin can move in a direction that is parallel to an axis of the support tube.

31. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatably mounted to the support tube;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being movably mounted; and

the opening being arranged on a surface that can rotate in each of two directions,

wherein, when the pin engages the opening, the fork member is prevented from rotating, and

wherein, when the pin does not engage the opening, the fork member is free to rotate in each of two directions.

32. The vehicle steering head of claim 31, wherein the pin can move in a direction that is parallel to an axis of the support tube.

33. The vehicle steering head of claim 31, further comprising a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

34. The vehicle steering head of claim 33, wherein the one part which is non-rotatably mounted to the support tube comprises two stop surfaces and wherein the other part which rotates with the fork member comprises two stop surfaces.

35. The vehicle steering head of claim 34, wherein the fork member can rotate approximately 45 degrees to each side.

36. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatably mounted to the support tube;

a locking system comprising an opening and a locking device;

the locking device comprising a button portion and an engaging portion;

the locking device being movably mounted and being capable of moving in a direction that is parallel to an axis of the support tube;

the opening being arranged on a surface that can rotate in each of two directions and being capable of receiving the engaging portion of the locking device,

wherein, when the engaging portion engages the opening, the fork member is prevented from rotating, and

wherein, when the engaging portion does not engage the opening, the fork member is free to rotate in each of two directions.

37. The vehicle steering head of claim 36, further comprising a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

38. The vehicle steering head of claim 36, wherein the one part which is non-rotatably mounted to the support tube comprises two stop surfaces and wherein the other part which rotates with the fork member comprises two stop surfaces.

39. A vehicle steering head for one of a bicycle or a tricycle having a frame, said steering head comprising:

a support tube adapted to be fixed to the frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that limits rotational movement of the connecting element;

the mechanism comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mechanism is coupled to a mudguard, and

wherein the mechanism and the mudguard comprise a one-piece structure.

40. A vehicle steering head for one of a bicycle or a tricycle having a frame, said steering head comprising:

a support tube adapted to be fixed to the frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that limits rotational movement of the connecting element;

the mechanism comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a device that engages the mechanism to prevent movement thereof,

wherein the device that engages the mechanism comprises a pin, and

wherein the pin is movable parallel to an axis of the connecting element.

41. The vehicle steering head of claim 40, wherein the pin engages an opening in the mechanism in a locking position.

42. A vehicle steering head for one of a bicycle or a tricycle having a frame, said steering head comprising:

a support tube adapted to be fixed to the frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatably mounted to the support tube;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being movably mounted; and

the opening being arranged on a surface that can rotate in each of two directions,

wherein, when the pin engages the opening, the fork member is prevented from rotating, and

wherein, when the pin does not engage the opening, the fork member is free to rotate in each of two directions.

43. The vehicle steering head of claim 42, wherein the pin is moveable in a direction that is parallel to an axis of the support tube.

44. The vehicle steering head of claim 42, further comprising a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

45. The vehicle steering head of claim 44, wherein the one part which is non-rotatably mounted to the support tube comprises two stop surfaces and wherein the other part which rotates with the fork member comprises two stop surfaces.

46. The vehicle steering head of claim 45, wherein the fork member can rotate approximately 45 degrees to each side.

47. A vehicle steering head for a bicycle or a tricycle having a frame, comprising:

a support tube fixed to the frame;

an upper bearing support non-movably mounted to the support tube;

a lower bearing support non-movably mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess formed in the lower bearing support and a protrusion that rotates when the connecting element rotates;

the protrusion comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a locking system that prevents rotational movement of the connecting element.

48. The vehicle steering head of claim 47, wherein the locking system comprises an engaging member that can be moved between a first position that allows the connecting element to rotate in each of two directions to a second position wherein the connecting element is prevented from rotational movement in each of the two directions.

49. The vehicle steering head of claim 47, wherein the locking system comprises a movable engaging member that can move parallel to an axis of the connecting element to prevent rotational movement of the connecting element.

50. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support non-movably mounted to the support tube;

a lower bearing support non-movably mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which movably engages with the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

the projecting portion being movable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion extends into the recess and rotates with the connecting element about an axis that runs through the connecting element.

51. The vehicle steering head of claim 50, further comprising a locking system that prevents rotational movement of the connecting element.

52. The vehicle steering head of claim 51, wherein the locking system comprises a locking member that moves parallel to an axis of the support tube and an opening which rotates with the connecting element, wherein when the locking member engages the opening the connecting element is prevented from rotating, and wherein when the locking member disengages from the opening the connecting element is allowed to rotate.

53. The vehicle steering head of claim 51, wherein the locking system comprises a movable locking member and a recess which rotates with the connecting element, wherein when the locking member engages the recess the connecting element is prevented from rotating, and wherein when the locking member disengages from the recess the connecting element is allowed to rotate.

54. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a device that engages an opening in the mechanism to prevent movement of the mechanism.

55. The vehicle steering head of claim 54, wherein the device that engages the mechanism comprises a pin.

56. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to an upper end of the support tube;

a lower bearing support mounted to a lower end of the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which movably engages with the recess;

the recess comprising two stop surfaces and being arranged on the lower bearing support;

the projecting portion being rotatable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion extends into the recess and rotates with the connecting element about an axis that runs through the connecting element.

57. The vehicle steering head of claim 56, wherein the projecting portion is arranged on a mudguard.

58. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to an upper end of the support tube;

a lower bearing support mounted to a lower end of the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which movably engages with the recess;

the recess comprising two stop surfaces and being arranged on the lower bearing support;

the projecting portion being arranged on a mudguard and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion extends into the recess and rotates with the connecting element about an axis that runs through the connecting element, and

wherein the projecting portion and the mudguard comprise a one-piece member.

59. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which moves within the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion rotates with the connecting element about an axis that runs through the connecting element.

60. The vehicle steering head of claim 59, further comprising a locking system that prevents rotational movement of the connecting element.

61. The vehicle steering head of claim 60, wherein the locking system comprises a locking member that moves parallel to the axis and an opening adapted to receive the locking member, and wherein the locking member is movable between a first position that allows the connecting element to rotate in each of two directions to a second position wherein the connecting element is prevented from rotational movement in each of the two directions, whereby, in the first position, the locking member does not extend into the opening, and whereby, in the second position, the locking member extends into the opening.

62. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which moves within the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

the projecting portion being movable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion rotates with the connecting element about an axis that runs through the connecting element.

63. The vehicle steering head of claim 62, wherein the projecting portion is arranged on a mudguard.

64. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which moves within the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

the projecting portion being arranged on a mudguard;

the projecting portion being movable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion rotates with the connecting element about an axis that runs through the connecting element, and

wherein the projecting portion and the mudguard comprise a one-piece member.

65. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which moves within the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

the projecting portion being movable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion rotates with the connecting element about an axis that runs through the connecting element.

66. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being movably mounted within the support tube; and

the opening being arranged on a surface that can rotate with the connecting element in each of two directions,

wherein, when the pin engages the opening, the connecting element is prevented from rotating, and

wherein, when the pin does not engage the opening, the connecting element is free to rotate in each of two directions.

67. The vehicle steering head of claim 66, further comprising a mudguard.

68. The vehicle steering head of claim 66, wherein the pin moves parallel to an axis of the connecting element.

69. The vehicle steering head of claim 66, wherein the pin moves parallel to an axis of the connecting element and is configured to pass through the lower bearing support and into the opening.

* * * * *

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(12) **United States Patent**
Kettler et al.

(10) **Patent No.: US 7,156,408 B2**
(45) **Date of Patent: Jan. 2, 2007**

(54) **VEHICLE STEERING HEAD**

(75) Inventors: **Heinz Kettler**, Ense-Parsit (DE); **Joachim Kettler**, Werl (DE); **Reinhard Rocholl**, Werl (DE)

(73) Assignee: **Heinz Kettler GmbH & Co. KG.**, Ense-Parsit (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(63) Continuation of application No. 10/298,002, filed on Nov. 18, 2002, now Pat. No. 6,799,772, which is a continuation of application No. 10/092,516, filed on Mar. 8, 2002, now abandoned, which is a continuation of application No. 09/584,497, filed on Jun. 1, 2000, now Pat. No. 6,378,884.

(30) **Foreign Application Priority Data**

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B62K 5/02 (2006.01)

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(58) **Field of Classification Search** 280/279, 280/272, 271, 282, 89; 403/354, 83; 74/495
See application file for complete search history.

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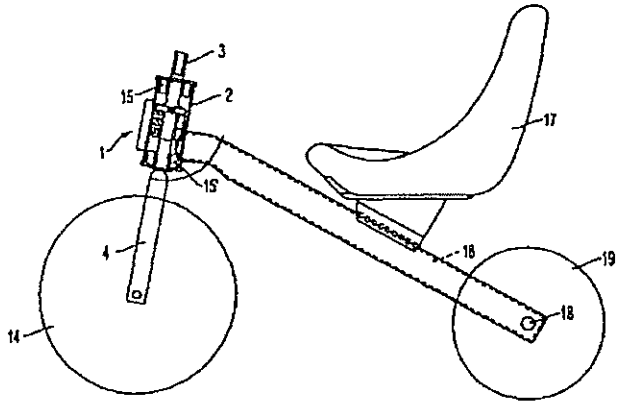
Primary Examiner—Tony Winner
(74) *Attorney, Agent, or Firm*—Greenblum & Bernstein, P.L.C.

(57) **ABSTRACT**

Vehicle steering head including a connecting element adapted to engage a handlebar. A support tube rotatably supports the connecting element. A connecting member is adapted to connect a wheel fork to a handlebar. The connecting member is rotatable with respect to the support tube. A mechanism limits the rotational movement of the connecting member in each of two directions. A lower bearing support is mounted to the support tube. The mechanism and the lower bearing support cooperate to limit the rotational movement of the connecting member.

71 Claims, 9 Drawing Sheets



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Three sheets labeled "ACKNOWLEDGMENT" which Radio Flyer alleges to be evidence that the Radio Flyer model No. 77 was sold during 1998.

A sheet entitled "Restricted Turning Prior Art" which Radio Flyer alleges to be evidence that the Radio Flyer model No. 77 was released Feb. 19, 1998.

A sheet entitled "Product Name: Roll N Ride" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Grow-With-Me-Trike" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Baby Too" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Tough Trikes" and "Product Name: Push'n Pedal Trike" which Radio Flyer alleges to be evidence that the products shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "HBC Model 29875 CS 04G" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Smoby Pilot Alu Plus Jugueles Pico S.A." which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Fisher Price Rock, Roll and Ride XL" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Charton Baby Driver 2 39150 St. Laurent France" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Processed Plastics West Coast Choppers" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Processed Plastic Item 17800-2" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799.772.

Two sheets entitled "Fischer Price Kawasaki (US Patent 6,651,528)" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Mattel Hot Wheels" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Tek-Net Toys Int'l Inc. USA 020821 Emergency 911" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Fischer Price L&S Ride on Harley" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Friendly Toys Item #7112 Fold-Up Trike" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

English Language Abstract of GB 815,456.

English Language Abstract of DE 32 42 863.

English Language Abstract of DE 39 14 050.

English Language Translation of Swiss No. 290478.

Document showing Radio Flyer model #77 entitled "Restricted Turning Prior Art" asserted by Radio Flyer to be prior art against the instant application in Civil Action No. 204-CV-614. During litigation, Radio Flyer presented to Applicant two Radio Flyer model #77 trikes and asserted that these trikes were prior art. One trike had an adhesive label with the following text "P.D. Jun. 1999" and another trike had an adhesive label with the text "P.D. Jul. 1998". Applicant has no knowledge with regard to the meaning of "P.D.". Additionally, during litigation, Applicant ordered three Radio Flyer model #77 trikes on ebay rom three different individuals. One trike had an adhesive label with the following text "P.D. Jun. 1999", another trike had an adhesive label with the text "P.D. Jul. 1999", and another trike had an adhesive label with the text "P.D. Oct. 1999". Applicant has no knowledge with regard to whether or when any of these five trikes was sold or offered for sale in the U.S.

Italtrike "Kids on wheels" catalog (in color) pp. KET2818-KET2841 dated Jan. 2005.

Italtrike International "Kids on wheels" catalog (in color) pages 100004-100027 dated Jan. 2000.

Italtrike International catalog pp. 100028-100039.

Radio Flyer catalog (in color) entitled "Specialty Collection 2000" pp. RF01266-RF01273.

Radio Flyer catalog (in color) entitled "Product Catalog 2000" pp. RF01274-RF01305.

Radio Flyer catalog (in color) entitled "Consumer Product Catalog" pp. RF01306-RF01313.

Radio Flyer catalog (in color) entitled "Product Catalog 1999" pp. RF01314-RF01349.

Radio Flyer catalog (in color) entitled "Specialty Collection Catalog 1999" pp. RF01350-RF01357.

Radio Flyer catalog (in color) pp. RF01358-RF01388.
Radio Flyer 1998 catalog (in color) pp. RF01389-RF01396.
Hand made drawing page No. RF12204 on ITALTRIKE letterhead. The drawing has a handwritten date of Jan. 21, 1987.
Hand made drawing page No. RF12206 on ITALTRIKE letterhead. The drawing has a handwritten date of Jan. 21, 1987.
Black and while picture allegedly showing a mold having page No. RF12208.
Black and white picture allegedly showing mold parts having page No. RF12209.
Sheet table in Italian having a stamp entitled "N. CITTON & C, s.a.s.".
Cover page of Europeo (in color) having page RF12230 and dated Feb. 1, 1991.
Four sheets with page Nos. RF12244-A, -B, -C and -D (in color) showing various pictures of trikes and a scooter on what appears to be notebook pages.
Four sheets with page Nos. RF12245-A, -B, -C and -D (in color) showing various pictures of trikes and a bike on what appears to be notebook pages.

* cited by examiner

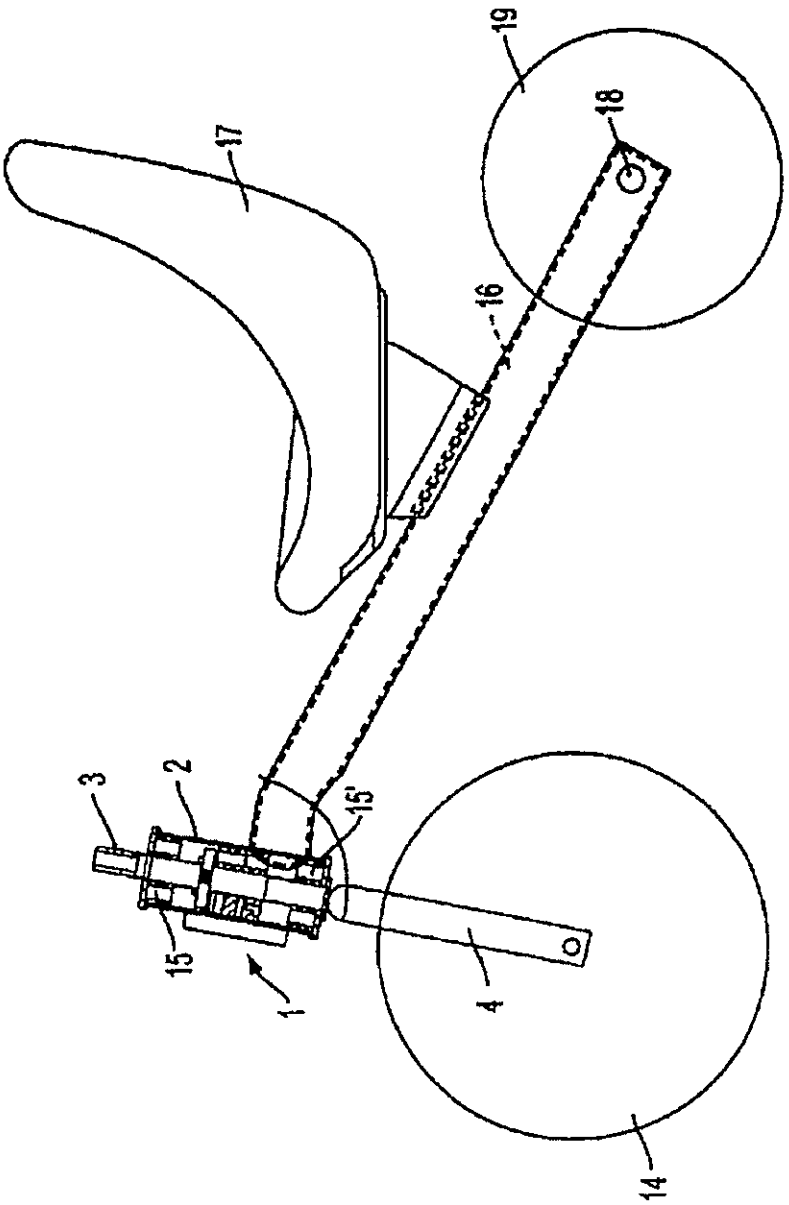


FIG. 1

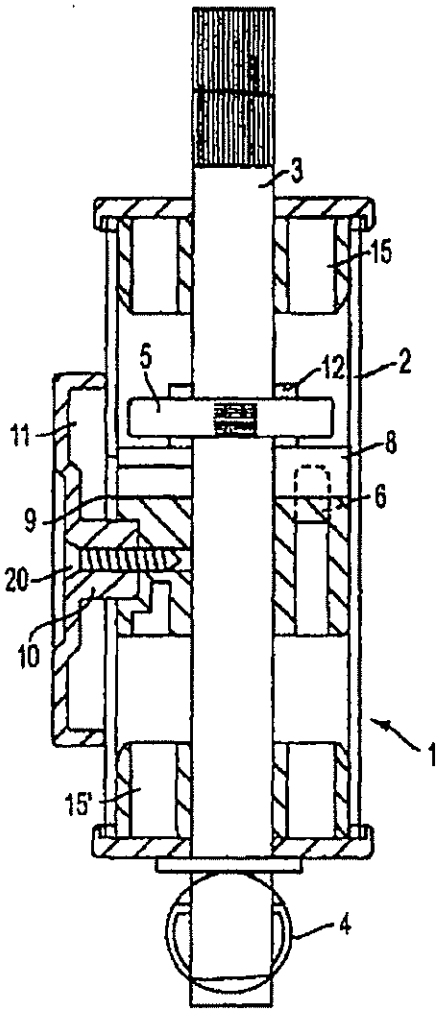


FIG. 2

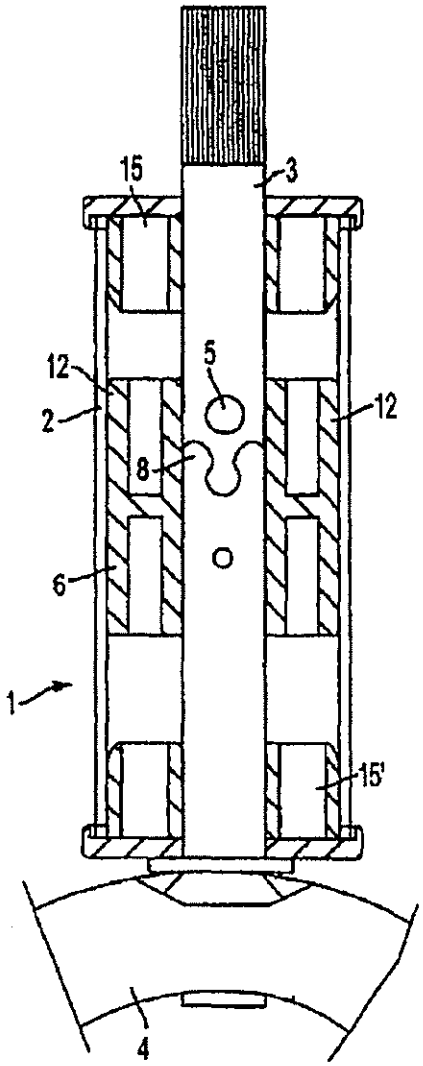


FIG. 3

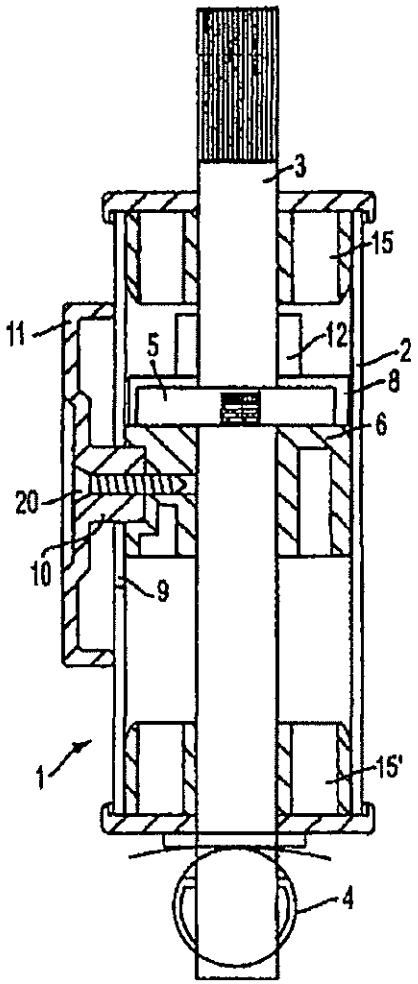


FIG. 4

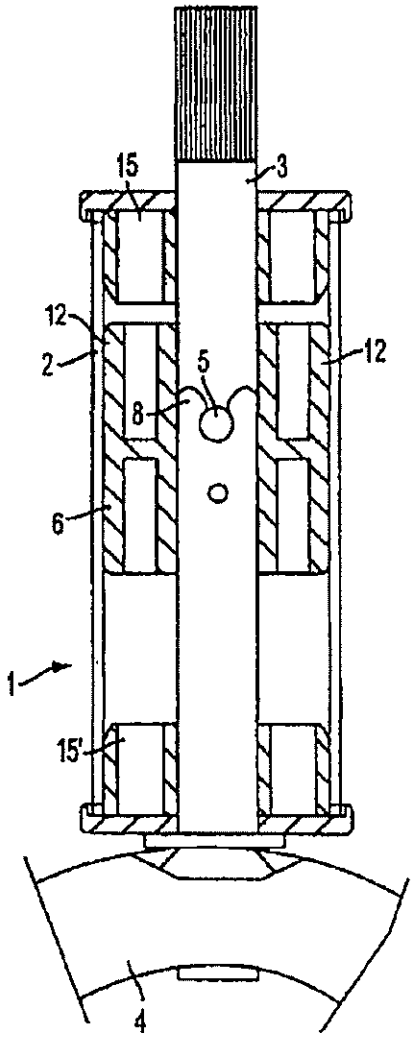


FIG. 5

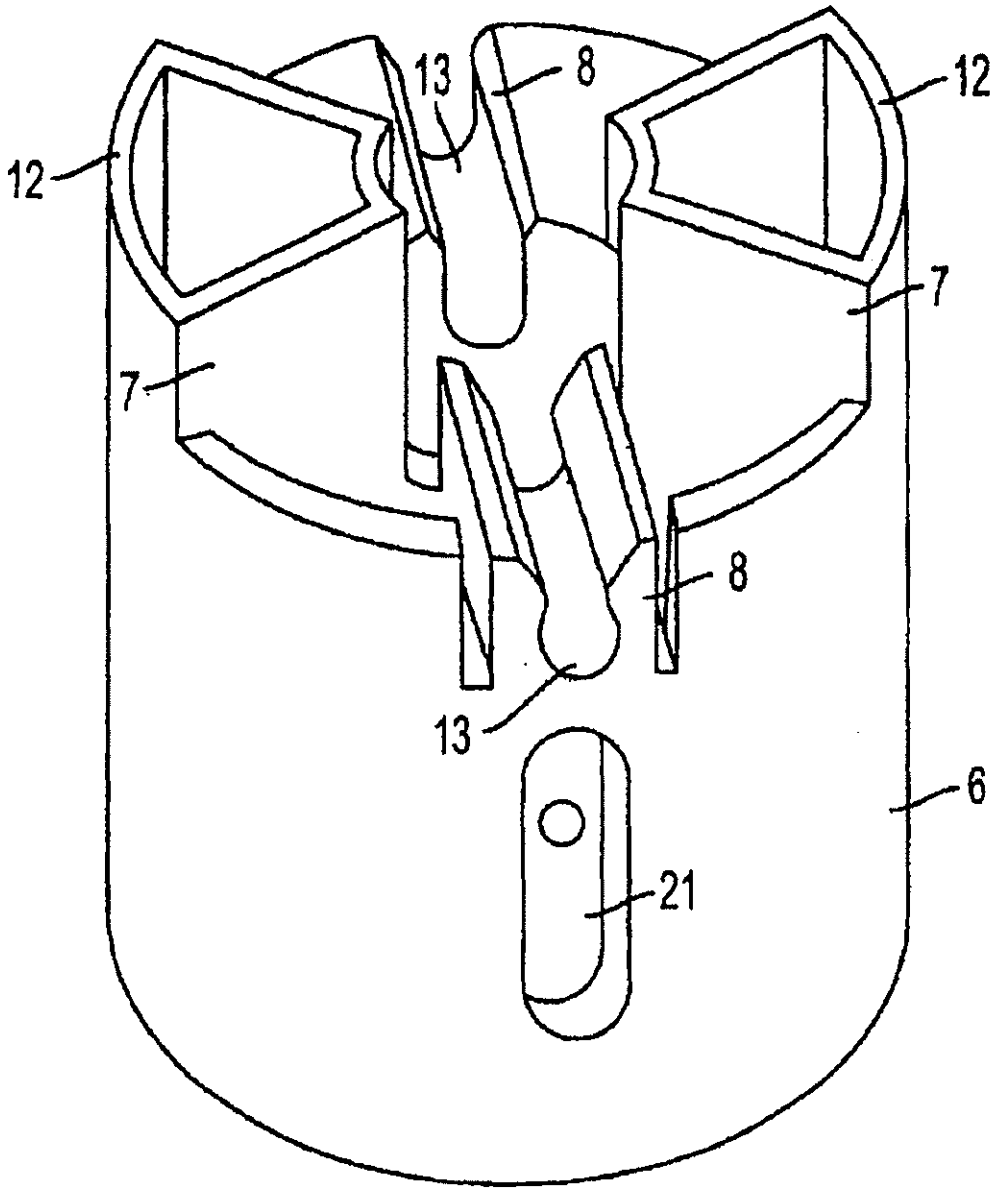


FIG. 6

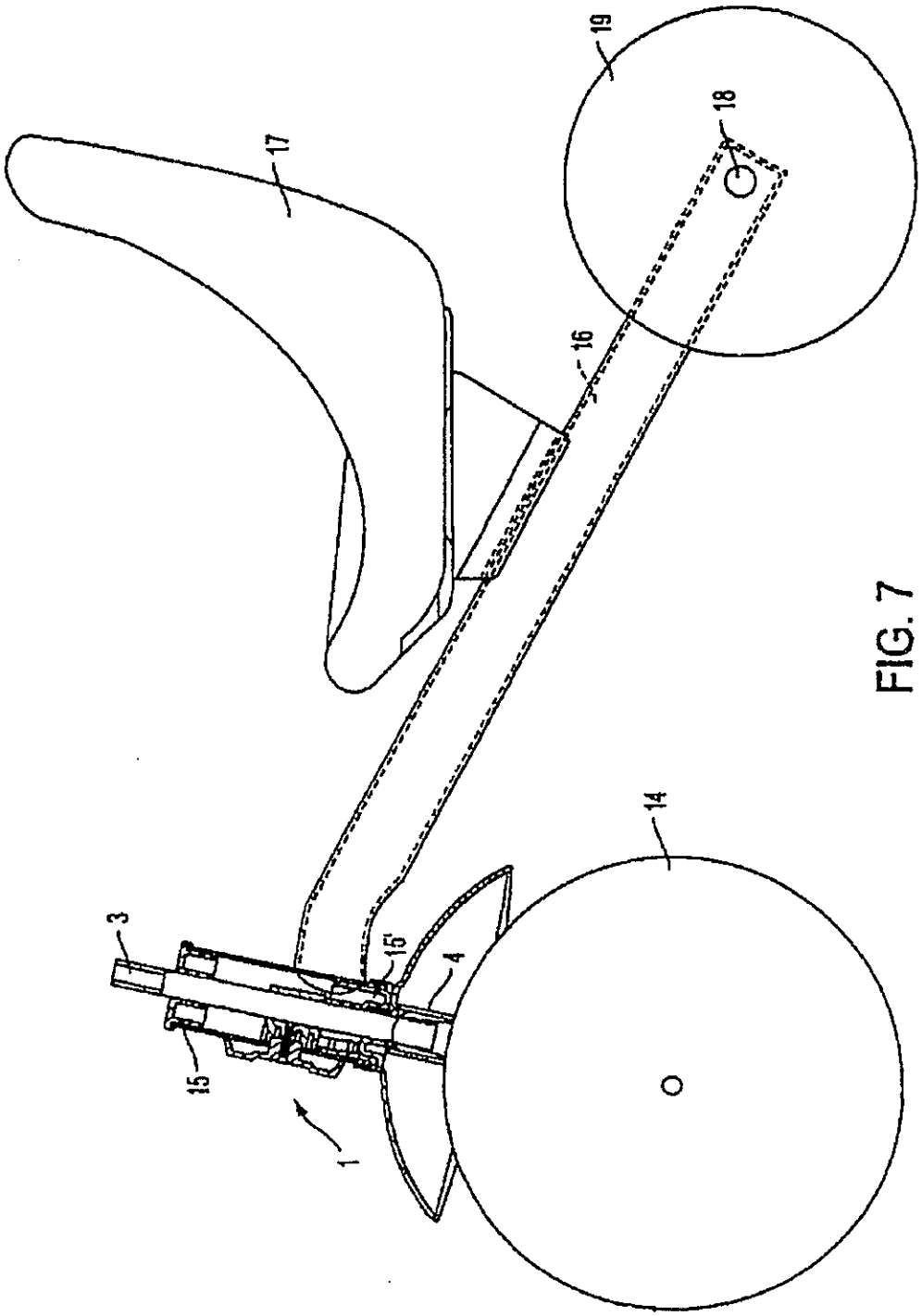
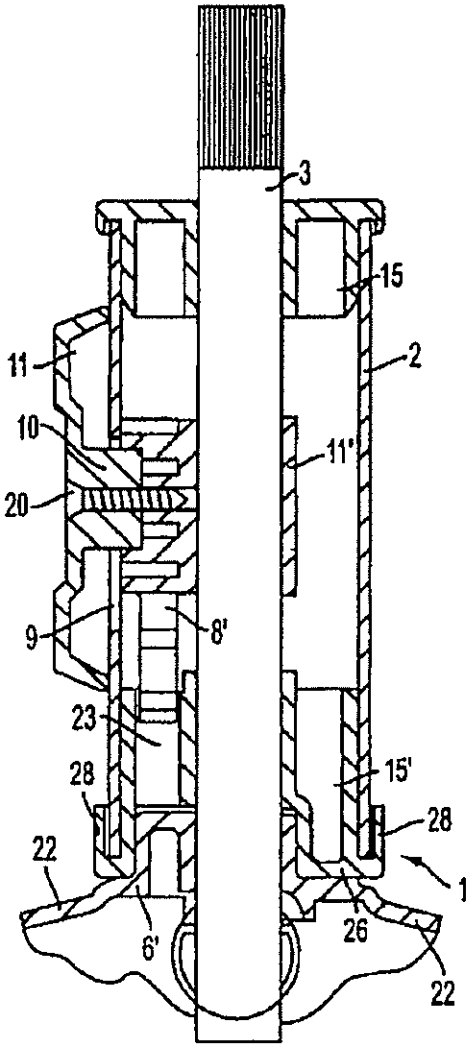


FIG. 7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15
2
11
10
11'
20
9
8'
23
28
15'
28
22
1
6'
26
22

FIG. 8

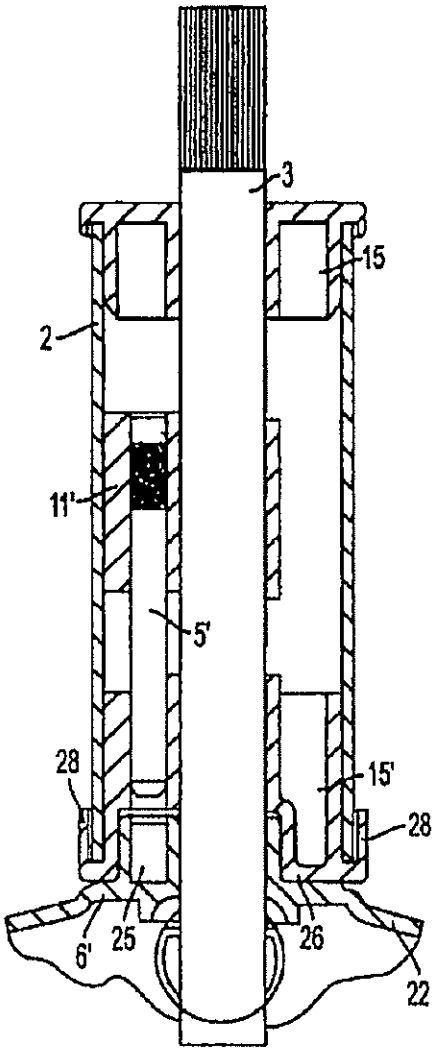
3
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FIG. 9

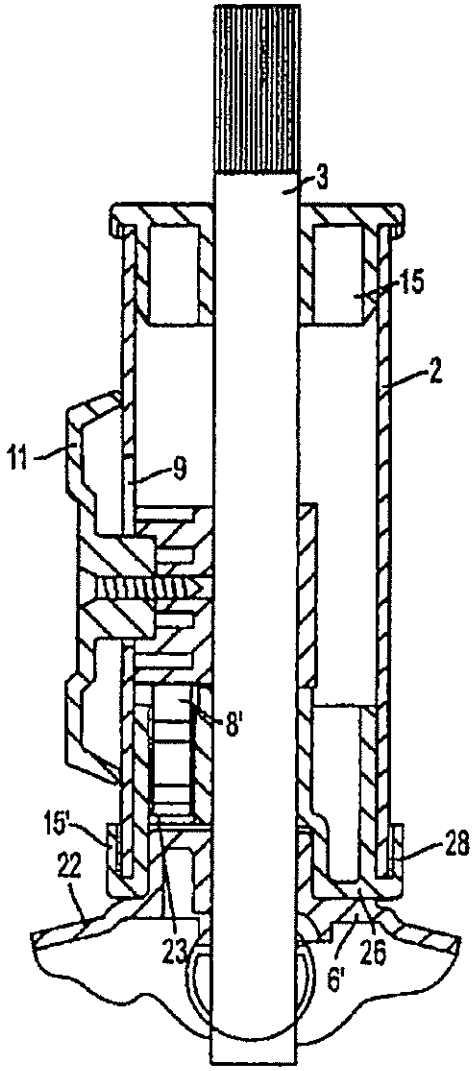

FIG. 10

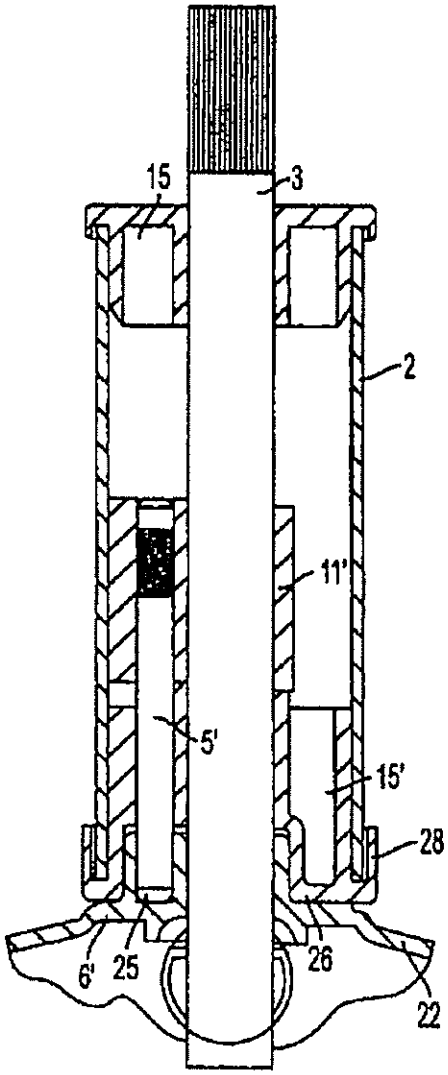

FIG. 11

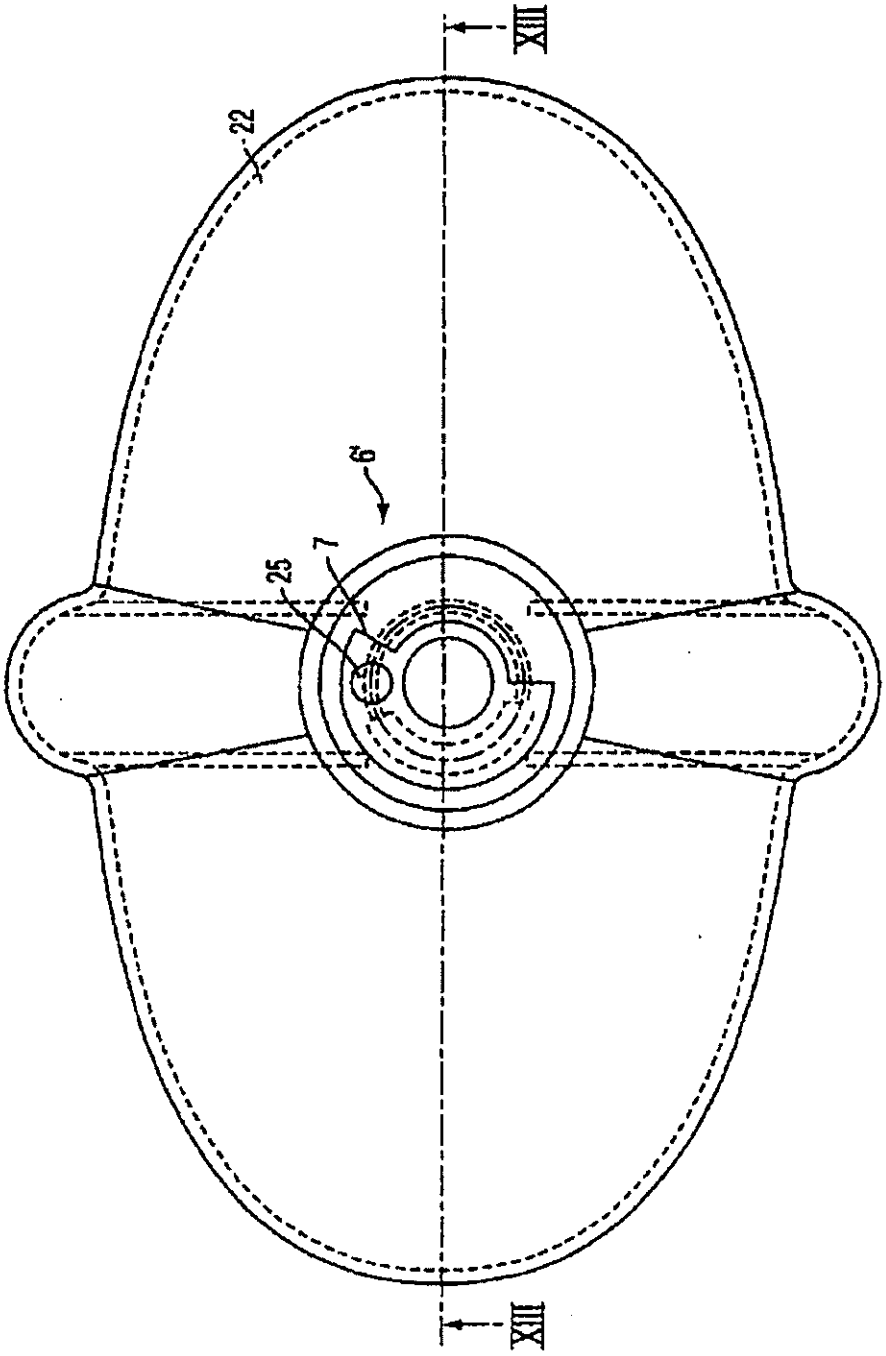

FIG. 12

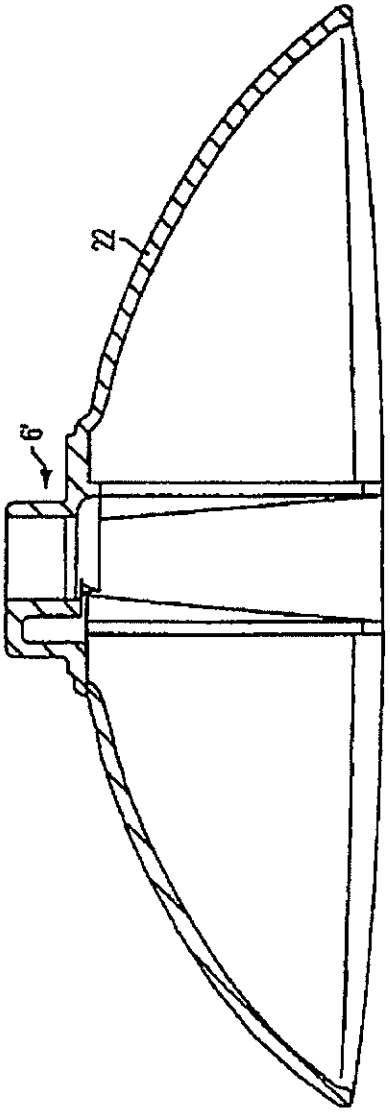

FIG. 13

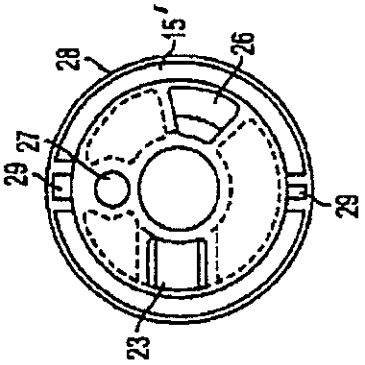

FIG. 17

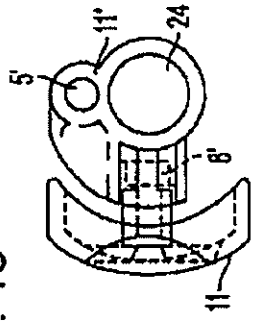

FIG. 16

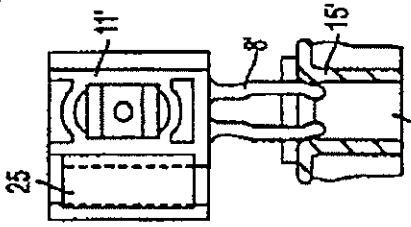

FIG. 15

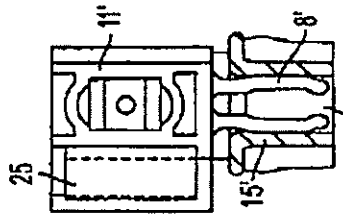

FIG. 14

VEHICLE STEERING HEAD

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of U.S. application Ser. No. 10/298,002 which was filed Nov. 18, 2002 now U.S. Pat. No. 6,799,772, which is a continuation of U.S. application Ser. No. 10/092,516 filed Mar. 8, 2002 now abandoned which is a continuation of U.S. application Ser. No. 09/584,497 filed Jun. 1, 2000, now U.S. Pat. No. 6,378,884, the disclosures of which are expressly incorporated by reference herein in their entireties. Further, the present application claims priority under 35 U.S.C. § 119 of German Patent Application No. 299 11 652.2, filed on Jul. 5, 1999, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle steering head and in particular, to a steering head for a vehicle comprising a support tube which has rotatably supported therein a fork member to which a wheel cover and a handlebar can be secured.

2. Discussion of Background Information

Vehicle steering heads of the above-described type are in particular used in bicycles or tricycles, and in particular in tricycles or bicycles for children.

In devices of the above-described type it is desirable for safety reasons that accidents be avoided which may be caused by an excessively large handlebar deflection. It has been found that when there is an excessively large handlebar deflection (e.g., the handle bar rotates beyond a point where effective steering occurs), the vehicle may tilt to the side. Moreover, such deflections or excessive rotation may run the risk that a user impacts his body against the handlebar. Additionally, the user may get caught with his/her feet in the front wheel and may be even be injured by the pedals.

A further drawback or disadvantage of prior-art devices occurs when they are pushed with a push rod type device. In such cases, these devices have a tendency towards uncontrolled steering movements of the front wheel which cannot be mastered or effectively controlled by small children, in particular.

SUMMARY OF THE INVENTION

The present invention therefore provides a vehicle steering head of the above-mentioned type which is of a simple construction and which can operate in an easy and reliable manner. Moreover, this design avoids the drawbacks of the prior art and can in particular limit a handlebar deflection to a desired degree. The invention also has provision for locking the handlebar.

According to one aspect of the invention a latch element is secured to a fork member on a portion provided inside the support tube. A linkage element is supported in the support tube for rotation therewith. The linkage element is displaceable or moveable in a longitudinal direction of the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the latch element. Moreover, the linkage element comprises at least one locking element which is releasably connectable to the latch element.

According to another aspect of the invention a latch element is supported on the support tube. A linkage element is arranged on the fork member and connected to the tube for rotation therewith. The latch element is freely displaceable or moveable along the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the support tube. Moreover, at least one latch element is provided that is releasably connectable to the support tube.

The vehicle steering head according to the invention is characterized by a number of considerable advantages.

First of all, it is possible to install or utilize the steering head in a frame of any desired design, e.g. children's bicycles or tricycles. Ideally, the dimensions of the steering head are such that they do not interfere with the remaining structure of the frame within which it is installed. Of course, the steering head may be combined with any and all common types of frames where ever its advantageous design is desired. Accordingly, the steering head may be utilized in a variety of devices where limited deflection or rotation and/or locking are desired.

Because the invention utilizes a latch element which is arranged in the support tube, no functional parts of the steering head need be outwardly visible or accessible. Accordingly, the internal parts are less susceptible to damage. Additionally, this design is less likely to cause injury when used by children or infants.

As a result of utilizing a linkage element according to the invention, it is possible to reliably lock the fork member and thus the wheel fork and the front wheel. Such a locking provision is easily be accomplished by displacing or moving the linkage element. This design ensures a high degree of operational safety and operational reliability.

The linkage element preferably utilizes stop surfaces which cooperate with the latch element in a manner where they are brought into contact with one another. In this way, the steering angle can be limited to a particularly or desired range. This limited range of motion of the steering angle can be realized according to the invention in different ways. The invention contemplates that the available steering angle is freely selectable within a wide desired range. This is of particular advantage to vehicles for children such as tricycles, which may require a steering angle of approximately 45° to each side. Of course, other desirable steering angles can be utilized. However, by designing in the desired limited steering angle, lateral tilting of the tricycle or similar devices can be prevented or their risk significantly reduced. Additionally, the risk of injuries which may be caused by the pedals, e.g., devices which utilize pedals on the front wheel can be reduced. Finally, the risk of injury which can occur when the handlebar exceeds a controlled steering angle can be ruled out to a considerable extent.

The invention also provides for a linkage element having a locking element which is releasably connectable to the latch element. This design ensures that when a push rod is used for pushing the device, i.e., a tricycle, the front wheel thereof may be reliably locked in place during straight travel.

In an advantageous embodiment of the invention, the latch element is designed in the form of a pin which extends in a direction transverse to the fork member. The pin may extend through the fork member such that it projects at both sides of the fork member. Alternatively, the pin can project from the fork member on only one side. Moreover, the pin can be firmly connected to the fork member, e.g. by welding or other conventional attachment techniques. Additionally, it may be secured by press fitting with or without utilizing a

knurled portion. Of course, the dimensions of the pin can easily be adapted to the respective conditions of use.

It should be noted that the manufacturing costs of the steering head are reduced by the above-described construction to quite a considerable degree.

In another advantageous embodiment of the invention, the linkage element is substantially designed in the form of a hollow cylinder. Thus, the linkage element can be reliably guided in the support tube and surround the fork member. Additionally, the linkage element can be designed as a single integral part or several parts which are either joined together or which cooperate together.

It is advantageous for the longitudinal displacement or movement of the linkage element to be along an axis of the support tube and the fork member. Accordingly, the support tube may comprise at least one longitudinal slot or a similar recess through which a connection element extends which is connected to the linkage element. This design also utilizes a slide which is arranged outside the support tube.

The slide facilitates the ease of handling or movement of the linkage element. In such a design, a displacement of the slide, which may additionally be provided with locking mechanism or fixing safety mechanism, effects a corresponding displacement or movement of the linkage element. The locking mechanism or fixing mechanism allows for fixing the front wheel in a single or set travel position which is preferably straight. Moreover, the invention also contemplates that the linkage element may be provided with inclined inlet surfaces or intercepting mechanisms which engage the latch element so as to initiate a locking action when the front wheel is slightly deflected angularly.

Stop surfaces on the latch element are preferably formed on at least one front attachment of the linkage element. Additionally, it is particularly advantageous when two opposite attachments or stops are in symmetry with each other and are each provided with at least one stop surface located on the linkage element. Thus, by utilizing two attachments or stops which are in symmetry with each other, this design can limit the steering angle in a symmetrical fashion to both the left and the right side.

In another advantageous embodiment of the invention, the associated stop surfaces of the attachments or stops act to limit the rotation of the fork member to a predetermined angular range at both sides. This angular range may e.g. be approximately 45° to both sides, for a total range of motion of approximately 90°.

The locking element is preferably designed in the form of at least one front recess which receives the latch element. Such an advantageous design makes it possible to grip and fix the latch element upon displacement or movement of the linkage element. Additionally, it is advantageous that the recess be retracted or set back relative to the front attachment, so that the attachments or stops can always remain in the plane of the latch element, while upon a displacement of the latch element, it is only the recess which can additionally be brought into engagement.

To implement a simple and operationally reliable structure of the steering head, it may be advantageous for the recess to be centrally arranged between the two attachments or stops.

The invention also contemplates that the fork member itself has not been changed constructionally. In other words, the invention can be adapted to work with a conventional fork member. Also, the invention makes it possible to manufacture all functional parts separately in a very simple manner. As a result, advantageous on costs can be achieved.

In a preferred design of a previously described embodiment, the linkage element is designed as part of a mudguard which extends from below into the support tube. This design allows for significant cost savings since the mudguard is normally made from plastics and is typically already included in most vehicles of the above described type. The linkage element can thus be mounted on the mudguard or made integrally therewith, in a particularly easy way and at low costs.

A further advantage of the this embodiment is that the latch element can be designed in the form of a bolt which arranged to be parallel with the fork member. The latch element of this design can thus be given relatively large dimensions so that the diameter of the support tube itself need not be chosen with such a large size.

It may be of particular advantage when the latch element is connected to a slide which extends into the support tube so as to be able to design the lock of the front wheel in a particularly simple manner. Furthermore, the locking element may preferably be connected to the slide. Moreover, the locking element serves to reliably maintain the locked state and to prevent any unintended unlocking. The locking element also preferably engages into a recess of a bearing which supports the fork member in the support tube. As a result, it is not necessary to mount additional parts or to take installation measures on the support tube itself.

It may also be of particular advantage for the limitation of the steering angle to be accomplished by a lower bearing which supports the fork member in the support tube. This lower bearing may have formed thereon an attachment which projects in the direction of the linkage element and which can be brought into contact with the stop surfaces formed on the linkage element and thus on the mudguard. This design has the advantageous effect that the predetermined angular range can be limited at both sides as well, e.g. approximately 45° each side.

The invention provides a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element projecting from the fork member and disposed within the support tube, and a linkage element disposed within the support tube, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member and comprises at least one stop surface for limiting a rotation of the fork member when the latch element contacts the at least one stop surface. The linkage element may further comprise at least one locking element for locking the fork member in a single position. The at least one locking element may releasably engage the latch element when the fork member is locked. The latch element may comprise a pin. The pin may project substantially perpendicular to the axis of the fork member. The linkage element may comprise a substantially cylindrical shape. The linkage element may comprise a plurality of hollow chambers separated by connecting walls. The support tube may comprise an opening which allows a connecting element to pass therethrough. The opening may comprise a longitudinal slot. The connecting element may be secured to the linkage element. The movement of the linkage element may be limited by the movement of the connecting element within the longitudinal slot. The steering head may further comprise a slide which is secured to the connecting element, the slide being disposed adjacent an outer surface of the support tube. The at least one stop surface may be disposed on at least one stop.

The at least one stop may comprise a projection which extends from the linkage element. The at least one stop may

comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The at least one stop may comprise two stops which are disposed opposite one another. Each stop may comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The two stops may define a limited range of rotational motion of the fork member in each of a clockwise and a counter-clockwise direction. The limited range of motion in the clockwise direction may be substantially equal to the range of motion in the counter-clockwise direction. The limited range of motion in one of the clockwise and counter-clockwise direction may be approximately 45 degrees.

The linkage element may further comprise at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element. The at least one recess is set back some distance from a surface of at least one stop. The at least one recess is centrally disposed between at least two stops.

The steering head may further comprise an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tube, each of the upper and lower bearings having an opening which allows the fork member to pass therethrough.

The steering head may be disposed on a tricycle frame.

The invention also provides for a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork member, and a linkage element connected to the fork member so as to rotate therewith, the linkage element comprising at least one stop surface, wherein the at least one stop surface limits the rotation of the fork member with respect to the support tube. The steering head may further comprise a slide, wherein the slide is disposed within the support tube and retains the latch element. The slide may further comprise at least one locking element for releasably securing the slide to the support tube. The linkage element may comprise a mudguard. The mudguard may be disposed between one end of the support tube and a wheel fork. The latch element may comprise a rod like member which is arranged substantially parallel to the axis of the fork member. The rod like member may comprise one of a bolt and a pin. The latch element may be connected to a slide, the slide being disposed within the support tube. The slide may be moveable substantially parallel to the axis of the fork member. A locking element may be connected to the slide.

The steering head may further comprise a bearing support disposed on at least one end of the support tube. The bearing support may be disposed on a lower end of the support tube. The steering head may further comprise a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support. The bearing support may comprise at least one stop, the at least one stop comprising at least one surface which engages the linkage element. The at least one stop may comprise a projection which engages a recess in the linkage element. The projection and the recess may cooperate to limit the rotational movement of the fork member within a desired range. The range of the rotational movement may be limited by at least two stop surfaces. The at least two stop surfaces may define a limited range of rotation in one of a clockwise and a counter-clockwise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counter-clockwise direction. The limited range of rotation between the at least two stops may be approximately 45 degrees.

The steering head may be disposed on a tricycle frame.

The invention further provides for a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The fork member comprises a fork end, a handlebar, and a latch element projecting from the fork member between the fork end and the handlebar end. The latch element is disposed within the support tube and a linkage element is slidably disposed within the support tube. The linkage element comprises at least one stop surface for engaging the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element and the at least one stop cooperate to limit the rotational movement of the fork member to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element.

The invention also relates to a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The lower bearing support comprises at least one stop surface, the fork member comprising a fork end, a handlebar, and a latch element which is slidably disposed adjacent the fork member between the fork end and the handlebar end, the latch element being disposed within the support tube and a linkage element moveably disposed adjacent the lower support bearing. The linkage element comprises at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element engages only the lower bearing support and where the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork member to a second position where the latch element releasably engages a recess in the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element. The linkage element may further comprise at least one locking element for engaging a locking recess in the lower bearing support. The at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

The invention provides for a vehicle steering head including a fork member adapted to engage a handlebar, a support tube which rotatably supports the fork member, a latch

element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork member from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork member to rotate with respect to the support tube in at least two directions. The latch element may comprise a rod-like member.

The invention also provides for a vehicle steering head that includes a support tube adapted to be coupled to a vehicle frame, an upper bearing support arranged at an upper end of the support tube, a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface, a cylindrical element rotatably mounted to the support tube via the upper and lower bearing supports, the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar, a latch element movably disposed within the support tube, a slide coupled to the latch element, the latch element being movable from outside the support tube, a linkage element that is rotatable with respect to the support tube, and the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube, wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, a mechanism which limits the rotational movement of the fork member in each of two directions, and a lower bearing support mounted to the support tube, wherein the mechanism and the lower bearing support cooperate to limit the rotational movement of the fork member.

The lower bearing support may be non-rotatably fixed to the support tube. The lower bearing support may comprise at least one stop surface. The lower bearing support may comprise two stop surfaces. The mechanism may comprise at least one stop surface. The mechanism may comprise two stop surfaces. The mechanism may comprise a linkage element having at least one stop surface. The linkage element may rotate with the fork member. The linkage element may be arranged on a mudguard. The fork member may be cylindrically shaped. The steering head may further comprise a handlebar connected to one end of the fork member and a wheel fork connected to another end of the fork member.

The invention also provides a vehicle steering head comprising a support tube adapted to be fixed to a frame, a cylindrical member adapted to connect a wheel fork to a handlebar, the cylindrical member being rotatable with respect to the support tube, a linkage element being movable and comprising at least two stop surfaces, wherein one of the at least two stop surfaces limits the rotation of the cylindrical member in one direction, and wherein another of the at least two stop surfaces limits the rotation of the cylindrical member in another direction.

The linkage element may rotate with the cylindrical member. The linkage element may rotate with a mudguard.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a connecting element adapted to connect a wheel fork to a handlebar, the connecting element being rotatable with respect to the support tube, a linkage element being rotatable and comprising at least two stop surfaces, a mudguard that rotates with the linkage element, one of the at least two stop surfaces limiting the rotation of the connecting element in one direction, and another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, and a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

FIG. 1 is a schematic side view of a children's tricycle with one embodiment of the vehicle steering head according to the invention;

FIG. 2 is a simplified sectional side view of the steering head according to the invention in an unlocked state;

FIG. 3 is a side view, turned or oriented by 90° (a right angle) of the arrangement shown in FIG. 2;

FIG. 4 is a sectional side view similar to FIG. 2, in the locked state;

FIG. 5 is a side view, similar to FIG. 3, of the view according to FIG. 4;

FIG. 6 is a simplified perspective illustration of the linkage element according to the invention;

FIG. 7 is a schematic side view of a children's tricycle with another embodiment of the vehicle steering head according to the invention;

FIG. 8 is a sectional side view of the vehicle steering head according to the invention, in the unlocked state;

FIG. 9 is a side view, turned or oriented by 90° of the arrangement shown in FIG. 8;

FIG. 10 is a sectional side view similar to FIG. 8, in the locked state;

FIG. 11 is a side view, turned or oriented by 90° which is similar to FIG. 9, in the locked state;

FIG. 12 is a top view on the linkage element according to the invention and on the associated mudguard;

FIG. 13 is a sectional view of the arrangement according to FIG. 12 along the sectional lines XIII—XIII of FIG. 12;

FIG. 14 is an enlarged side view showing a portion of the slide and of the locking element in the locked state;

FIG. 15 is a view analogous to FIG. 14, in the unlocked state;

FIG. 16 is a top view on the slide; and

FIG. 17 is a top view on the lower bearing.

DETAILED DESCRIPTION OF THE INVENTION

The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is

made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

A children's tricycle is shown in FIG. 1 and comprises a front wheel 14 which is supported on a wheel fork 4. Wheel fork 4 is fixedly connected to a fork member 3. A handlebar (not shown) can be secured to the upper end of fork member 3.

Fork member 3 is supported in a support tube 2. This support is accomplished by utilizing slide bearings 15 and 15' which are shown in detail in FIGS. 2 to 5. The slide bearings 15 and 15' correspond to those of the prior art in this embodiment so that a detailed description is not needed.

Support tube 2 is firmly connected to a frame 16 which has mounted thereon a seat 17. The tricycle also has a rear axle 18 with rear wheels 19. Accordingly, a support tube 2 and a fork member 3 form a steering head 1.

According to the invention, support tube 2 has arranged therein a linkage element 6 which has a substantially cylindrical configuration (see also FIG. 6) and which is received with a play or clearance (so that it can slide) within support tube 2. Linkage element 6 is also provided with a central recess through which fork member 3 extends or passes.

Support tube 2 also has formed therein a longitudinal slot 9 through which a connection element 10 extends or passes. This connection element 10 is connected to a slide 11 and linkage element 6. The connection may be via a screw 20 (see FIGS. 2 and 4) or other conventional connecting mechanism. In the illustrated embodiment, connection element 10 is integrally connected to or formed with slide 11 and extends in a recess 21 of linkage element 6. However, connection element 10 and slide 11 may be made as separate components which are joined or secured together by any conventional attachment technique including a screw or threaded element.

On its front upper portion, linkage element 6 comprises two symmetrical opposite attachments or stops 12. Each of these stops 12 may be provided with lateral stop surfaces 7. When viewed from the top, these attachments or stops 12 are designed in a manner of a segment of a partial circle (pie shaped or wedge shaped), so that four stop surfaces 7 are formed, with each one being arranged in symmetry with one another. Of course, stops 12 may be separately formed and attached to linkage element 6 instead of being integrally formed therewith, as is shown.

In the illustrated embodiment two locking elements 8 may be utilized in which each is formed by a recess 13. These locking elements 8 are preferably provided on linkage element 6 in retracted or set back manner with respect to stops 12. As is apparent from FIG. 6, the walls of at least one recess 13 may be made resilient to ensure a releasable locking of a bolt-like latch element 5 when linkage element 6 is pushed upwards or into engagement with bolt-like latch element 5.

As is apparent from FIGS. 2 to 5, fork member 3 is provided with a bolt-like or pin-like latch element 5 which extends or projects from at least one and preferably both sides of fork member 3. Of course, latch element 5 may be integrally formed with fork member. Alternatively, latch element 5 may be a threaded or partially threaded member which threads into fork member 3. However, it is preferred that latch element 5 be a pin having a centrally disposed exterior knurl which is press fit into a fork member as is shown. In its working position, latch element 5 rotates with fork member 3 when a deflection or rotation of the handlebar takes place. The deflection of the handlebar is limited by way of latch element 5 abutting on stop surfaces 7, these stop surfaces 7 defining the limited range of motion of the handlebar.

When it is desired to lock the handlebar in a set position, latch element 5 is pressed or forced into recesses 13. This engagement occurs when locking element 8, which is disposed on linkage element 6, is pushed upwards by slide 11. Recesses 13 also utilize inclined inlet surfaces because they act as guiding lead-in surfaces which facilitate entry of pin 5 into recess 13. In the locked state, which is shown in FIGS. 4 and 5, a steering movement thus becomes impossible since the handlebar or fork member 3 is locked in a single direction. FIGS. 2 and 3 show a downwardly displaced condition of linkage element 6 in which latch element 5 is in a position which it does not cooperate with the locking element 8. As a result, in this position fork member 3 and handlebar are free to rotate until latch element 5 abuts on stop surfaces 7, this range of movement or rotation corresponding to a steering angle range.

According to a preferred aspect of the invention, linkage element 6 may be made from a plastic material. Of course, other materials are also contemplated.

Another embodiment of the vehicle steering head according to the invention is described with reference to FIGS. 7 to 16. In this regard, like parts are provided with like reference numerals.

As for the description of FIG. 7, reference can be made to the description of FIG. 1 to the extent that the same features are shown. The subsequent figures are illustrations elucidating the details which have been changed.

As in FIGS. 2 to 5, FIGS. 8 and 9 and 10 and 11, respectively, are illustrations showing the vehicle steering head on an enlarged scale. Again, like parts are here also provided with like reference numerals, so that reference can be made to the preceding explanations. Slide 11 utilizes connection element 10 and screw 20. Connection element 10 also extends through a longitudinal slot 9. Moreover, slide 11 comprises an outer grip portion 11 and an interior portion 11' which is screwed to outer grip portion 11 by a screw 20. A top view of slide 11 and 11' is shown in FIG. 16. As can be seen in this figure, a central recess 24 is provided through which fork member 3 extends or passes (with a clearance which allows slide 11' to move up and down with respect to fork member 3). Furthermore, slide 11' also has a recess (see FIGS. 9, 11 and 16) which is formed so that it can accept a bolt-like latch element 5'. Of course, this latch element 5' may be pressed into this recess, threaded into the recess, or otherwise secured to slide 11' in a suitable manner. Alternatively, latch element 5' may be integrally formed with slide 11'.

As already described in conjunction with a previous embodiment, a bearing 15 which serves as a slide bearing is used on the upper portion of steering head 1.

Lower bearing 15' in this embodiment is configured such that it has an upwardly projecting contour of a linkage element 6' which can extend into bearing 15'. Of course, the bearing and the upwardly projecting contour may be made as separate components which are joined together by conventional techniques rather than integrally formed as is shown. Additionally, as becomes apparent in FIG. 12, linkage element 6' may have a recess 25 into which latch element 5' can be inserted (see also FIGS. 9 and 11).

As can further be seen from the top view of FIG. 12, linkage element 6' comprises two lateral stop surfaces 7 which are angularly spaced apart from each other. This

design is such that a downwardly oriented attachment or stop **26** (see FIGS. **8** to **11**) of the bearing **15'**, which is connected to support tube **2**, forms a steering limitation of plus/minus approximately 45°. Of course, as with the previous embodiment, the range of steering limitation can be designed to any desired range.

FIG. **13** shows a lateral sectional view of mudguard **22** and of linkage element **6'**. Note that these components are integrally formed as a single member which reduces manufacturing costs associated with joining two separate components.

FIGS. **14** and **15** are front views of slide **11'** wherein handpiece **11** has been removed to illustrate the operation of locking element **8'**. Locking element **8'** is U-shaped and includes two movable or flexible lateral legs which can releasably be inserted into a recess **23** of bearing **15'**. Upon insertion and locking, locking element **8'** is pressed against an undercut and thereby held in position inside recess **23**. Accordingly, when it is desired to release the locked state of fork member **3**, slide **11'** must be pushed upwards which removes the legs from recess **23**. Of course, other locking mechanisms may be utilized and this embodiment is not limited to the use of this particular locking mechanism. For example, a pin may be used which has a floating ring disposed around its circumference. Alternatively, other conventional releasable locking mechanisms may be utilized.

FIG. **17** is a top view on lower bearing **15'** on an enlarged scale. The (downwardly projecting) attachment or stop **26** can be seen here as can recess **23** which receives locking element **8'**. Moreover, recess **27** is adapted to receive and guide bolt-like latch element **5'** therein. Furthermore, a surrounding collar-like edge **28** can be seen in which **29** designates two oppositely disposed attachments or projections which serve as anti-rotation engagements. These engagements are designed to engage recesses (not shown) of support tube **2**. Of course, lower bearing may be secured to support tube **2** in any conventional manner such as by bonding, welding, or screws. Moreover, this attachment may be releasable or more permanent in nature.

It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

What is claimed:

1. A tricycle vehicle steering head comprising:
- a support tube adapted to be fixed to a frame;
- a connecting member adapted to connect a wheel fork to a handlebar;
- a mechanism which limits the rotational movement of the connecting member in each of two directions;
- the mechanism being arranged on a mudguard;
- an upper bearing support mounted to an upper end of the support tube;
- a lower bearing support mounted to a lower end of the support tube,
- the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports; and
- a locking device that engages an opening in the mechanism;
- wherein the mechanism and the lower bearing support cooperate to limit the rotational movement of the connecting member.

2. The steering head of claim **1**, wherein the upper and lower bearing supports are each non-rotatably fixed to the support tube.

3. The steering head of claim **1**, wherein the lower bearing support comprises at least one stop surface.

4. The steering head of claim **3**, wherein the lower bearing support comprises two stop surfaces.

5. The steering head of claim **1**, wherein the mechanism comprises at least one stop surface.

6. The steering head of claim **5**, wherein the mechanism comprises two stop surfaces.

7. The steering head of claim **1**, wherein the mechanism comprises a linkage element having at least one stop surface.

8. The steering head of claim **7**, wherein the linkage element rotates with the connecting member.

9. The steering head of claim **7**, wherein the linkage element and the mudguard comprise a one-piece structure.

10. The steering head of claim **1**, wherein the connecting member is cylindrically shaped.

11. The steering head of claim **1**, further comprising a handlebar connected to one end of the connecting member and a wheel fork connected to another end of the coanecting member.

12. A tricycle vehicle steering head comprising:
- a support tube adapted to be fixed to a frame;
- a cylindrical member adapted to connect a wheel fork to a handlebar;
- the cylindrical member being rotatable with respect to the support tube;
- a recessed portion arranged at a lower end of the support tube and comprising first and second stop surfaces;
- an arcuate projecting portion configured to rotate within the recessed portion and comprising first and second stop surfaces; and
- an arc length of the arcuate protecting portion being greater than 180 degrees between the first and second stop surfaces,
- wherein contact between the first stop surfaces of the projecting portion and the recessed portion limits the rotation of the cylindrical member in one direction, and
- wherein contact between the second stop surfaces of the projecting portion and the recessed portion limits the rotation of the cylindrical member in another direction.

13. The steering head of claim **12**,
- wherein the arcuate projecting portion rotates with the cylindrical member; and
- wherein a lower bearing support includes the recessed portion.

14. The steering head of claim **12**, wherein the arcuate projecting portion is coupled to a mudguard.

15. A tricycle vehicle steering head comprising:
- a support tube adapted to be fixed to a frame;
- a connecting element adapted to connect a wheel fork to a handlebar;
- the connecting element being rotatably mounted to the support tube via upper and lower bearing supports;

a rotatably mounted linkage element comprising at least two stop surfaces and an opening;

the linkage element engaging the lower bearing support;

a mudguard that rotates with the linkage element;

a movably mounted pin that engages the opening in the linkage element in a locking position and that does not engage the opening in the linkage element in a unlocked position:

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

16. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting member adapted to connect a wheel fork to a handlebar;

the connecting element being rotatably mounted to the support tube via upper and lower bearing supports;

a locking device that, in a locked position, prevents rotational movement of the fork member and that, in an unlocked position, allows rotational movement of the fork member in each of two directions;

a system which is arranged at a lower end of the support tube and that limits the rotational movement of the fork member in each of the two directions,

wherein the system includes an arcuate projecting part and a recessed part which is configured to receive the arcuate projecting part, and

wherein the recessed part is non-rotatably mounted and wherein the arcuate projecting part rotates with the connecting member.

17. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatably mounted to the support tube via upper and lower bearing supports;

a mechanism that is rotatable and comprises an opening and at least two stop surfaces arranged on an arcuate projecting portion;

the mechanism engaging with the lower bearing support;

a movably mounted pin that, in a locking position, engages with the opening in the mechanism;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

18. The vehicle steering head of claim 17, the mechanism is arranged on a mudguard.

19. The vehicle steering head of claim 18, wherein the movably mounted pin moves parallel to an axis of the connecting element.

20. The vehicle steering head of claim 17, wherein the lower bearing support comprises at least two stop surfaces that are engagable with the at least two stop surfaces of the arcuate projecting portion.

21. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a movable locking member which engages with an opening to prevent rotational movement of the connecting element and which disengages from the opening to allow rotational movement of the connecting element;

a first stop surface limiting the rotation of the connecting element in one direction; and

a second stop surface limiting the rotation of the connecting element in another direction,

wherein the opening, the first stop surface and the second stop surface are each arranged on a mudguard.

22. The vehicle steering head of claim 21, wherein the first and second stop surfaces rotate with the mudguard.

23. The vehicle steering head of claim 21, wherein the first and second stop surfaces are disposed on an arcuate projecting portion of the mudguard.

24. The vehicle steering head of claim 21, wherein the opening rotates with the connecting element.

25. The vehicle steering head of claim 21, wherein the movable locking member comprises a pin.

26. The vehicle steering head of claim 21, wherein the first and second stop surfaces moveably engage two stop surfaces which do not move.

27. The vehicle steering head of claim 21, further comprising a lower bearing support that comprises the two stop surfaces which do not move, wherein the two stop surfaces which do not move engage the first and second stop surfaces.

28. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting member adapted to connect a wheel fork to a handlebar;

the connecting member being rotatable with respect to the support tube; and

a system which limits the rotational movement of the fork member in each of two directions;

the system including one part which is non-rotatably mounted to an end of the support tube and another part which rotates with the connecting member;

a pin that engages, in a locking position, an opening in the other part,

wherein the other part is an arcuate projection and the one part is an arcuate guiding recess within which the arcuate projection moves.

29. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a cylindrical member adapted to connect a wheel fork to a handlebar;

the cylindrical member being rotatably mounted to the support tube; and

a system which limits the rotational movement of the cylindrical member in each of two directions, the system including one part which is non-rotatably mounted to the support tube and another part which rotates with the cylindrical member;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being configured to move in a direction which is parallel to an axis of the support tube; and

the opening being arranged on the other part and being configured to rotate with the cylindrical member,

wherein, when the pin engages the opening, the cylindrical member is prevented from rotating, and

wherein when the pin does not engage the opening, the cylindrical member is free to rotate in each of two directions.

30. A tricycle vehicle steering head coupled to a frame, said steering head comprising:

a support tube adapted to be fixed to the frame;

a lower bearing support non-movably mounted to the support tube;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that limits rotational movement of the connecting element;

the mechanism comprising at least two stop surfaces which engage with first and second stop surfaces of the lower bearing support;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mechanism comprises an arcuate projection, an arc length of the arcuate projection between the at least two stop surfaces being greater than an arc length of a space defined by the at least two stop surfaces, whereby the arcuate projection and the space comprise an arc length equal to a circle.

31. The vehicle steering head of claim 30, wherein the mechanism is coupled to a mudguard.

32. The vehicle steering head of claim 30, further comprising a device that engages the mechanism to prevent movement thereof.

33. The vehicle steering head of claim 32, wherein the device that engages the mechanism comprises a pin.

34. A tricycle vehicle steering head coupled to a frame, comprising:

a support tube fixed to the frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being configured to rotate with respect to the support tube;

a mechanism that limits rotational movement of the connecting element;

the mechanism comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a locking system that prevents rotational movement of the connecting element,

the locking system comprising a movable engaging member and an opening that can receive the engaging member and which can rotate with the connecting element,

wherein the opening is arranged on the mechanism.

35. The vehicle steering head of claim 34, wherein the engaging member can move between a first position that allows the connecting element to rotate in each of two directions and a second position wherein the connecting element is prevented from rotational movement in each of the two directions.

36. The vehicle steering head of claim 34, wherein the engaging member can move from a first position to a second position, wherein, in the first position, the connecting element can rotate in each of two directions and wherein, in the second position, the engaging member enters the opening and the connecting element is prevented from rotational movement in each of the two directions.

37. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting member rotatably mounted to the support tube;

a mechanism that limits rotational movement of the connecting member in each of two directions;

the mechanism comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting member in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting member in another direction; and

a locking system which utilizes a movable locking member and an opening;

wherein, when the locking member does not engage the opening, the connecting member can rotate in each of the two directions, and wherein, when the locking member engages the opening, the connecting member is prevented from rotating in each of the two directions.

38. The vehicle steering head of claim 37, further comprising a mudguard.

39. The vehicle steering head of claim 37, wherein the locking member moves in a direction that is parallel to an axis of the connecting member.

40. The vehicle steering head of claim 37, wherein the coanecting member is mounted to the support tube via upper and lower bearing supports.

41. The vehicle steering head of claim 37, wherein the mechanism moves when the connecting member moves.

42. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element rotatably mounted to the support tube via upper and lower bearing supports;

a mudguard;

a system which limits the rotational movement of the connecting element in each of two directions;

a locking system comprising a movable locking member and an opening arranged on the mudguard;

wherein, when the locking member does not engage the opening, the connecting element can rotate in each of the two directions, and wherein, when the locking member engages the opening, the connecting element is prevented from rotating in each of the two directions.

43. The vehicle steering head of claim 42, wherein the locking member moves in a direction that is parallel to an axis of the connecting element.

44. The vehicle steering head of claim 42, wherein the mechanism moves when the connecting element moves.

45. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member rotatably mounted to the support tube via upper and lower bearing supports;

a system which limits the rotational movement of the fork member in each of two directions; and

a locking system comprising a movable locking member and an opening,

wherein the locking member moves in a direction that is parallel to an axis of the support tube, and

wherein, when the locking member does not engage the opening, the fork member can rotate in each of the two directions, and wherein, when the locking member engages the opening, the fork member is prevented from rotating in each of the two directions.

46. The vehicle steering head of claim 45, wherein the locking member comprises a pin.

47. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member rotatably mounted to the support tube;

a mudguard;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being movably mounted; and

the opening being arranged on a surface of the mudguard;

wherein, when the pin engages the opening, the fork member is prevented from rotating, and

wherein, when the pin does not engage the opening, the fork member is free to rotate in each of two directions.

48. The vehicle steering head of claim 47, wherein the pin can move in a direction that is parallel to an axis of the support tube.

49. The vehicle steering head of claim 47, further comprising a system which limits the rotational movement of the fork member in each of the two directions.

50. The vehicle steering head of claim 47, wherein the fork member can rotate approximately 45 degrees in each of the two directions.

51. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard; and

a movement limiting system that limits rotational movement of the connecting element in each of two directions,

wherein the movement limiting system comprises an arcuate recess and an arcuate projection, the arcuate projection having an arc length between two stop surfaces that is

greater and an arc length of a space defined by the two stop surfaces of the arcuate projection, whereby the arcuate projection and the space comprise an arc length equal to a circle, and the arcuate recess having an arc length between two other stop surfaces that is greater than the arc length of the arcuate projection.

52. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mechanism which limits rotational movement of the connecting element; and

a locking system which cooperates with the lower bearing support and which can be moved by a user,

wherein, when moved to one position, the locking system is structured and arranged to prevent the connecting element from rotating in each of the two directions, and wherein, when moved to another position, the locking system is structured and arranged to allow the connecting element to rotate in each of the two directions.

53. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard comprising a mechanism for limiting rotational movement of the connecting element and an opening; and

a locking system which can be moved by a user to engage the opening,

wherein, when moved to one position, the locking system is structured and arranged to prevent the connecting element from rotating in each of the two directions, and wherein, when moved to another position, the locking system is structured and arranged to allow the connecting element to rotate in each of the two directions.

54. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard;

a movement limiting system that limits rotational movement of the connecting

element in each of two directions;

the movement limiting system comprising one part arranged on the mudguard and another part arranged on the lower bearing support; and

a locking system which can be moved by a user,

wherein, when moved to one position, the locking system is structured and arranged to prevent the connecting element from rotating in each of the two directions, and wherein, when moved to another position, the locking system is structured and arranged to allow the connecting element to rotate in each of the two directions.

55. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard;

a locking system comprising a pin and an opening arranged on the mudguard; and

a movement limiting system that limits rotational movement of the connecting element in each of two directions,

the movement limiting system comprising an arcuate recess arranged on the lower bearing support and an arcuate projection arranged on the mudguard,

wherein the arcuate projection has an arc length between two stop surfaces that is greater and an arc length of a space defined by the two stop surfaces of the arcuate projection, whereby the arcuate projection and the space comprise an arc length equal to a circle, and

wherein the arcuate recess has an arc length between two other stop surfaces that is greater than the arc length the arcuate projection.

56. The vehicle steering head of claim 55, further comprising a device for locking the pin in a locking position.

57. The vehicle steering head of claim 56, wherein the device for locking the pin in the locking position engages the lower bearing support.

58. The vehicle steering head of claim 55, wherein the pin moves parallel to an axis of the connecting element.

59. The vehicle steering head of claim 55, wherein the arcuate projection extends from a surface of the mudguard which rotatably engages the lower bearing support.

60. The vehicle steering head of claim 55, wherein the lower bearing support comprises an opening which allows an end of the pin to pass therethrough.

61. The vehicle steering head of claim 55, wherein the arcuate projection and the mudguard comprise a one-piece structure.

62. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element mounted to the support tube via the upper and lower bearing supports;

a wheel fork rotating with respect to the support tube;

a first part comprising stop surfaces;

a second part comprising stop surfaces;

one stop surface of the first part contacting one stop surface of the second part when the wheel fork is rotated in one direction and another stop surface of the first part contacting another stop surface of the second part when the wheel fork is rotated in another direction;

the first part and the second part being structured and arranged to allow rotational movement of the wheel fork in each of two directions while also limiting rotational movement of the wheel fork in each of the two directions within an angular range; and

a locking system which, in a locked position, prevents rotational movement of the wheel fork and which, in an unlocked position, allows the wheel fork to rotate in each of the

two directions within the angular range.

63. The vehicle steering head of claim 62, wherein the first part comprises a projecting part and the second part comprises a recess which receives therein the projecting part.

64. The vehicle steering head of claim 62, wherein the locking system comprises a movable first member and a second member that receives therein an end of the movable first member.

65. The vehicle steering head of claim 64, wherein the movable first member moves parallel to an axis of the connecting member and the second member comprises an opening.

66. The vehicle steering head of claim 62, wherein each of the first part and the second part are arcuate-shaped.

67. The vehicle steering head of claim 66, wherein the first part has an arc length between the stop surfaces that is greater and an arc length of a space defined by the stop surfaces of the first part, whereby the first part and the space comprise an arc length equal to a circle, and wherein the second part has an arc length between the stop surfaces of the second part that is greater than the arc length the first part.

68. The vehicle steering head of claim 62, further comprising a mudguard, wherein the first part is arranged on the mudguard and the second part is arranged on the lower bearing support.

69. The vehicle steering head of claim 62, wherein the locking system comprises a pin and an opening that receives therein an end of the pin in the locked position.

70. The vehicle steering head of claim 62, wherein the locking system comprises a device that is movably mounted and an opening that, in the locked position,

receives therein an end of the device.

71. The vehicle steering head of claim 62, wherein the locking system comprises one part having an opening which receives therein the connecting element and another part having an opening which, in the locked position, receives therein a portion of the one part.

* * * * *

Court Name: United States District Court
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Receipt Number: 24683007540
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CIVIL FILING FEE
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CIVIL COVER SHEET

The JS 44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS
HEINZ KETTLER GMBH & CO., KG and KETTLER INTERNATIONAL, INC.

(b) County of Residence of First Listed Plaintiff:
(EXCEPT IN U.S. PLAINTIFF CASES)

(c) Attorney's (Firm Name, Address, and Telephone Number)

John C. Lynch, Esq. (VSB# 39267)
Liz S. Flowers, Esq. (VSB$ 78487)
Troutman Sanders LLP
222 Central Park Avenue, Suite 2000
Virginia Beach, Virginia 23462
Telephone: (757) 687-7765
Facsimile: (757) 687-1504
E-mail: john.lynch@troutmansanders.com
liz.flowers@troutmansanders.com

DEFENDANTS

RAZOR USA, LLC

County of Residence of First Listed Defendant

(IN U.S. PLAINTIFF CASES ONLY)

NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF THE LAND INVOLVED.

Attorneys (If Known)

II. BASIS OF JURISDICTION (Place an "X" in One Box Only)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place an "X" in One Box for Plaintiff and One Box for Defendant)

(For Diversity Cases Only)

	PLTF	DEF		PLTF	DEF
Citizen of This State	☐1	☐1	Incorporated *or* Principal Place of Business in This State	☐4	☐4
Citizen of Another State	☐2	☐2	Incorporated and Principal Place of Business In Another State	☐5	☐5
Citizen or Subject of a Foreign Country	☐3	☐3	Foreign Nation	☐6	☐6

IV. NATURE OF SUIT (Place an "X" in One Box Only)

CONTRACT	TORTS		FORFEITURE/PENALTY	BANKRUPTCY	OTHER STATUTES
☐ 110 Insurance ☐ 120 Marine ☐ 130 Miller Act ☐ 140 Negotiable Instrument ☐ 150 Recovery of Overpayment & Enforcement of Judgment ☐ 151 Medicare Act ☐ 152 Recovery of Defaulted Student Loans (Excl. Veterans) ☐ 153 Recovery of Overpayment of Veteran's Benefits ☐ 160 Stockholders' Suits ☐ 190 Other Contract ☐ 195 Contract Product Liability ☐ 196 Franchise	PERSONAL INJURY ☐ 310 Airplane ☐ 315 Airplane Product Liability ☐ 320 Assault, Libel & Slander ☐ 330 Federal Employers' Liability ☐ 340 Marine ☐ 345 Marine Product Liability ☐ 350 Motor Vehicle ☐ 355 Motor Vehicle Product Liability ☐ 360 Other Personal Injury	PERSONAL INJURY ☐ 362 Personal Injury – Med. Malpractice ☐ 365 Personal Injury – Product Liability ☐ 368 Asbestos Personal Injury Product Liability PERSONAL PROPERTY ☐ 370 Other Fraud ☐ 371 Truth in Lending ☐ 380 Other Personal Property Damage ☐ 385 Property Damage Product Liability	☐ 610 Agriculture ☐ 620 Other Food & Drug ☐ 625 Drug Related Seizure of Property 21 USC 881 ☐ 630 Liquor Laws ☐ 640 R.R. & Truck ☐ 650 Airline Regs ☐ 660 Occupational Safety/ Health ☐ 690 Other LABOR ☐ 710 Fair Labor Standards Act ☐ 720 Labor/Mgmt. Relations ☐ 730 Labor/Mgmt. Reporting & Disclosure Act ☐ 740 Railway Labor Act	☐ 422 Appeal 28 USC 158 ☐ 423 Withdrawal 28 USC 157 PROPERTY RIGHTS ☐ 820 Copyrights ☒ 830 Patent ☐ 840 Trademark SOCIAL SECURITY ☐ 861 HIA (1395ff) ☐ 862 Black Lung (923) ☐ 863 DIWC/DIWW (405(g)) ☐ 864 SSID Title XVI ☐ 865 RSI (405(g))	☐ 400 State Reapportionment ☐ 410 Antitrust ☐ 430 Banks and Banking ☐ 450 Commerce ☐ 460 Deportation ☐ 470 Racketeer Influenced and Corrupt Organization ☐ 480 Consumer Credit ☐ 490 Cable/Sat TV ☐ 810 Selective Service ☐ 850 Securities/ Commodities/ Exchange ☐ 875 Customer Challenge 12 USC 3410 ☐ 890 Other Statutory Actions ☐ 891 Agricultural Acts ☐ 892 Economic Stabilization Act
REAL PROPERTY	CIVIL RIGHTS	PRISONER PETITIONS	☐ 790 Other Labor Litigation ☐ 791 Empl. Ret. Inc. Security Act	FEDERAL TAX SUITS	☐ 893 Environmental Matters ☐ 894 Energy Allocation Act ☐ 895 Freedom of Information Act ☐ 900 Appeal of Fee Determination Under Equal Access to Justice ☐ 950 Constitutionality of State Statutes
☐ 210 Land Condemnation ☐ 220 Foreclosure ☐ 230 Rent Lease & Ejectment ☐ 240 Torts to Land ☐ 245 Tort Product Liability ☐ 290 All Other Real Property	☐ 441 Voting ☐ 442 Employment ☐ 443 Housing/ Accommodations ☐ 444 Welfare ☐ 445 Amer. w/Disabilities – Employment ☐ 446 Amer. w/Disabilities – Other ☐ 440 Other Civil Rights	☐ 510 Motions to Vacate Sentence Habeas Corpus ☐ 530 General ☐ 535 Death Penalty ☐ 540 Mandamus & Other ☐ 550 Civil Rights ☐ 555 Prison Condition		☐ 870 Taxes (U.S. Plaintiff or Defendant ☐ 871 IRS – Third Party 26 USC 7609	

V. ORIGIN (Place an "X" in One Box Only)

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from Appellate Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION

Cite the U.S. Civil Statute under which you are filing (Do not cite jurisdictional statutes unless diversity):
35 U.S.C. § 283 *et. seq.*

Brief Description of cause:
Patent Infringement

VII. REQUESTED IN COMPLAINT: ☐ CHECK IF THIS IS A CLASS ACTION UNDER F.R.C.P. 23 DEMAND $*

CHECK YES only if demanded in complaint:
JURY DEMAND: ☒ Yes ☐ No

VIII. RELATED CASE(S) IF ANY (See instructions) JUDGE _____ DOCKET NUMBER

DATE
June 24, 2010

SIGNATURE OF ATTORNEY OF RECORD

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RECEIPT #	AMOUNT	APPLYING IFP	JUDGE	MAG. JUDGE

JOHN C.LYNCH
757.687.7765 telephone
757.687.1504 facsimile
john.lynch@troutmansanders.com

TROUTMAN SANDERS

TROUTMAN SANDERS LLP
Attorneys at Law
222 Central Park Avenue
Suite 2000
Virginia Beach, Virginia 23462
757.687.7500 telephone
757.687.7510 facsimile
troutmansanders.com

June 24, 2010

VIA HAND DELIVERY

Fernando Galindo, Clerk
United States District Court
600 Granby Street, Room 193
Norfolk, VA 23510-2449

Re: ***HEINZ KETTLER GMBH & CO., KG and KETTLER INTERNATIONAL, INC. v. RAZOR USA, LLC***

Dear Mr. Galindo:

Enclosed are the following documents for filing on behalf of the Plaintiffs in the above-captioned matter:

1. Original and two copies of the Civil Cover Sheet;
2. Three copies of the Summons directed to the Defendant;
3. Original and two copies of the Complaint;
4. Two originals and two copies of each Plaintiff's Financial Interest Disclosure Statement; and
5. Our check in the amount of $350.00, representing the filing fee.

Please prepare the copies of the Complaint and Summons for service and contact my paralegal, Karen L. Kreutter at (757) 687-7561, when the documents are ready to be picked up for service. We will then have our private process server serve the documents on the Defendant.

Thank you for your assistance in this matter. If you have any questions, please do not hesitate to call.

Very truly yours,

John C. Lynch

Enclosures

JOHN C.LYNCH
757.687.7765 telephone
757.687.1504 facsimile
john.lynch@troutmansanders.com

TROUTMAN SANDERS

TROUTMAN SANDERS LLP
Attorneys at Law
222 Central Park Avenue
Suite 2000
Virginia Beach, Virginia 23462
757.687.7500 telephone
757.687.7510 facsimile
troutmansanders.com

June 30, 2010

VIA OVERNIGHT DELIVERY

Hon. Fernando Galindo, Clerk
United States District Court
Albert V. Bryan U.S. Courthouse
401 Courthouse Square
Alexandria, VA 22314

Re: ***HEINZ KETTLER GMBH & CO., KG and KETTLER INTERNATIONAL, INC., Plaintiffs, v. RAZOR USA, LLC, Defendant***
Civil Action No. 1:10-cv-708

Dear Mr. Galindo:

At the request of the Clerk and in connection with the above-referenced action, we are resubmitting for filing the following documents:

1. Three copies of the Summons directed to the Defendant;
2. Original and two copies of the Complaint.

We were advised by the Clerk's office that our previously filed Complaint lacked an original signature, and that the Summons was incorrect on its face. On June 24, we submitted these documents, along with plaintiff's Financial Interest Disclosure Statement, and our filing fee of $350.00 (copy of filing receipt, which contains the above-referenced civil action number, attached).

Please prepare the copies of the Complaint and Summons for service and return same to us in the enclosed postage-prepaid envelope. We will then have the documents served on the Defendant.

Thank you for your assistance in this matter. If you have any questions, please do not hesitate to call.

Very truly yours,

John C. Lynch

Enclosures

Exhibit B

US006378884B1

(12) **United States Patent**
Kettler

(10) **Patent No.: US 6,378,884 B1**
(45) **Date of Patent: Apr. 30, 2002**

(54) **VEHICLE STEERING HEAD**

(75) Inventor: **Heinz Kettler**, Ense-Parsit (DE)

(73) Assignee: **Heinz Kettler GmbH & Co.**, Ense-Parsit (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/584,497**

(22) Filed: **Jun. 1, 2000**

(30) **Foreign Application Priority Data**

Jul. 5, 1999 (DE) 299 11 652

(51) **Int. Cl.**[7] **B62K 5/02**
(52) **U.S. Cl.** **280/279**; 74/495; 280/272
(58) **Field of Search** 280/279, 272, 280/271, 282, 89; 403/354, 83; 74/495

(56) **References Cited**

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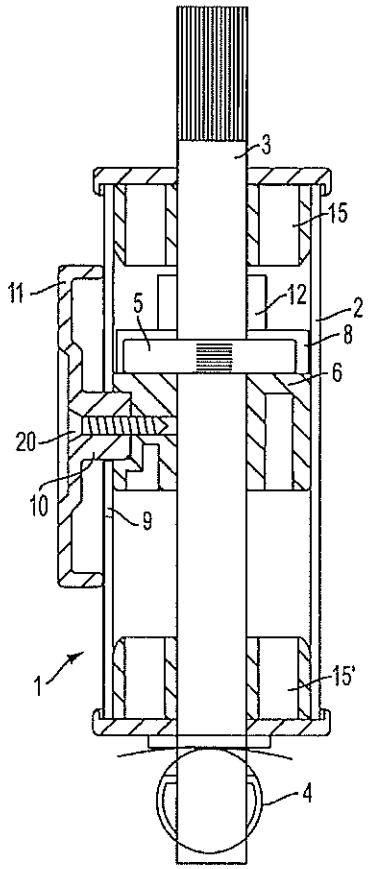
* cited by examiner

Primary Examiner—Avraham Lerner
Assistant Examiner—Tony Winner
(74) *Attorney, Agent, or Firm*—Greenblum & Bernstein P.L.C.

(57) **ABSTRACT**

A vehicle steering head including a fork tube adapted to engage a handlebar, a support tube which rotatably supports the fork tube, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork tube from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork tube to rotate with respect to the support tube in at least two directions.

58 Claims, 9 Drawing Sheets



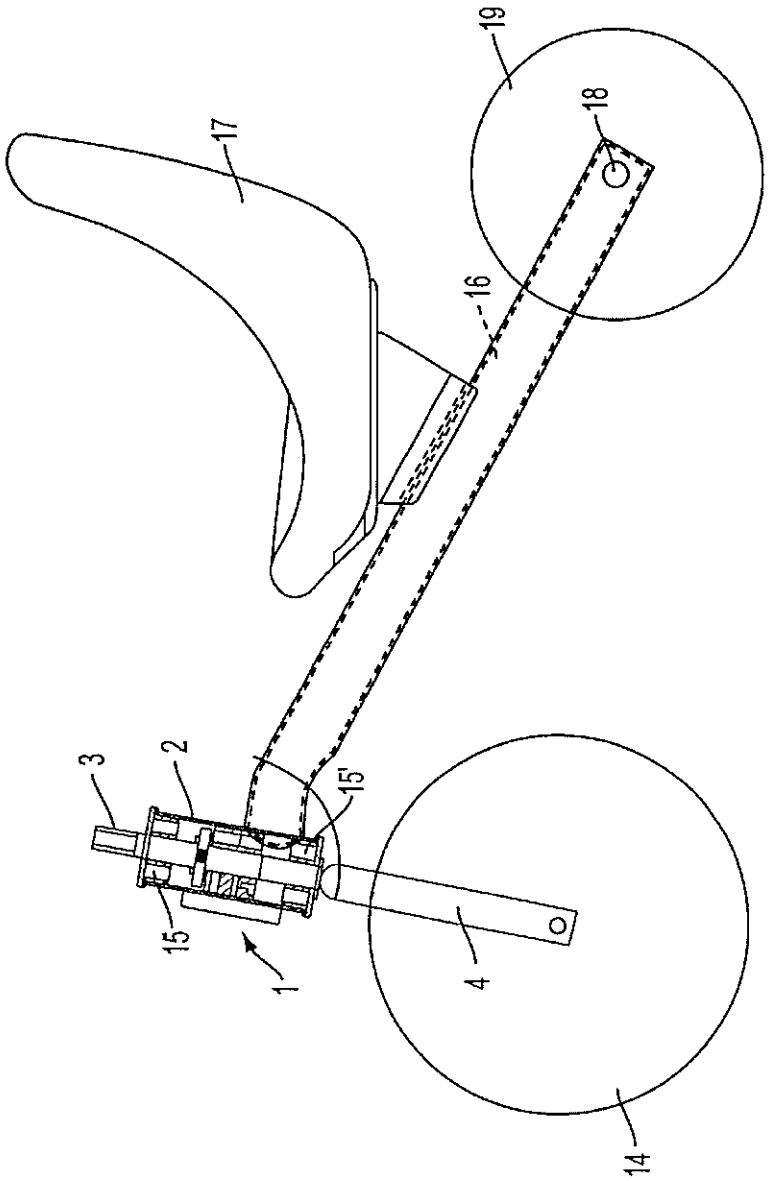


FIG. 1

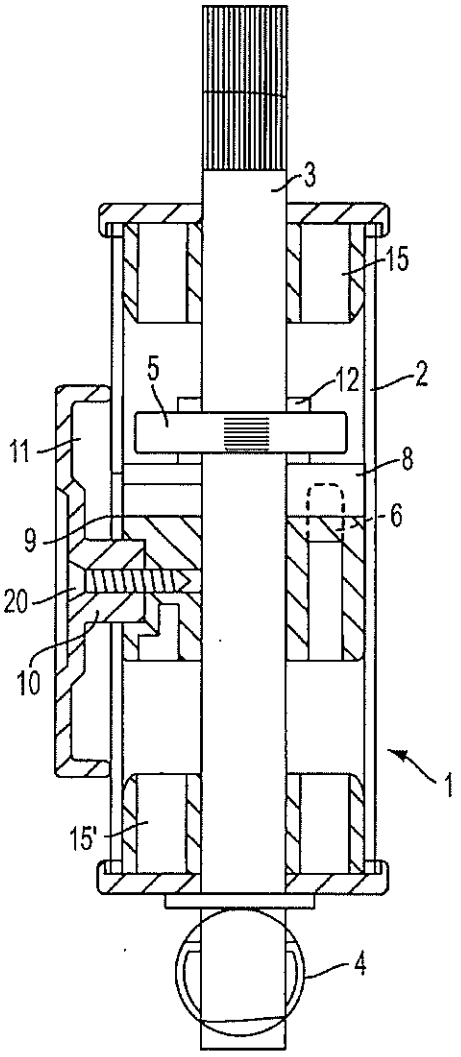


FIG. 2

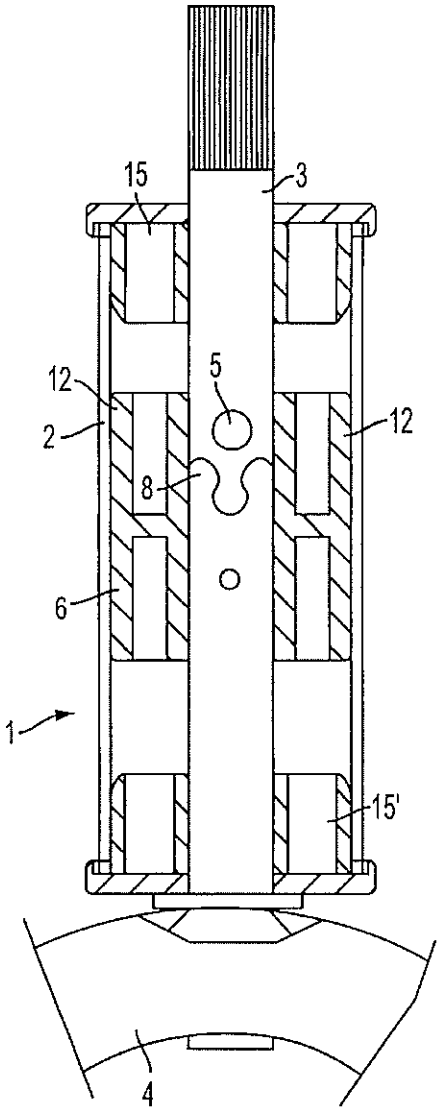


FIG. 3

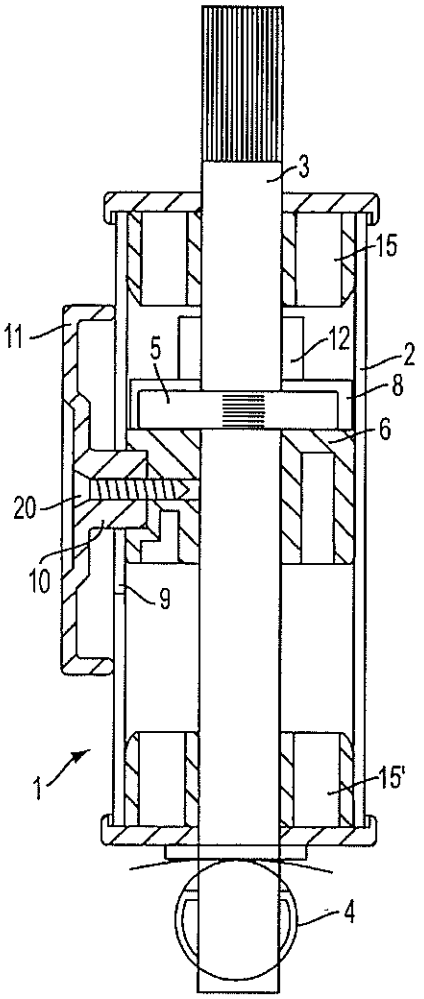


FIG. 4

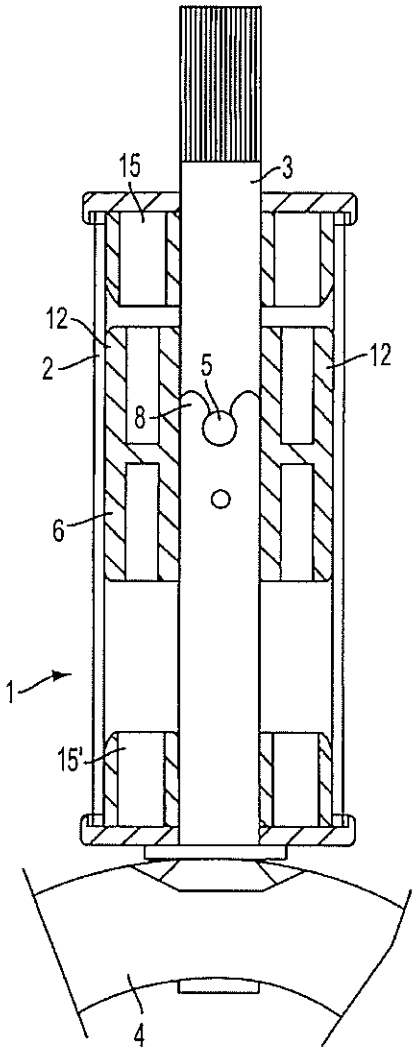
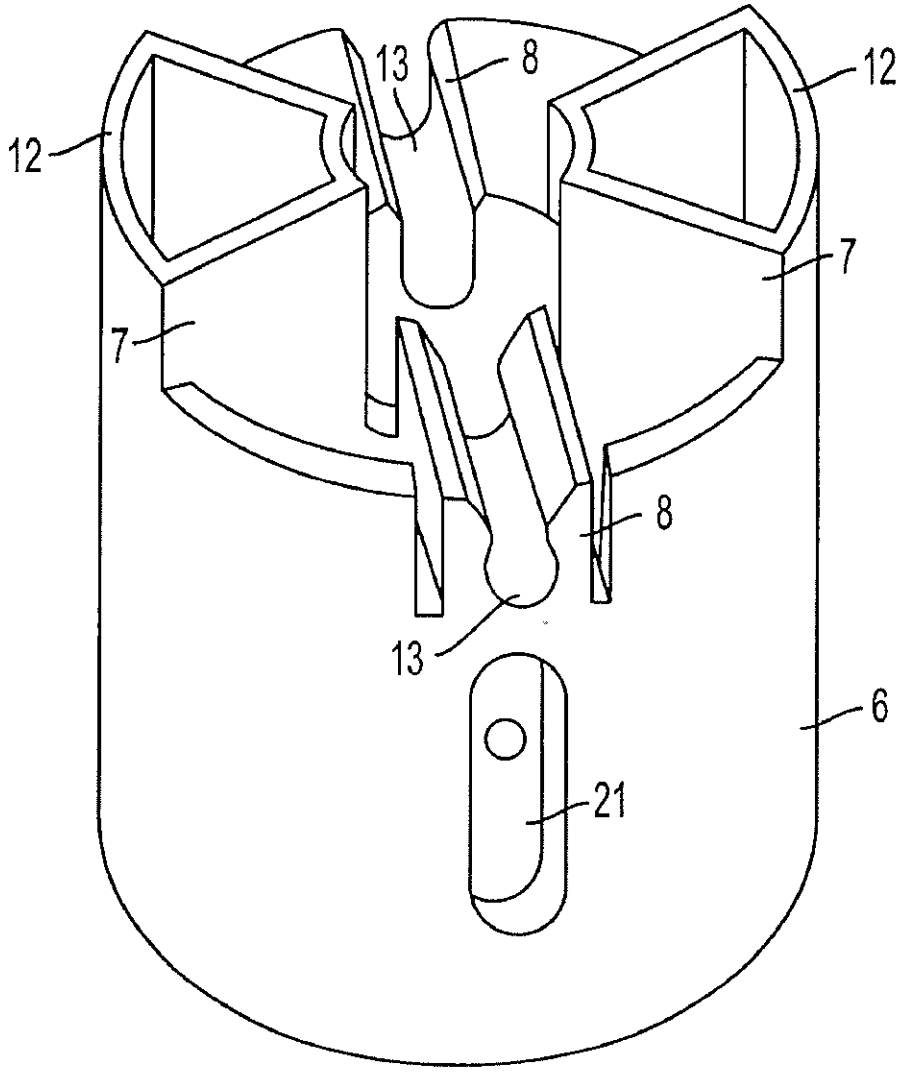


FIG. 5



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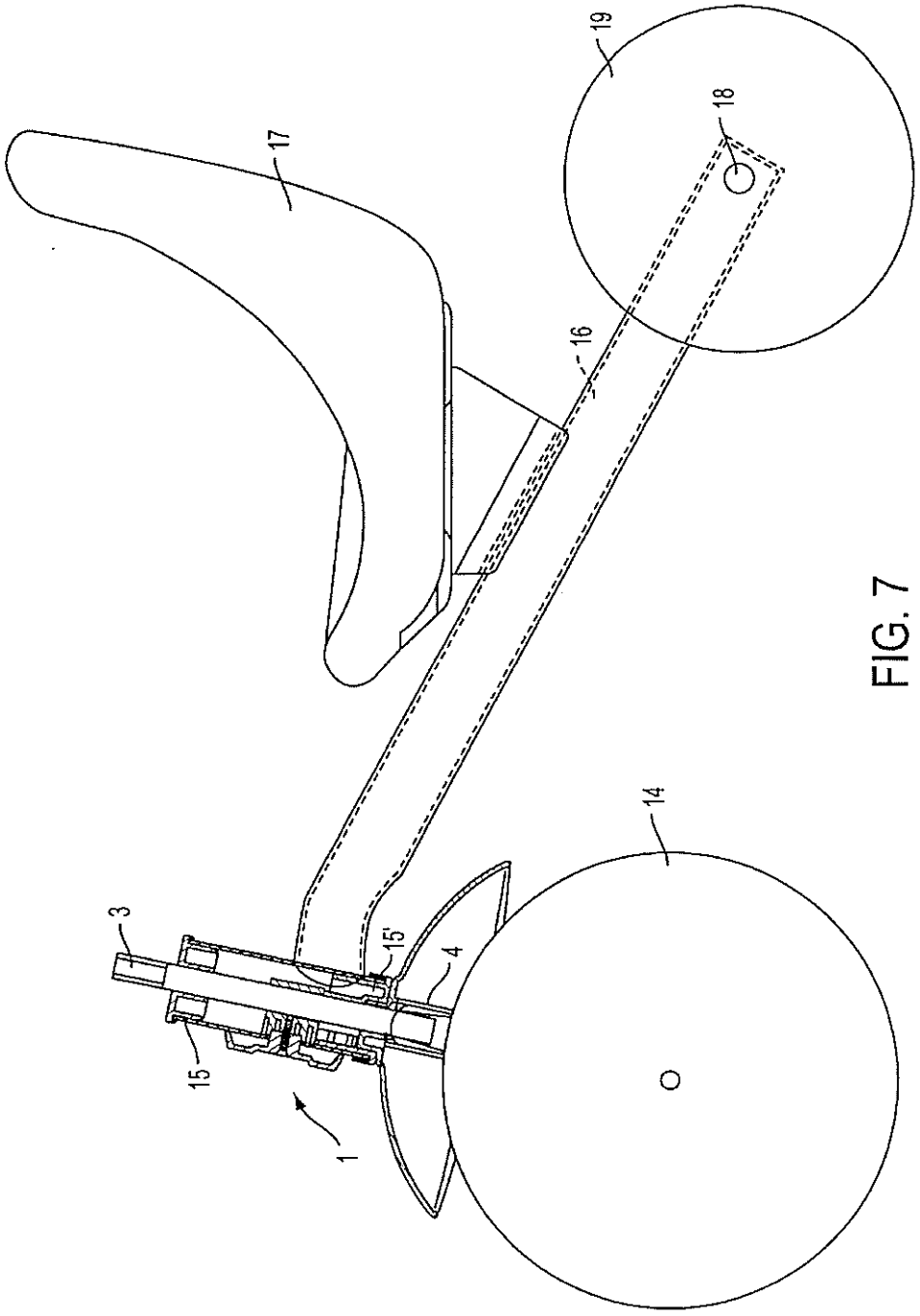

FIG. 7

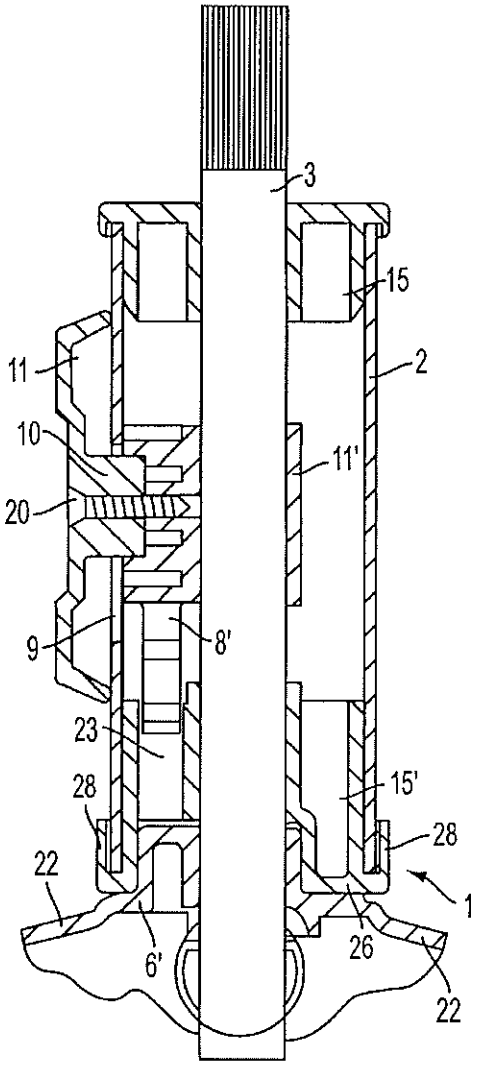
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FIG. 8

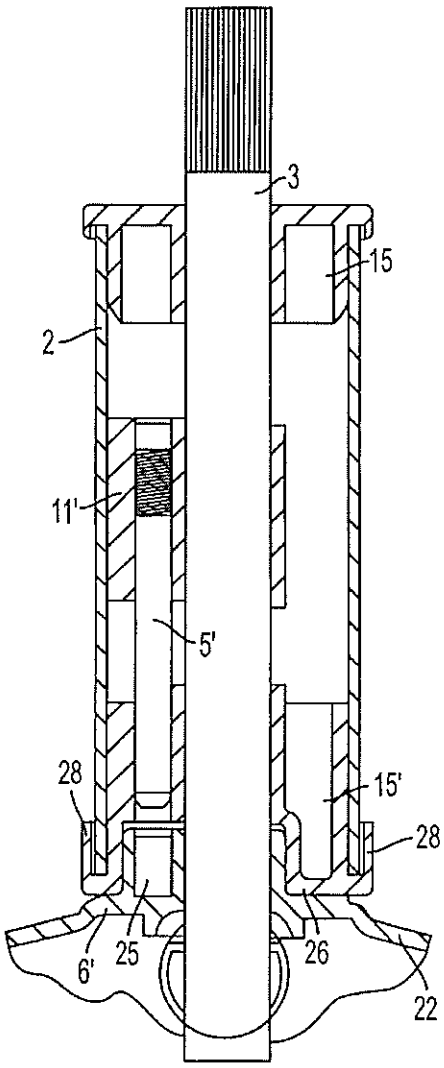
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FIG. 9

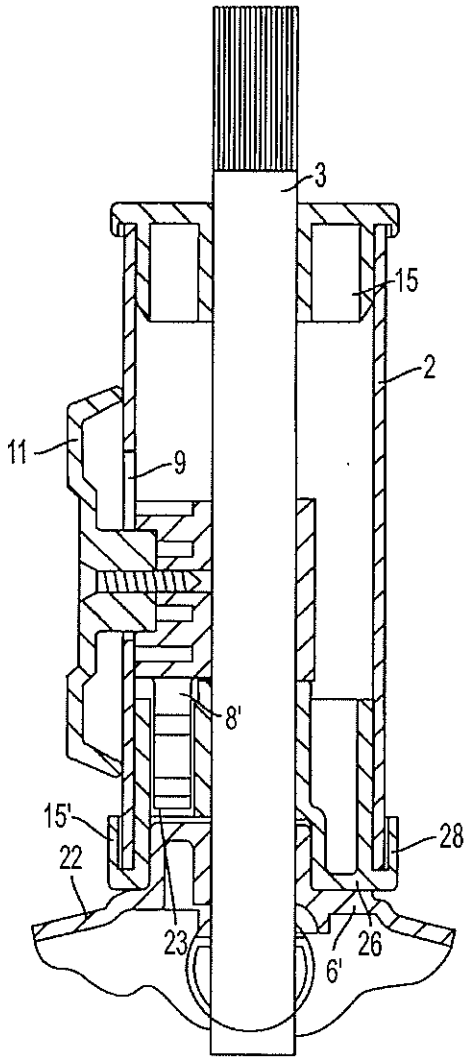
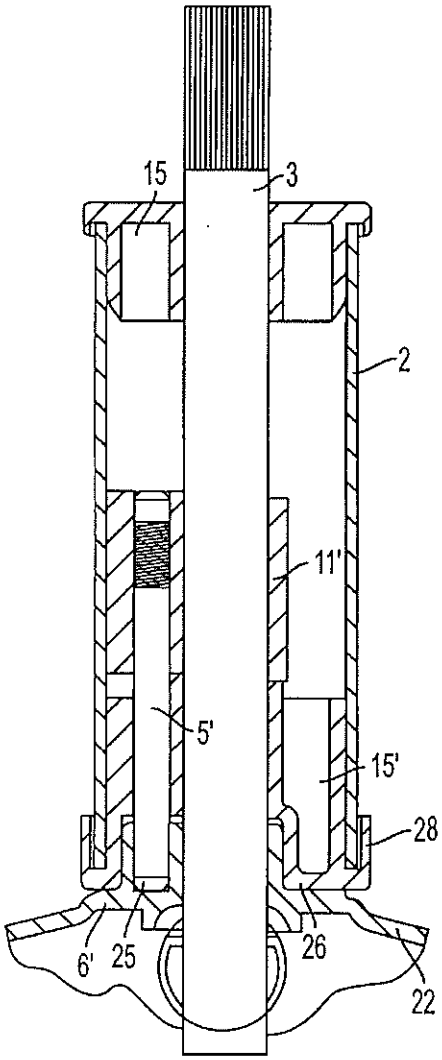


FIG. 10



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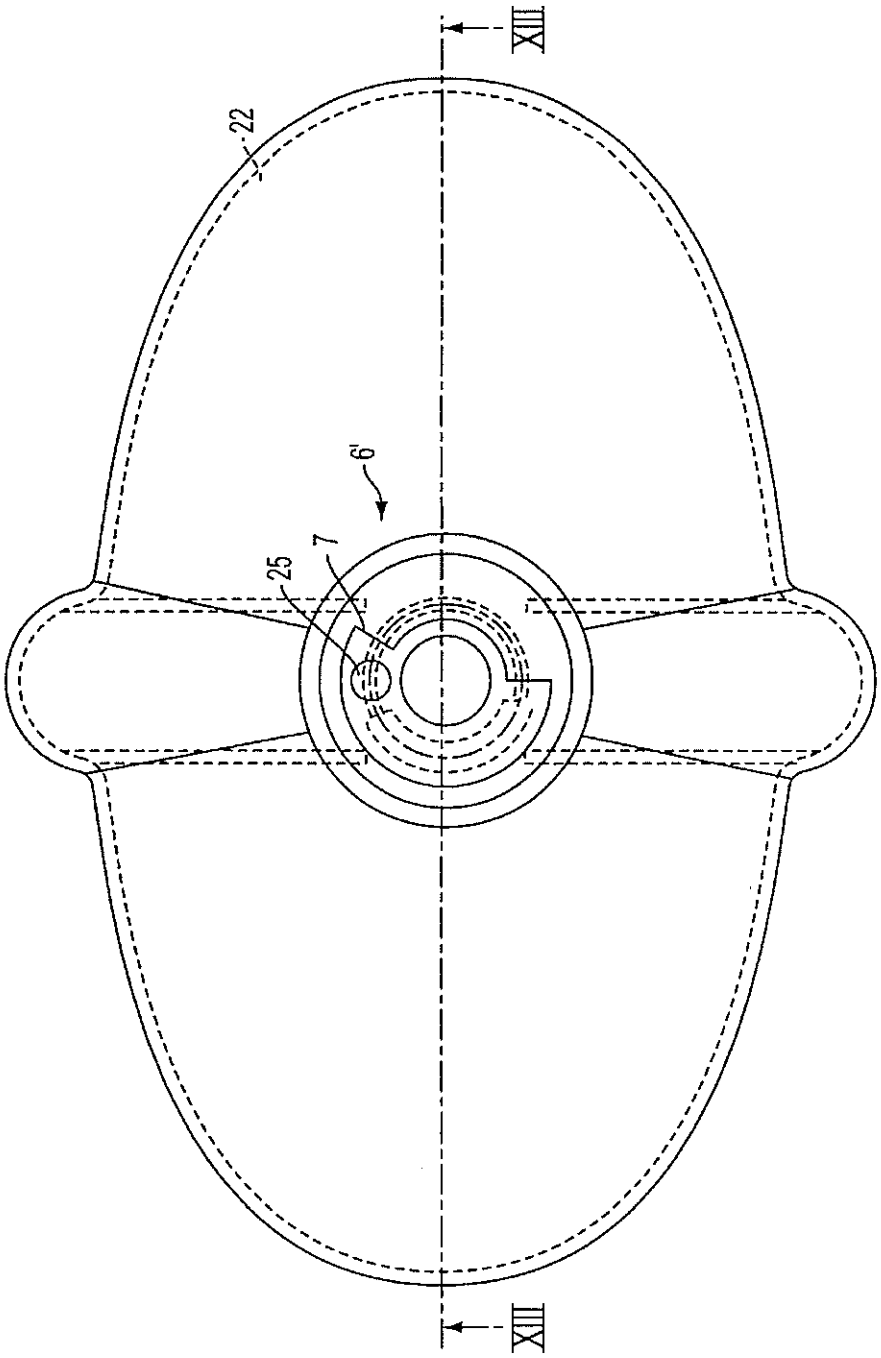

FIG. 12

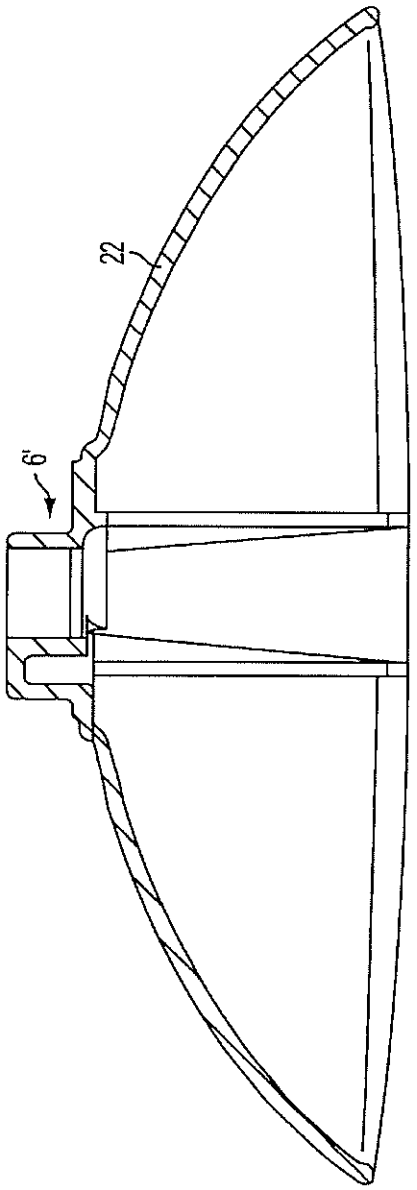

FIG. 13

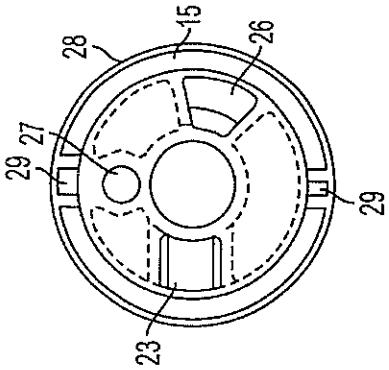

FIG. 17

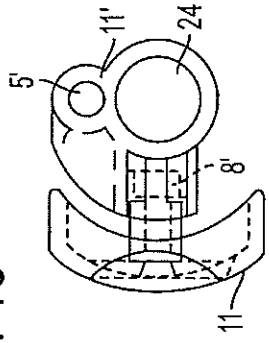

FIG. 16

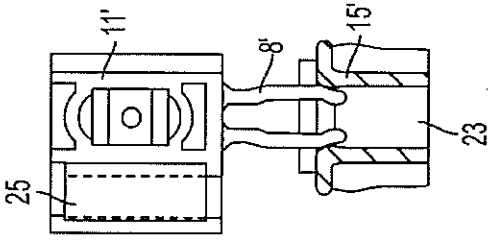

FIG. 15

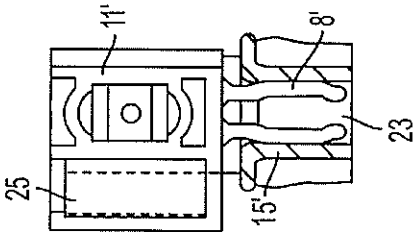

FIG. 14

VEHICLE STEERING HEAD

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims priority under 35 U.S.C. §119 of German Patent Application No. 299 11 652.2, filed on Jul. 5, 1999, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle steering head and in particular, to a steering head for a vehicle comprising a support tube which has rotatably supported therein a fork tube to which a wheel cover and a handlebar can be secured.

2. Discussion of Background Information

Vehicle steering heads of the above-described type are in particular used in bicycles or tricycles, and in particular in tricycles or bicycles for children.

In devices of the above-described type it is desirable for safety reasons that accidents be avoided which may be caused by an excessively large handlebar deflection. It has been found that when there is an excessively large handlebar deflection (e.g., the handle bar rotates beyond a point where effective steering occurs), the vehicle may tilt to the side. Moreover, such deflections or excessive rotation may run the risk that a user impacts his body against the handlebar. Additionally, the user may get caught with his/her feet in the front wheel and may be even be injured by the pedals.

A further drawback or disadvantage of prior-art devices occurs when they are pushed with a push rod type device. In such cases, these devices have a tendency towards uncontrolled steering movements of the front wheel which cannot be mastered or effectively controlled by small children, in particular.

SUMMARY OF THE INVENTION

The present invention therefore provides a vehicle steering head of the above-mentioned type which is of a simple construction and which can operate in an easy and reliable manner. Moreover, this design avoids the drawbacks of the prior art and can in particular limit a handlebar deflection to a desired degree. The invention also has provision for locking the handlebar.

According to one aspect of the invention a latch element is secured to a fork tube on a portion provided inside the support tube. A linkage element is supported in the support tube for rotation therewith. The linkage element is displaceable or moveable in a longitudinal direction of the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork tube and can be brought into contact with the latch element. Moreover, the linkage element comprises at least one locking element which is releasably connectable to the latch element.

According to another aspect of the invention a latch element is supported on the support tube. A linkage element is arranged on the fork tube and connected to the tube for rotation therewith. The latch element is freely displaceable or moveable along the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork tube and can be brought into contact with the support tube. Moreover, at least one latch element is provided that is releasably connectable to the support tube.

The vehicle steering head according to the invention is characterized by a number of considerable advantages.

First of all, it is possible to install or utilize the steering head in a frame of any desired design, e.g. children's bicycles or tricycles. Ideally, the dimensions of the steering head are such that they do not interfere with the remaining structure of the frame within which it is installed. Of course, the steering head may be combined with any and all common types of frames where ever its advantageous design is desired. Accordingly, the steering head may be utilized in a variety of devices where limited deflection or rotation and/or locking are desired.

Because the invention utilizes a latch element which is arranged in the support tube, no functional parts of the steering head need be outwardly visible or accessible. Accordingly, the internal parts are less susceptible to damage. Additionally, this design is less likely to cause injury when used by children or infants.

As a result of utilizing a linkage element according to the invention, it is possible to reliably lock the fork tube and thus the wheel fork and the front wheel. Such a locking provision is easily be accomplished by displacing or moving the linkage element. This design ensures a high degree of operational safety and operational reliability.

The linkage element preferably utilizes stop surfaces which cooperate with the latch element in a manner where they are brought into contact with one another. In this way, the steering angle can be limited to a particularly or desired range. This limited range of motion of the steering angle can be realized according to the invention in different ways. The invention contemplates that the available steering angle is freely selectable within a wide desired range. This is of particular advantage to vehicles for children such as tricycles, which may require a steering angle of approximately 45° to each side. Of course, other desirable steering angles cab be utilized. However, by designing in the desired limited steering angle, lateral tilting of the tricycle or similar devices can be prevented or its risk significantly reduced. Additionally, the risk of injuries which may be caused by the pedals, e.g., devices which utilize pedals on the front wheel can be reduced. Finally, the risk of injury which can occur when the handlebar exceeds a controlled steering angle can be ruled out to a considerable extent.

The invention also provides for a linkage element having a locking element which is releasably connectable to the latch element. This design ensures that when a push rod is used for pushing the device, i.e., a tricycle, the front wheel thereof may be reliably locked in place during straight travel.

In an advantageous embodiment of the invention, the latch element is designed in the form of a pin which extends in a direction transverse to the fork tube. The pin may extend through the fork tube such that it projects at both sides of the fork tube. Alternatively, the pin can project from the fork tube on only one side. Moreover, the pin can be firmly connected to the fork tube, e.g. by welding or other conventional attachment techniques. Additionally, it may be secured by press fitting with or without utilizing a knurled portion. Of course, the dimensions of the pin can easily be adapted to the respective conditions of use.

It should be noted that the manufacturing costs of the steering head are reduced by the above-described construction to quite a considerable degree.

In another advantageous embodiment of the invention, the linkage element is substantially designed in the form of a hollow cylinder. Thus, the linkage element can be reliably guided in the support tube and surround the fork tube. Additionally, the linkage element can be designed as a single

integral part or several parts which are either joined together or which cooperate together.

It is advantageous for the longitudinal displacement or movement of the linkage element to be along an axis of the support tube and the fork tube. Accordingly, the support tube may comprise at least one longitudinal slot or a similar recess through which a connection element extends which is connected to the linkage element. This design also utilizes a slide which is arranged outside the support tube.

The slide facilitates the ease of handling or movement of the linkage element. In such a design, a displacement of the slide, which may additionally be provided with locking mechanism or fixing safety mechanism, effects a corresponding displacement or movement of the linkage element. The locking mechanism or fixing mechanism allows for fixing the front wheel in a single or set travel position which is preferably straight. Moreover, the invention also contemplates that the linkage element may be provided with inclined inlet surfaces or intercepting mechanisms which engage the latch element so as to initiate a locking action when the front wheel is slightly deflected angularly.

Stop surfaces on the latch element are preferably formed on at least one front attachment of the linkage element. Additionally, it is particularly advantageous when two opposite attachments or stops are in symmetry with each other and are each provided with at least one stop surface located on the linkage element. Thus, by utilizing two attachments or stops which are in symmetry with each other, this design can limit the steering angle in a symmetrical fashion to both the left and the right side.

In another advantageous embodiment of the invention, the associated stop surfaces of the attachments or stops act to limit the rotation of the fork tube to a predetermined angular range at both sides. This angular range may e.g. be approximately 45° to both sides, for a total range of motion of approximately 90°.

The locking element is preferably designed in the form of at least one front recess which receives the latch element. Such an advantageous design makes it possible to grip and fix the latch element upon displacement or movement of the linkage element. Additionally, it is advantageous that the recess is retracted or set back relative to the front attachment, so that the attachments or stops can always remain in the plane of the latch element, while upon a displacement of the latch element, it is only the recess which can additionally be brought into engagement.

To implement a simple and operationally reliable structure of the steering head, it may be of advantage that the recess be centrally arranged between the two attachments or stops.

The invention also contemplates that the fork tube itself has not been changed constructionally. In other words, the invention can be adapted to work with a conventional fork tube. Also, the invention makes it possible to manufacture all functional parts separately in a very simple manner. As a result, advantageous production costs can be achieved.

In a preferred design of a previously described embodiment, the linkage element is designed as part of a mudguard which extends from below into the support tube. This design allows for significant cost savings since the mudguard is normally made from plastics and is typically already included in most vehicles of the above-described type. The linkage element can thus be mounted on the mudguard or made integrally therewith, in a particularly easy way and at low costs.

A further advantage of the this embodiment is that the latch element can be designed in the form of a bolt which arranged to be parallel with the fork tube. The latch element of this design can thus be given relatively large dimensions so that the diameter of the support tube itself need not be chosen with such a large size.

It may be of particular advantage when the latch element is connected to a slide which extends into the support tube so as to be able to design the lock of the front wheel in a particularly simple manner. Furthermore, the locking element may preferably be connected to the slide. Moreover, the locking element serves to reliably maintain the locked state and to prevent any unintended unlocking. The locking element also preferably engages into a recess of a bearing which supports the fork tube in the support tube. As a result, it is not necessary to mount additional parts or to take installation measures on the support tube itself.

It may also be of particular advantage for the limitation of the steering angle to be accomplished by a lower bearing which supports the fork tube in the support tube. This lower bearing may have formed thereon an attachment which projects in the direction of the linkage element and which can be brought into contact with the stop surfaces formed on the linkage element and thus on the mudguard. This design has the advantageous effect that the predetermined angular range can be limited at both sides as well, e.g. approximately 45° each side.

The invention provides of a vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head including a latch element projecting from the fork tube and disposed within the support tube, and a linkage element disposed within the support tube, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube and comprises at least one stop surface for limiting a rotation of the fork tube when the latch element contacts the at least one stop surface. The linkage element may further comprise at least one locking element for locking the fork tube in a single position. The at least one locking element may releasably engage the latch element when the fork tube is locked. The latch element may comprises a pin. The pin may project substantially perpendicular to the axis of the fork tube. The linkage element may comprise a substantially cylindrical shape. The linkage element may comprise a plurality of hollow chambers separated by connecting walls. The support tube may comprise an opening which allows a connecting element to pass therethrough. The opening may comprise a longitudinal slot. The connecting element may be secured to the linkage element. The movement of the linkage element may be limited by the movement of the connecting element within the longitudinal slot. The steering head may further comprise a slide which is secured the connecting element, the slide being disposed adjacent an outer surface of the support tube. The at least one stop surface may be disposed on at least one stop.

The at least one stop may comprise a projection which extends from the linkage element. The at least one stop may comprise wedge-shaped hollow projection having two angled lateral stop surfaces. The at least one stop may comprise two stops which are disposed opposite one another. Each stop may comprise wedge-shaped hollow projection having two angled lateral stop surfaces. The two stops may define a limited range of rotational motion of the fork tube in each of a clockwise and a counter-clockwise direction. The limited range of motion in the clockwise direction may be substantially equal to the range of motion in the counter-clockwise direction. The limited range of motion in one of the clockwise and counter-clockwise direction may be approximately 45 degrees.

The linkage element may further comprise at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element. The at least one recess is set back some distance from a surface of at least one stop. The at least one recess is centrally disposed between at least two stops.

The steering head may further comprise an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tube, each of the upper and lower bearings having an opening which allows the fork tube to pass therethrough.

The steering head may be disposed on a tricycle frame.

The invention also provides for a vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head including a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube, and a linkage element connected to the fork tube so as to rotate therewith, the linkage element comprising at least one stop surface, wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube. The steering head may further comprise a slide, wherein the slide is disposed within the support tube and retains the latch element. The slide may further comprise at least one locking element for releasably securing the slide to the support tube. The linkage element may comprise a mudguard. The mudguard may be disposed between one end of the support tube and a wheel fork. The latch element may comprise a rod like member which is arranged substantially parallel to the axis of the fork tube. The rod like member may comprise one of a bolt and a pin. The latch element may be connected to a slide, the slide being disposed within the support tube. The slide may be moveable substantially parallel to the axis of the fork tube. A locking element may be connected to the slide.

The steering head may further comprise a bearing support disposed on at least one end of the support tube. The bearing support may be disposed on a lower end of the support tube. The steering head may further comprise a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support. The bearing support may comprise at least one stop, the at least one stop comprising at least one surface which engages the linkage element. The at least one stop may comprise a projection which engages a recess in the linkage element. The projection and the recess may cooperate to limit the rotational movement of the fork tube within a desired range. The range of the rotational movement may be limited by at least two stop surfaces. The at least two stop surfaces may define a limited range of rotation in one of a clockwise and a counter-clockwise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counter-clockwise direction. The limited range of rotation between the at least two stops may be approximately 45 degrees.

The steering head may be disposed on a tricycle frame.

The invention further provides for a vehicle steering head including a support tube and fork tube which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube, a lower bearing support disposed at a lower end of the support tube, the fork tube comprising a fork end, a handlebar, and a latch element projecting from the fork tube between the fork end and the handlebar end, the latch element being disposed within the support tube, a linkage element slidable disposed within the support tube, the linkage element comprising at least one stop surface for engaging the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube from a first position where the latch element and the at least one stop cooperate to limit the rotational movement of the fork tube to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork tube is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element.

The invention also relates to a vehicle steering head including a support tube and fork tube which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube, a lower bearing support disposed at a lower end of the support tube, the lower bearing support comprising at least one stop surface, the fork tube comprising a fork end, a handlebar, and a latch element which is slidably disposed adjacent the fork tube between the fork end and the handlebar end, the latch element being disposed within the support tube, a linkage element moveably disposed adjacent the lower support bearing, the linkage element comprising at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube from a first position where the latch element engages only the lower bearing support and where the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork tube to a second position where the latch element releasably engages a recess in the linkage element whereby the fork tube is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element. The linkage element may further comprise at least one locking element for engaging a locking recess in the lower bearing support. The at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

The invention provides for a vehicle steering head including a fork tube adapted to engage a handlebar, a support tube which rotatably supports the fork tube, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork tube from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork tube to rotate with respect to the support tube in at least two directions. The latch element may comprise a rod-like member.

The invention also provides for a vehicle steering head that includes a support tube adapted to be coupled to a vehicle frame, an upper bearing support arranged at an upper end of the support tube, a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface, a cylindrical element rotatably mounted to the support tube via the upper and

lower bearing supports, the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar, a latch element movably disposed within the support tube, a slide coupled to the latch element, the latch element being movable from outside the support tube, a linkage element that is rotatable with respect to the support tube, and the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube, wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of exemplary embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

FIG. **1** is a schematic side view of a children's tricycle with one embodiment of the vehicle steering head according to the invention;

FIG. **2** is a simplified sectional side view of the steering head according to the invention in an unlocked state;

FIG. **3** is a side view, turned or oriented by 90° (a right angle) of the arrangement shown in FIG. **2**;

FIG. **4** is a sectional side view similar to FIG. **2**, in the locked state;

FIG. **5** is a side view, similar to FIG. **3**, of the view according to FIG. **4**;

FIG. **6** is a simplified perspective illustration of the linkage element according to the invention;

FIG. **7** is a schematic side view of a children's tricycle with another embodiment of the vehicle steering head according to the invention;

FIG. **8** is a sectional side view of the vehicle steering head according to the invention, in the unlocked state;

FIG. **9** is a side view, turned or oriented by 90° of the arrangement shown in FIG. **8**;

FIG. **10** is a sectional side view similar to FIG. **8**, in the locked state;

FIG. **11** is a side view, turned or oriented by 90° which is similar to FIG. **9**, in the locked state;

FIG. **12** is a top view on the linkage element according to the invention and on the associated mudguard;

FIG. **13** is a sectional view of the arrangement according to FIG. **12** along the sectional lines XIII—XIII of FIG. **12**;

FIG. **14** is an enlarged side view showing a portion of the slide and of the locking element in the locked state;

FIG. **15** is a view analogous to FIG. **14**, in the unlocked state;

FIG. **16** is a top view on the slide; and

FIG. **17** is a top view on the lower bearing.

DETAILED DESCRIPTION OF THE INVENTION

The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

A children's tricycle is shown in FIG. **1** and comprises a front wheel **14** which is supported on a wheel fork **4**. Wheel fork **4** is fixedly connected to a fork tube **3**. A handlebar (not shown) can be secured to the upper end of fork tube **3**.

Fork tube **3** is supported in a support tube **2**. This support is accomplished by utilizing slide bearings **15** and **15'** which are shown in detail in FIGS. **2** to **5**. The slide bearings **15** and **15'** correspond to those of the prior art in this embodiment so that a detailed description is here not needed.

Support tube **2** is firmly connected to a frame **16** which has mounted thereon a seat **17**. The tricycle also has a rear axle **18** with rear wheels **19**. Accordingly, it is support tube **2** and fork tube **3** which form a steering head **1**.

According to the invention, support tube **2** has arranged therein a linkage element **6** which has a substantially cylindrical configuration (see also FIG. **6**) and which is received with a play or clearance (so that it can slide) within support tube **2**. Linkage element **6** is also provided with a central recess through which fork tube **3** extends or passes.

Support tube **2** also has formed therein a longitudinal slot **9** through which a connection element **10** extends or passes. This connection element **10** is connected to a slide **11** and linkage element **6**. The connection may be via a screw **20** (see FIGS. **2** and **4**) or other conventional connecting mechanism. In the illustrated embodiment, connection element **10** is integrally connected to or formed with slide **11** and extends in a recess **21** of linkage element **6**. However, connection element **10** and slide **11** may be made as separate components which are joined or secured together by any conventional attachment technique including a screw or threaded element.

On its front upper portion, linkage element **6** comprises two symmetrical opposite attachments or stops **12**. Each of these stops **12** may be provided with lateral stop surfaces **7**. When viewed from the top, these attachments or stops **12** are designed in a manner of a segment of a partial circle (pie shaped or wedge shaped), so that four stop surfaces **7** are formed, with each one being arranged in symmetry with one another. Of course, stops **12** may be separately formed and attached to linkage element **6** instead of being integrally formed therewith, as is shown.

In the illustrated embodiment two locking elements **8** may be utilized in which each is formed by a recess **13**. These locking elements **8** are preferably provided on linkage element **6** in retracted or set back manner with respect to stops **12**. As becomes apparent from FIG. **6**, the walls of at least one recess **13** may be made resilient to ensure a releasable locking of a bolt-like latch element **5** when linkage element **6** is pushed upwards or into engagement with bolt-like latch element **5**.

As becomes apparent from FIGS. **2** to **5**, fork tube **3** is provided with a bolt-like or pin-like latch element **5** which extends or projects from at least one and preferably both sides of fork tube **3**. Of course, latch element **5** may be integrally formed with fork tube. Alternatively, latch element **5** may be a threaded or partially threaded member which threads into fork tube **3**. However, it is preferred that latch element **5** is a pin having a centrally disposed exterior knurl which is press fit into fork tube as is shown. In its working position, latch element **5** rotates with fork tube **3**

when a deflection or rotation of the handlebar takes place. The deflection of the handlebar is limited by way of latch element **5** abutting on stop surfaces **7**, these stop surfaces **7** defining the limited range of motion of the handlebar.

When it is desired to lock the handlebar in a set position, latch element **5** is pressed or forced into recesses **13**. This engagement occurs when locking element **8**, which is disposed on linkage element **6**, is pushed upwards by slide **11**. Recesses **13** also utilize inclined inlet surfaces because they act as guiding lead-in surfaces which facilitate entry of pin **5** into recess **13**. In the locked state, which is shown in FIGS. **4** and **5**, a steering movement thus becomes impossible since the handlebar or fork tube **3** is locked in a single direction. FIGS. **2** and **3** show a downwardly displaced condition of linkage element **6** in which latch element **5** is in a position which it does not cooperate with the locking element **8**. As a result, in this position fork tube **3** and handlebar are free to rotate until latch element **5** abuts on stop surfaces **7**, this range of movement or rotation corresponding to a steering angle range.

According to a preferred aspect of the invention, linkage element **6** may be made from a plastic material. Of course, other materials are also contemplated.

Another embodiment of the vehicle steering head according to the invention is described with reference to FIGS. **7** to **16**. In this regard, like parts are provided with like reference numerals.

As for the description of FIG. **7**, reference can be made to the description of FIG. **1** to the extent that the same features are shown. The subsequent figures are illustrations elucidating the details which have been changed.

As in FIGS. **2** to **5**, FIGS. **8** and **9** and **10** and **11**, respectively, are illustrations showing the vehicle steering head on an enlarged scale. Again, like parts are here also provided with like reference numerals, so that reference can be made to the preceding explanations. Slide **11** utilizes connection element **10** and screw **20**. Connection element **10** also extends through a longitudinal slot **9**. Moreover, slide **11** comprises an outer grip portion **11** and an interior portion **11'** which is screwed to outer grip portion **11** by a screw **20**. A top view of slide **11** and **11'** is shown in FIG. **16**. As can be seen in this figure, a central recess **24** is provided through which fork tube **3** extends or passes (with a clearance which allows slide **11'** to move up and down with respect to fork tube **3**). Furthermore, slide **11'** also has a recess (see FIGS. **9**, **11** and **16**) which is formed so that it can accept a bolt-like latch element **5'**. Of course, this latch element **5'** may be pressed into this recess, threaded into the recess, or otherwise secured to slide **11'** in a suitable manner. Alternatively, latch element **5'** may be integrally formed with slide **11'**.

As already described in conjunction with a previous embodiment, a bearing **15** which serves as a slide bearing is used on the upper portion of steering head **1**.

Lower bearing **15'** in this embodiment is configured such that it has an upwardly projecting contour of a linkage element **6'** which can extend into bearing **15'**. Of course, the bearing and the upwardly projecting contour may be made as separate components which are joined together by conventional techniques rather than integrally formed as is shown. Additionally, as becomes apparent in FIG. **12**, linkage element **6'** may have a recess **25** into which latch element **5'** can be inserted (see also FIGS. **9** and **11**).

As can further be seen from the top view of FIG. **12**, linkage element **6'** comprises two lateral stop surfaces **7** which are angularly spaced apart from each other. This design is such that a downwardly oriented attachment or stop **26** (see FIGS. **8** to **11**) of the bearing **15'**, which is connected to support tube **2**, forms a steering limitation of plus/minus approximately **45°**. Of course, as with the previous embodiment, the range of steering limitation can be designed to any desired range.

FIG. **13** shows a lateral sectional view of mudguard **22** and of linkage element **6'**. Note that these components are integrally formed as a single member which reduces manufacturing costs associated with joining two separate components.

FIGS. **14** and **15** are front views of slide **11'** wherein handpiece **11** has been removed to illustrate the operation of locking element **8'**. Locking element **8'** comprises a U-shaped and includes two movable or flexible lateral legs which can releasably be inserted into a recess **23** of bearing **15'**. Upon insertion and locking, locking element **8'** is pressed against an undercut and thereby held in position inside recess **23**. Accordingly, when it is desired to release the locked state of fork tube **3**, slide **11'** must be pushed upwards which removes the legs from recess **23**. Of course, other locking mechanisms may be utilized and this embodiment is not limited to the use of this particular locking mechanism. For example, a pin may be used which has a floating ring disposed around its circumference. Alternatively, other conventional releasable locking mechanisms may be utilized.

FIG. **17** is a top view on lower bearing **15'** on an enlarged scale. The (downwardly projecting) attachment or stop **26** can here be seen as well as recess **23** which receives locking element **8'**. Moreover, recess **27** is adapted to receive and guide bolt-like latch element **5'** therein. Furthermore, a surrounding collar-like edge **28** can be seen in which **29** designates two oppositely disposed attachments or projections which serve as anti-rotation engagements. These engagements are designed to engage recesses (not shown) of support tube **2**. Of course, lower bearing may be secured to support tube **2** in any conventional manner such as by bonding, welding, or screws. Moreover, this attachment may be releasable or more permanent in nature.

It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

What is claimed:

1. A vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element projecting from the fork tube and disposed within the support tube; and

a linkage element disposed within the support tube,

wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube

and comprises at least one stop surface for limiting a rotation of the fork tube when the latch element contacts the at least one stop surface.

2. The steering head of claim 1, wherein the linkage element further comprises at least one locking element for locking the fork tube in a single position.

3. The steering head of claim 2, wherein the at least one locking element releasably engages the latch element when the fork tube is locked.

4. The steering head of claim 1, wherein the latch element comprises a pin.

5. The steering head of claim 4, wherein the pin projects substantially perpendicular to the axis of the fork tube.

6. The steering head of claim 1, wherein the linkage element comprises a substantially cylindrical shape.

7. The steering head of claim 6, wherein the linkage element comprises a plurality of hollow chambers separated by connecting walls.

8. The steering head of claim 1, wherein the support tube comprises an opening which allows a connecting element to pass therethrough.

9. The steering head of claim 8, wherein the opening comprises a longitudinal slot.

10. The steering head of claim 9, wherein the connecting element is secured to the linkage element.

11. The steering head of claim 10, wherein the movement of the linkage element is limited by the movement of the connecting element within the longitudinal slot.

12. The steering head of claim 10, further comprising a slide which is secured the connecting element, the slide being disposed adjacent an outer surface of the support tube.

13. The steering head of claim 1, wherein the at least one stop surface is disposed on at least one stop.

14. The steering head of claim 13, wherein the at least one stop comprises a projection which extends from the linkage element.

15. The steering head of claim 14, wherein the at least one stop comprises wedge-shaped hollow projection having two angled lateral stop surfaces.

16. The steering head of claim 13, wherein the at least one stop comprises two stops which are disposed opposite one another.

17. The steering head of claim 16, wherein each stop comprises wedge-shaped hollow projection having two angled lateral stop surfaces.

18. The steering head of claim 16, wherein the two stops define a limited range of rotational motion of the fork tube in each of a clockwise and a counter-clockwise direction.

19. The steering head of claim 18, wherein the limited range of motion in the clockwise direction is substantially equal to the range of motion in the counter-clockwise direction.

20. The steering head of claim 18, wherein the limited range of motion in one of the clockwise and counter-clockwise direction is approximately 45 degrees.

21. The steering head of claim 1, wherein the linkage element further comprises at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element.

22. The steering head of claim 21, wherein the at least one recess is set back some distance from a surface of at least one stop.

23. The steering head of claim 21, wherein the at least one recess is centrally disposed between at least two stops.

24. The steering head of claim 1, further comprising an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tube, each of the upper and lower bearings having an opening which allows the fork tube to pass therethrough.

25. The steering head of claim 1, wherein the steering head is disposed on a tricycle frame.

26. A vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element that is rotatable with the fork tube, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

wherein the latch element is connected to a slide, the slide being disposed within the support tube.

27. The steering head of claim 26, wherein the slide is moveable substantially parallel to the axis of the fork tube.

28. The steering head of claim 26, further comprising a locking element connected to the slide.

29. The steering head of claim 26, wherein the steering head is disposed on a tricycle frame. mudguard.

30. A vehicle steering head including a support tube which rotatable supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element that is rotatable with the fork tube, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

a slide that is disposed within the support tube and retains the latch element.

31. The steering head of claim 30, wherein the slide further comprises at least one locking element for releasable securing the slide to the support tube.

32. A vehicle steering head including a support tube which rotatable supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element that is rotatable with the fork tube, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

wherein the linkage element comprises a mudguard.

33. The steering head of claim 32, wherein the mudguard is disposed between one end of the support tube and a wheel fork.

34. A vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element connected to the fork tube so as to rotate therewith, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

wherein the latch element comprises a rod like member which is arranged substantially parallel to the axis of the fork tube.

35. The steering head of claim 34, wherein the rod like member comprises one of a bolt and a pin.

36. A vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element that is rotatable with the fork tube, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

a bearing support disposed on at least one end of the support tube.

37. The steering head of claim 36, wherein the bearing support is disposed on a lower end of the support tube.

38. The steering head of claim 36, further comprising a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support.

39. The steering head of claim 36, wherein the bearing support comprises at least one stop, the at least one stop comprising at least one surface which engages the linkage element.

40. The steering head of claim 38, wherein the at least one stop comprises a projection which engages a recess in the linkage element.

41. The steering head of claim 39, wherein the projection and the recess cooperate to limit the rotational movement of the fork tube within a desired range.

42. The steering head of claim 40, wherein the range of the rotational movement is limited by at least two stop surfaces.

43. The steering head of claim 41, wherein the at least two stop surfaces define a limited range of rotation in one of a clockwise and a counter-clockwise direction.

44. The steering head of claim 42, wherein the at least two stop surfaces define a limited range of rotation in each of a clockwise and a counter-clockwise direction.

45. The steering head of claim 42, wherein the limited range of rotation between the at least two stops is approximately 45 degrees.

46. A vehicle steering head including a support tube and fork tube which is rotatably mounted with respect to the support tube, the steering head comprising:

an upper bearing support disposed at an upper end of the support tube;

a lower bearing support disposed at a lower end of the support tube;

the fork tube comprising a fork end and a handlebar engaging end;

a latch element projecting from the fork tube between the fork end and the handlebar engaging end, the latch element being disposed within the support tube; and

a linkage element slidable disposed within the support tube, the linkage element comprising at least one stop surface for engaging the latch element;

wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube from a first position, wherein the latch element and the at least one stop cooperate to limit the rotational movement of the fork tube, to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork tube is prevented from rotating in any direction.

47. The steering head of claim 46, wherein the linkage element is moveable from outside the support tube via a slide.

48. The steering head of claim 47, wherein the slide is connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube.

49. The steering head of claim 48, wherein the longitudinal slot limits the movement of the linkage element.

50. A vehicle steering head including a support tube and fork tube which is rotatably mounted with respect to the support tube, the steering head comprising:

an upper bearing support disposed at an upper end of the support tube;

a lower bearing support disposed at a lower end of the support tube, the lower bearing support comprising at least one stop surface;

the fork tube comprising a fork end and a handlebar engaging end;

a latch element slidably disposed adjacent the fork tube between the fork end and the handlebar engaging end, the latch element being disposed within the support tube; and

a linkage element moveably disposed adjacent the lower support bearing, the linkage element comprising at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element,

wherein the latch element is moveable in a direction which is substantially parallel to an axis of the fork tube from a first position where the latch element engages only the lower bearing support, wherein the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork tube, to a second position where the latch element releasably engages a recess in the linkage element whereby the fork tube is prevented from rotating in any direction.

51. The steering head of claim 50, wherein the latch element is moveable from outside the support tube via a slide.

52. The steering head of claim 51, wherein the slide is connected to the latch element via a connection element, the connection element passing through a longitudinal slot in the support tube.

53. The steering head of claim 52, wherein the longitudinal slot limits the movement of one of the latch element or the slide.

54. The steering head of claim 52, further comprising a least one locking element for engaging a locking recess in the lower bearing support.

55. The steering head of claim 54, wherein the at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

56. A vehicle steering head comprising:

a fork tube adapted to engage a handlebar;

a support tube which rotatably supports the fork tube;

a latch element disposed within the support tube;

a slide which is moveable with respect to the support tube; and

a linkage element;

wherein the slide is moveable from at least one position wherein the linkage element prevents the fork tube from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork tube to rotate with respect to the support rube in at least two directions, and

wherein the slide is adapted to move the latch element from outside the support tube.

57. The steering head of claim 56, wherein the latch element comprises a rod-like member.

58. A vehicle steering head comprising:

a support tube adapted to be coupled to a vehicle frame;

an upper bearing support arranged at an upper end of the support tube;

a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface;

a cylindrical element rotatably mounted to the support tube via the upper and lower bearing supports;

the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar;

a latch element movably disposed within the support tube;

a slide coupled to the latch element;

the latch element being movable from outside the support tube;

a linkage element that is rotatable with respect to the support tube; and

the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube,

wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,378,884 B1
DATED : April 30, 2002
INVENTOR(S) : H. Kettler

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 12,
Line 23, delete "mudguard".
Lines 25 and 41, replace "rotatable" with -- rotatably --.

Column 13,
Line 30, the claim dependency should be changed from "38" to -- 39 --.
Line 33, the claim dependency should be changed from "39" to -- 40 --.
Line 36, the claim dependency should be changed from "40" to -- 41 --.
Line 39, the claim dependency should be changed from "41" to -- 42 --.
Line 61, replace "slidable" with -- slidably --.

Column 14,
Line 10, insert -- slot -- between the words "longitudinal" and "in".
Line 14, replace "rube" with -- tube --.
Line 57, the claim dependency should be changed from "52" to -- 50 --.

Signed and Sealed this

Twenty-fifth Day of February, 2003

JAMES E. ROGAN
Director of the United States Patent and Trademark Office

Exhibit C

US007487988B2

(12) **United States Patent**
Kettler et al.

(10) **Patent No.: US 7,487,988 B2**
(45) **Date of Patent: *Feb. 10, 2009**

(54) **VEHICLE STEERING HEAD**

(75) Inventors: **Heinz Kettler**, Ense-Parsit (DE); **Joachim Kettler**, Werl (DE); **Reinhard Rocholl**, Werl (DE)

(73) Assignee: **Heinz Kettler GmbH & Co. KG**, Ense-Parsit (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **11/562,694**

(22) Filed: **Nov. 22, 2006**

(65) **Prior Publication Data**

US 2007/0096425 A1 May 3, 2007

Related U.S. Application Data

(63) Continuation of application No. 10/671,668, filed on Sep. 29, 2003, now Pat. No. 7,156,408, which is a continuation of application No. 10/298,002, filed on Nov. 18, 2002, now Pat. No. 6,799,772, which is a continuation of application No. 10/092,516, filed on Mar. 8, 2002, now abandoned, which is a continuation of application No. 09/584,497, filed on Jun. 1, 2000, now Pat. No. 6,378,884.

(30) **Foreign Application Priority Data**

Jul. 5, 1999 (DE) ..... 299 11 652 U

(51) **Int. Cl.**
B62K 5/02 (2006.01)

(52) **U.S. Cl.** **280/279**; 280/272; 74/495

(58) **Field of Classification Search** 280/279, 280/272, 271, 282, 89; 403/354, 83; 74/495
See application file for complete search history.

(56) **References Cited**

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Hand made drawing page No. RF12204 of Italtrike letterhead. The drawing has a handwritten date of Jan. 21, 1987.

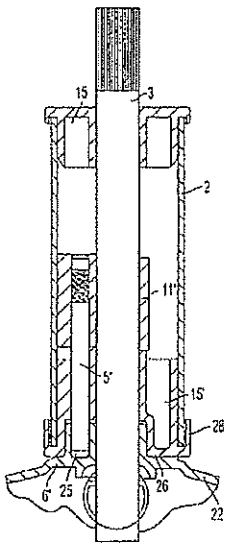
(Continued)

Primary Examiner—Tony H. Winner
(74) *Attorney, Agent, or Firm*—Greenblum & Bernstein, P.L.C.

(57) **ABSTRACT**

Vehicle steering head for a trike includes a hollow support. A connecting member is adapted to connect a wheel fork to a handlebar. The connecting member is rotatably mounted to the hollow support. A pin is arranged within the hollow support and is structured and arranged to move parallel to an axis of the connecting element. The vehicle steering head is structured and arranged to limit rotational movement of the connecting member in each of two directions.

24 Claims, 9 Drawing Sheets



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Hand made drawing page No. RF12206 on Italtrike letterhead. The drawing has a handwritten date of Jan. 21, 1987.
Black and white picture allegedly showing a mold having page No. RF12208.
Black and white picture allegedly showing mold parts having page No. RF12209.
Sheet table in Italian having a stamp entitled "N. CITTON & C, s.a.s.".
Cover page of Europeo (in color) having page RF12230 and dated Feb. 1, 1991.
Four sheets with page Nos. RF12244-A, -B, -C and -D (in color) showing vaious pictures of trikes and a scooter on what appears to be notebook pages.
Four sheets with page Nos. RF12245-A, -B, -C and -D (in color) showing various pictures of trikes and a bike on what appears to be notebook pages.
Pages 1 and 2 of a 1998 Radio Flyer catalog.
Three sheets labeled "Acknowledgment".
A sheet entitled "Restricted Turning Prior Art".
A sheet entitled "Product Name: Roll N Ride".
A sheet entitled "Product Name: Grow-With-Me-Trike".
A sheet entitled "Product Name: Baby Too".
A sheet entitled "Product Name: Tough Trikes" and "Product Name: Push'n Pedal Trike".
Two sheets entitled "HBC Model 29875 CS 04G".
Two sheets entitled "Smoby Pilot Alu Plus Juguetes Pico S.A.".
Two sheets entitled "Fisher Price Rock, Roll and Ride XL".
Two sheets entitled "Charton Baby Driver 2 39150 St. Laurent France".
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Four pages of assembly Instructions for Push, Pedal & Ride Trike, date unknown.
Figs. 1, 2A and 2B purporting to show the Push, Pedal & Ride Trike in a fully assembled state and a partially disassembled state, date unknown.
English language Translation of DE 29901449.
English language Abstract of GB 815456.
English language Abstract of DE 3242863.
English language Abstract of 3914050.
English language Translation of Swiss 290478.

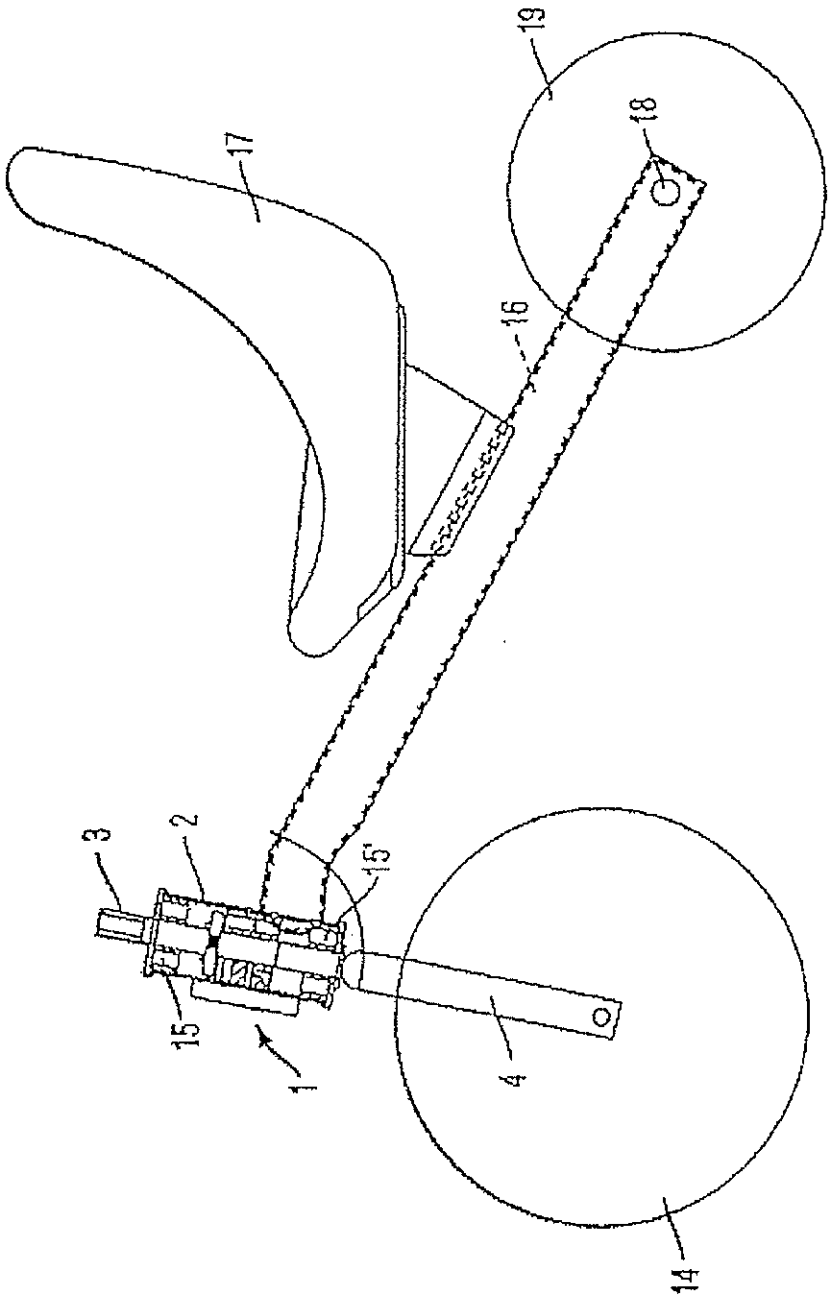

FIG. 1

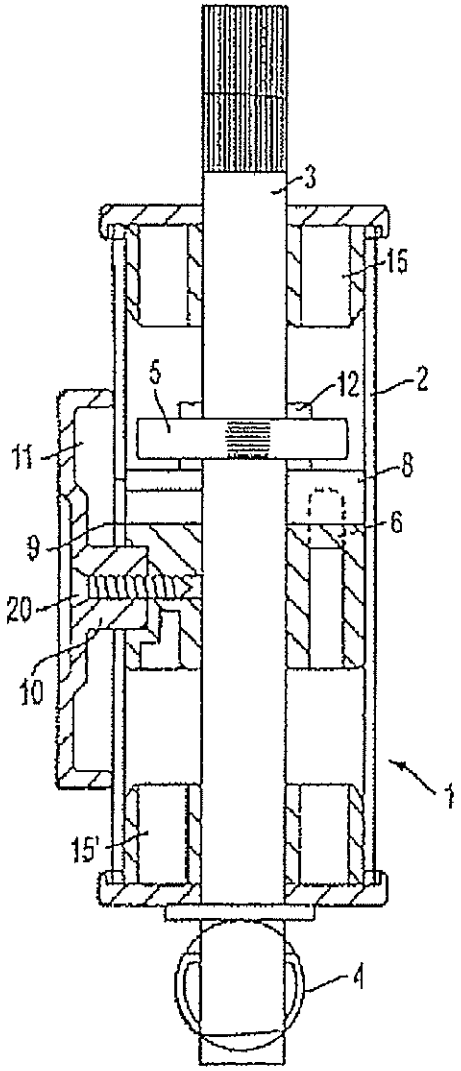

FIG. 2

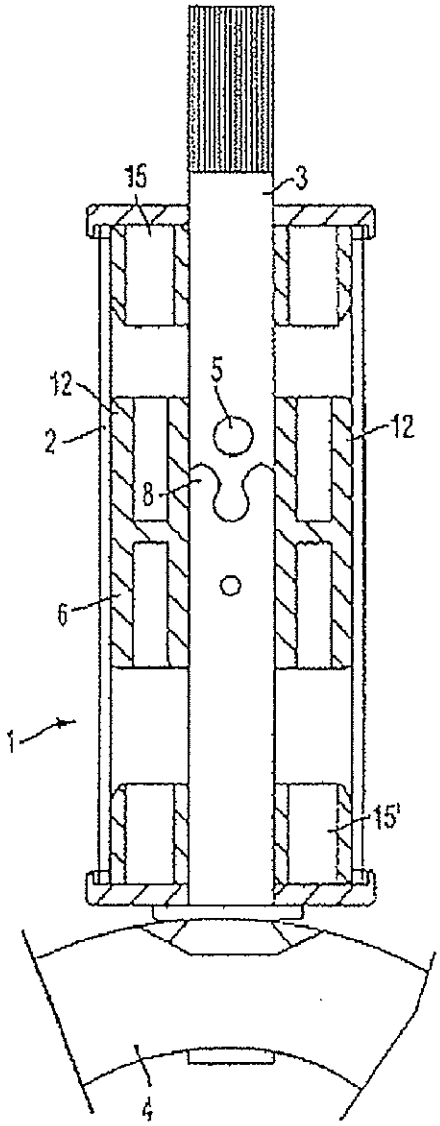

FIG. 3

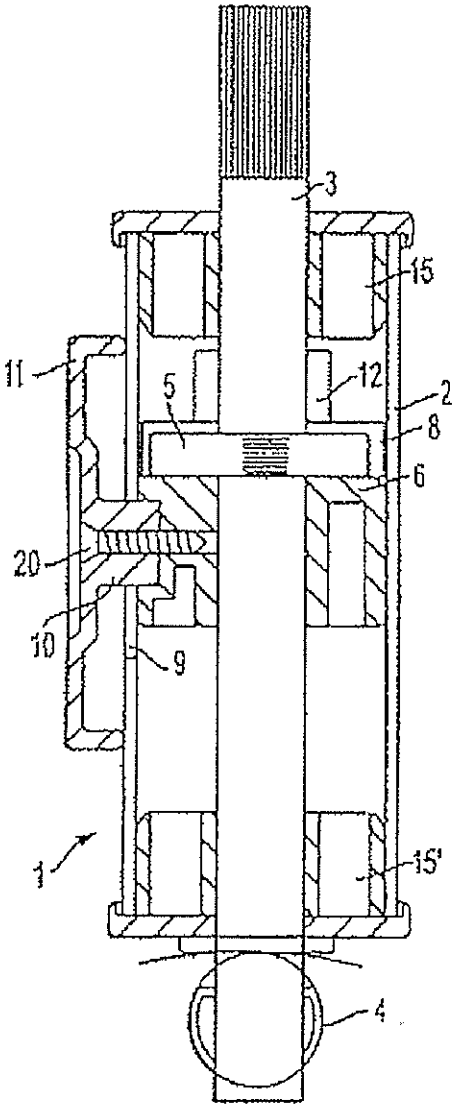

FIG. 4

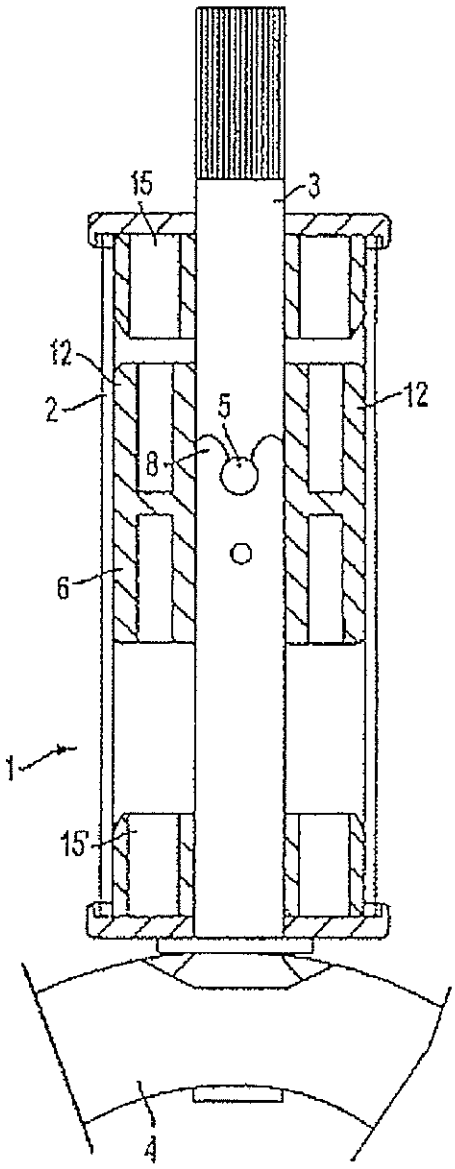

FIG. 5

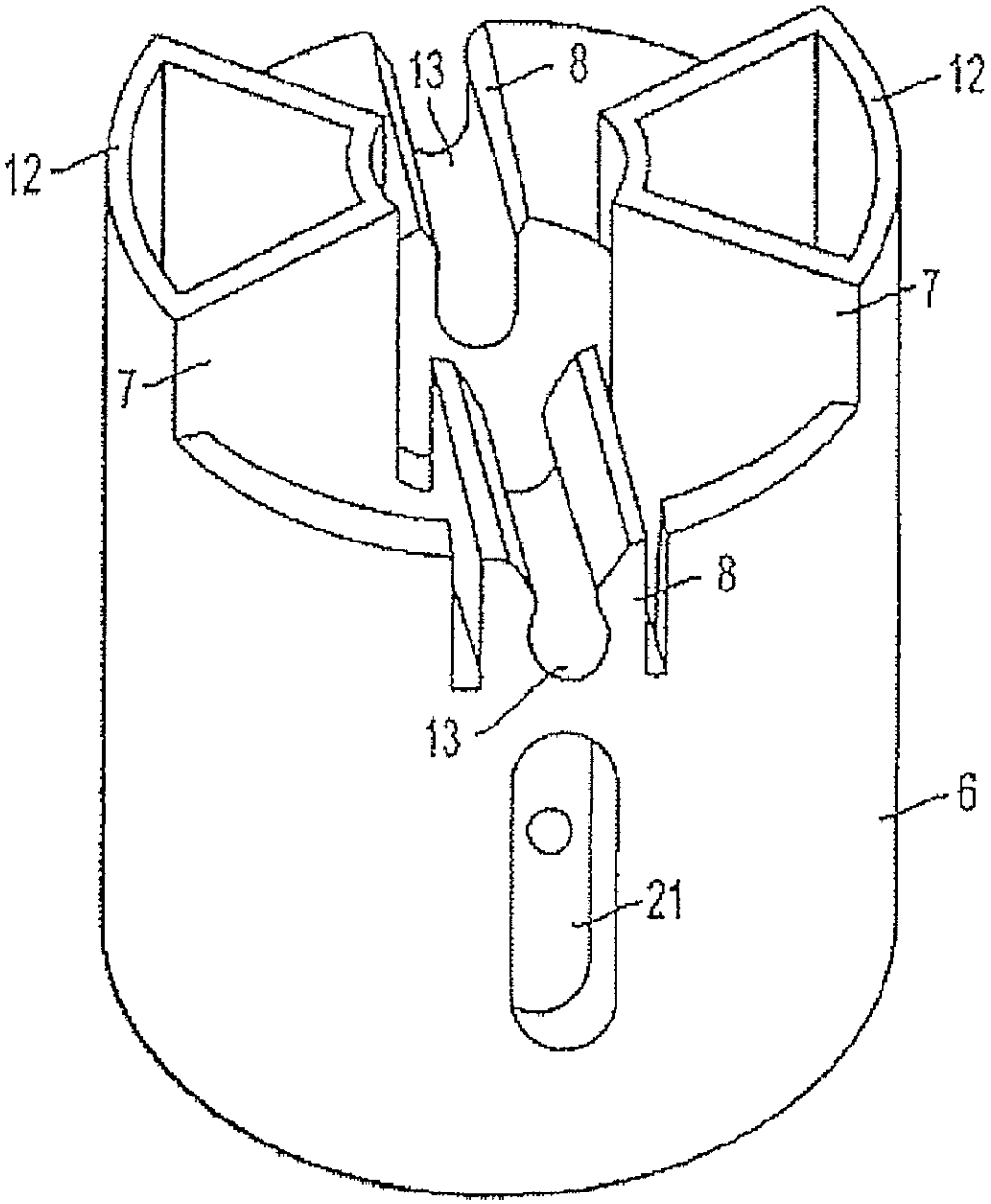

FIG. 6

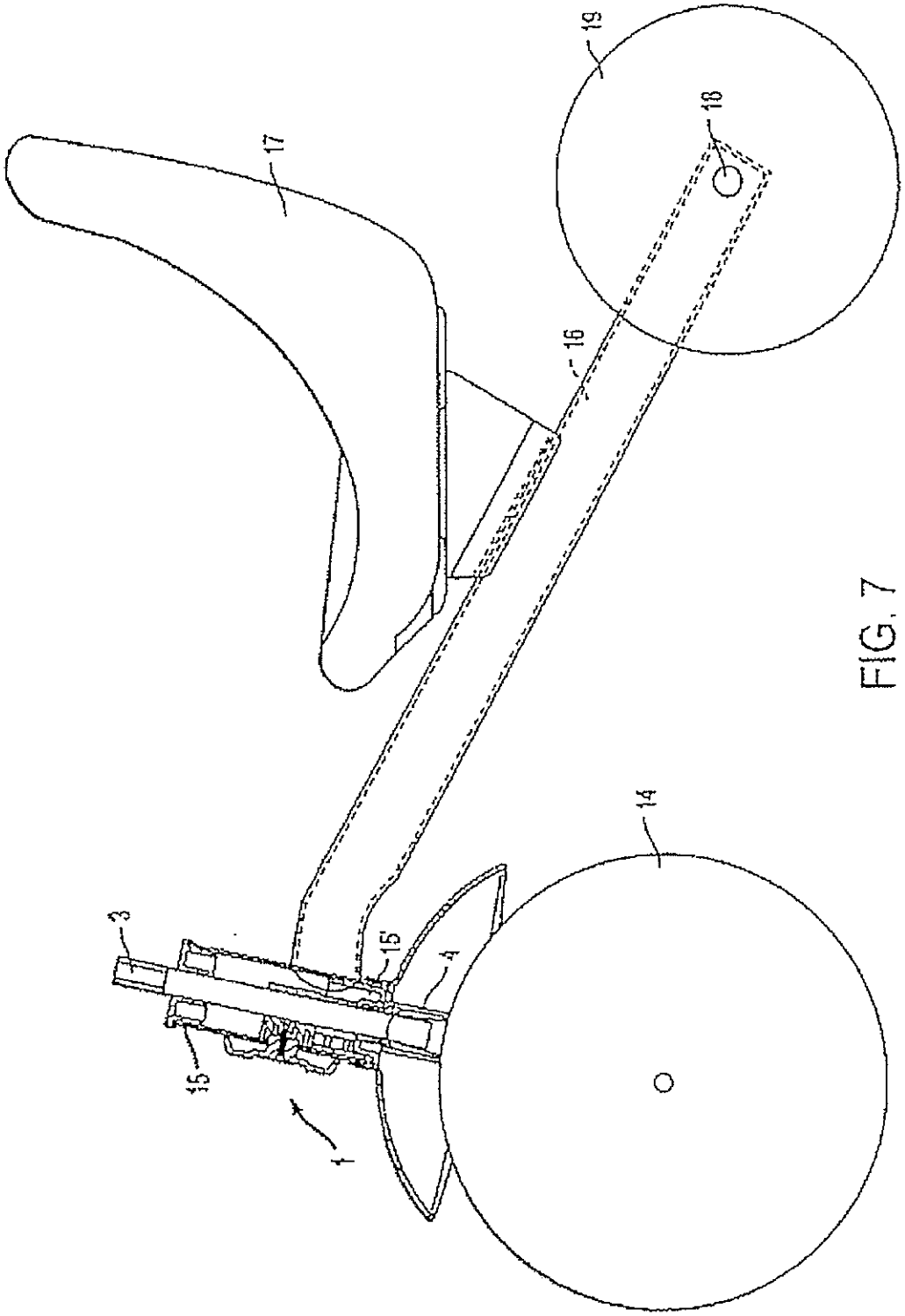

FIG. 7

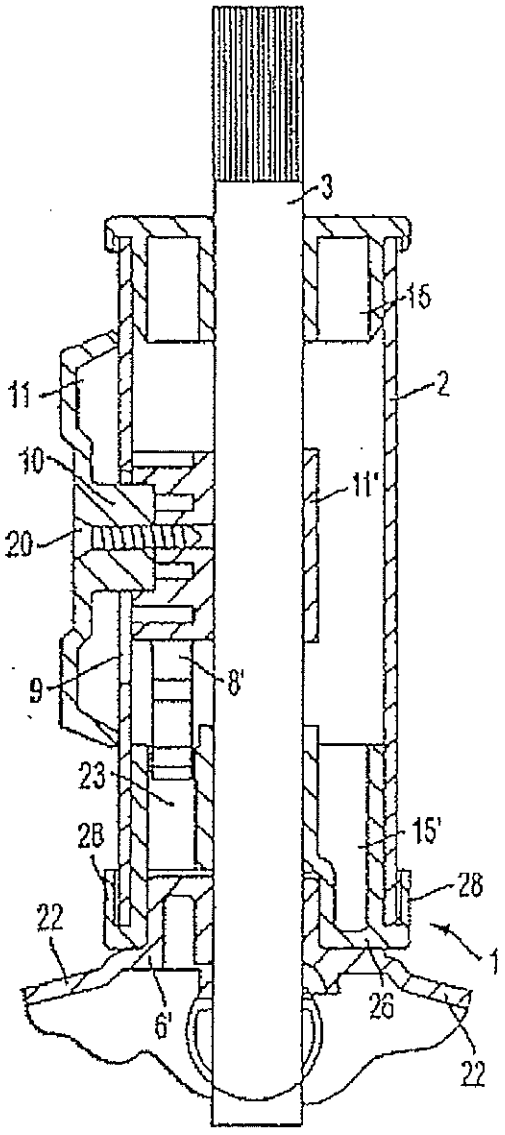
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FIG. 8

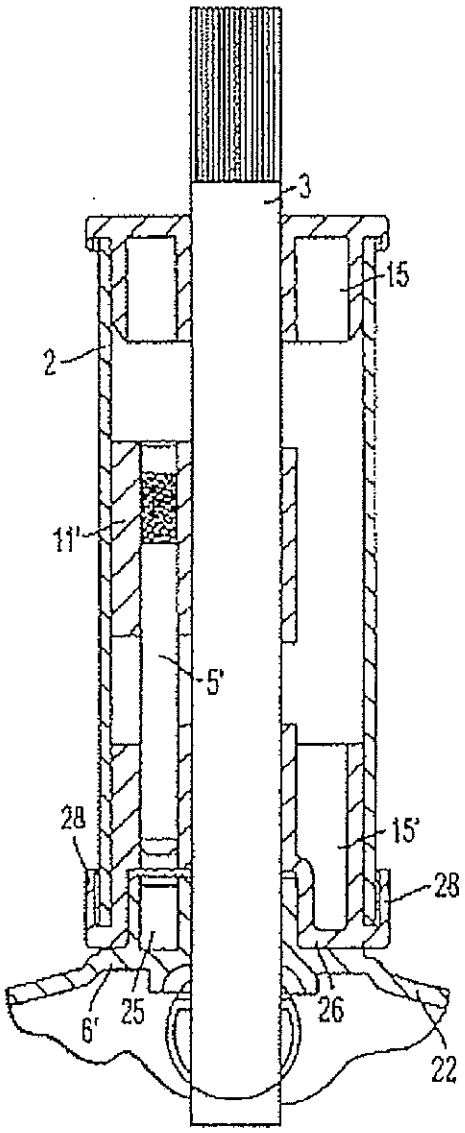
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FIG. 9

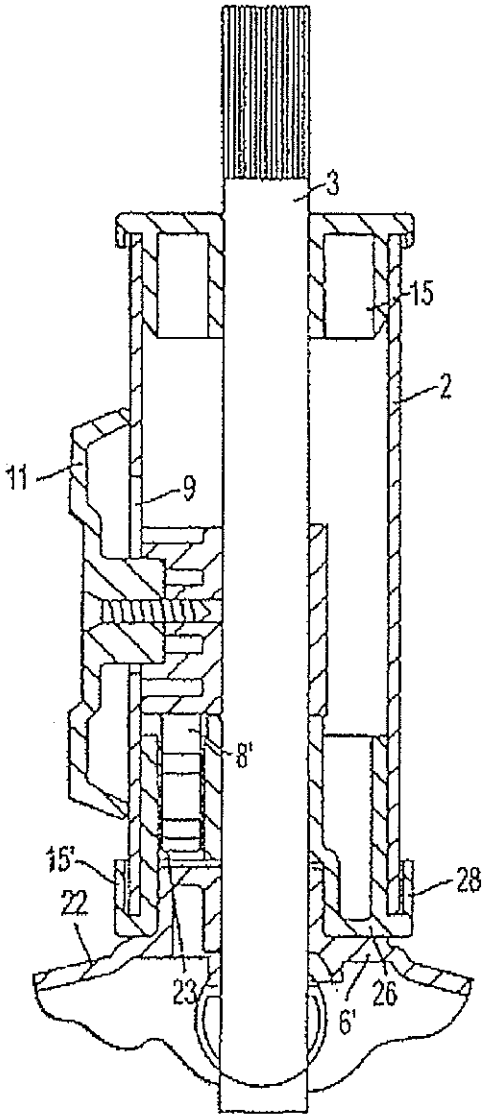

FIG. 10

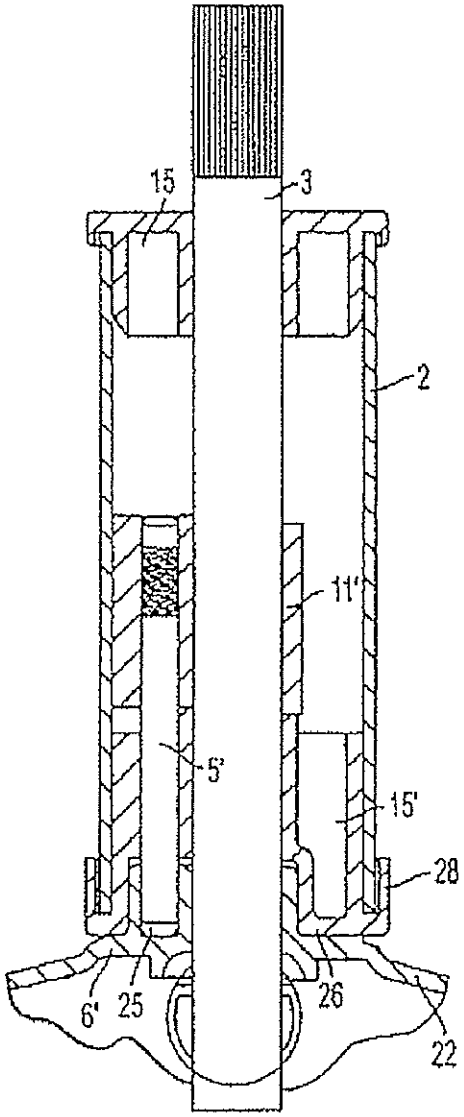

FIG. 11

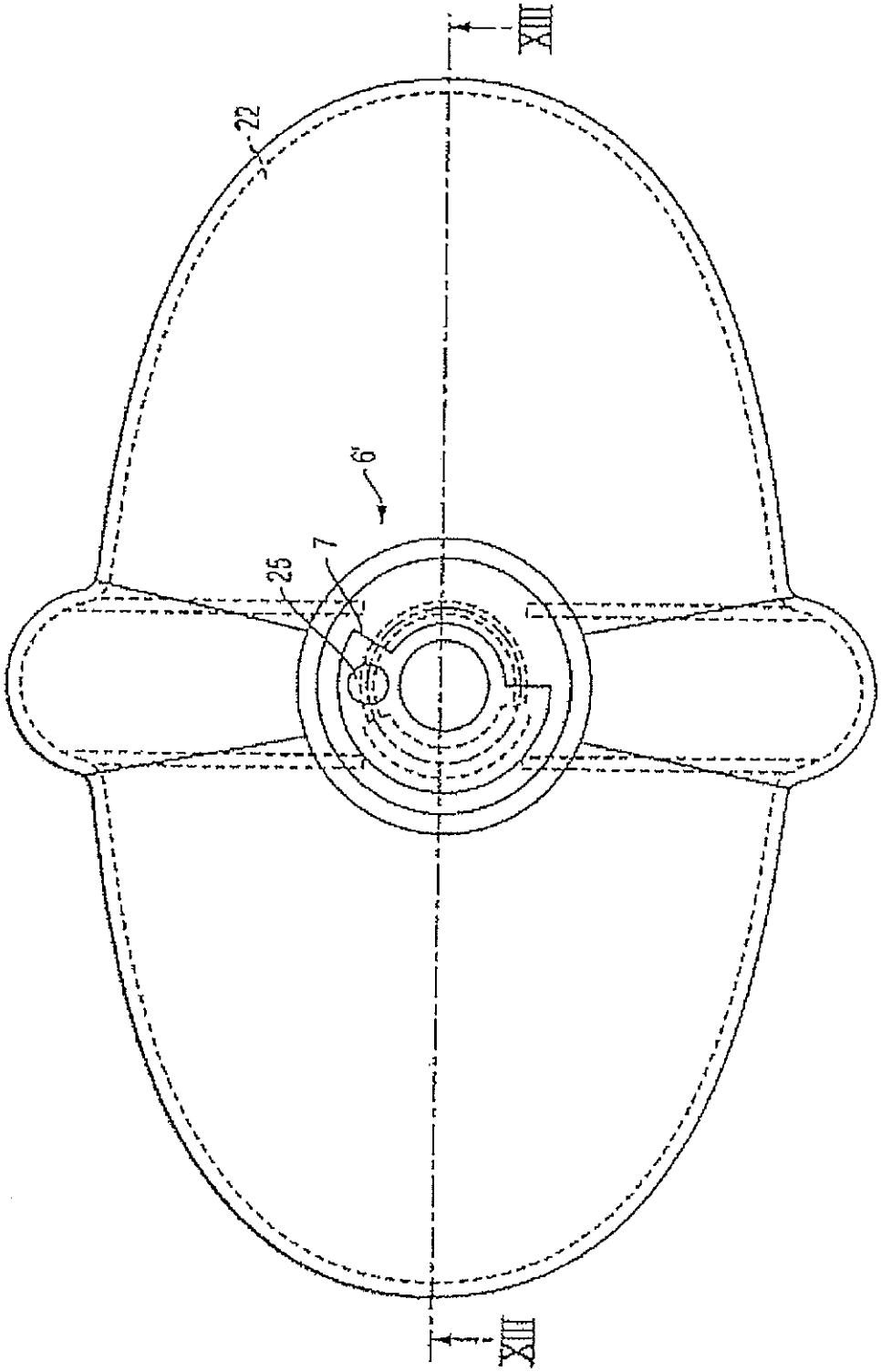

FIG. 12

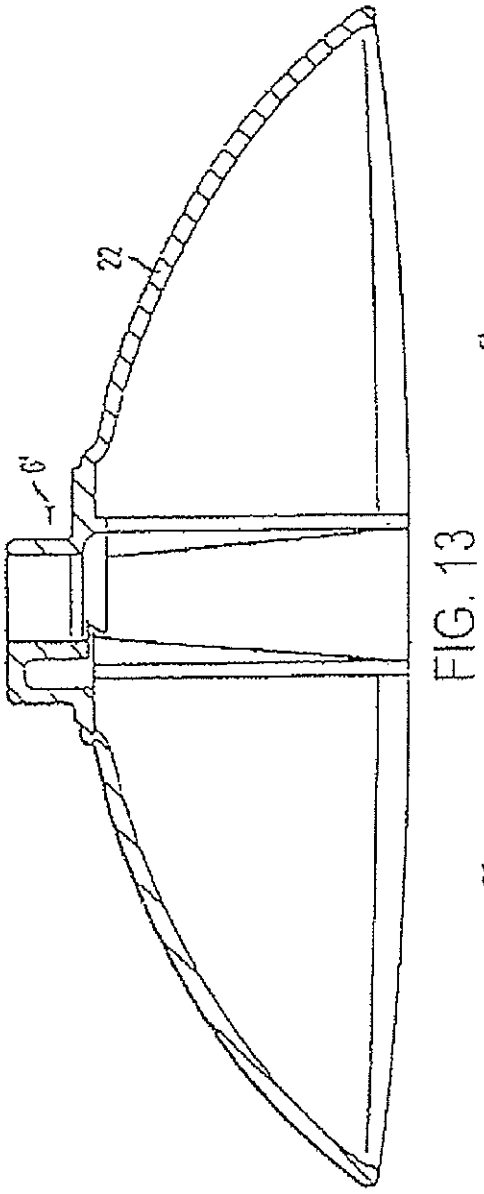

FIG. 13

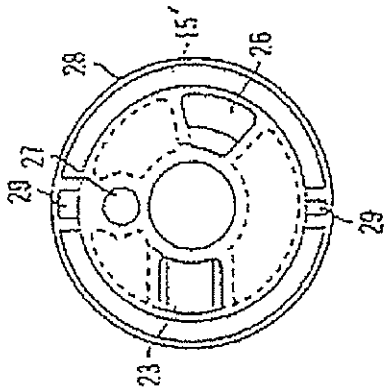

FIG. 17

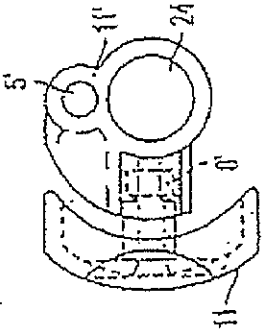

FIG. 16

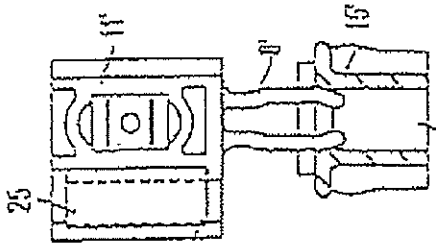

FIG. 15

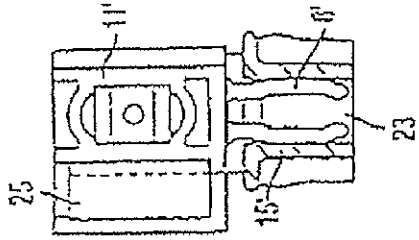

FIG. 14

VEHICLE STEERING HEAD

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of U.S. application Ser. No. 10/671,668 which was filed Sep. 29, 2003, which is a continuation of U.S. application Ser. No. 10/298,002, which was filed Nov. 18, 2002, now U.S. Pat. No. 6,799,772, which is a continuation of U.S. application Ser. No. 10/092,516 filed Mar. 8, 2002, now abandoned, which is a continuation of U.S. application Ser. No. 09/584,497 filed Jun. 1, 2000, now U.S. Pat. No. 6,378,884, the disclosures of which are expressly incorporated by reference herein in their entirety. Further, the present application claims priority under 35 U.S.C. § 119 of German Patent Application No. 299 11 652.2, filed on Jul. 5, 1999, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle steering head and in particular, to a steering head for a vehicle comprising a support tube which has rotatably supported therein a fork member to which a wheel cover and a handlebar can be secured.

2. Discussion of Background Information

Vehicle steering heads of the above-described type are in particular used in bicycles or tricycles, and in particular in tricycles or bicycles for children.

In devices of the above-described type it is desirable for safety reasons that accidents be avoided which may be caused by an excessively large handlebar deflection. It has been found that when there is an excessively large handlebar deflection (e.g., the handle bar rotates beyond a point where effective steering occurs), the vehicle may tilt to the side. Moreover, such deflections or excessive rotation may run the risk that a user impacts his body against the handlebar. Additionally, the user may get caught with his/her feet in the front wheel and may be even be injured by the pedals.

A further drawback or disadvantage of prior-art devices occurs when they are pushed with a push rod type device. In such cases, these devices have a tendency towards uncontrolled steering movements of the front wheel which cannot be mastered or effectively controlled by small children, in particular.

SUMMARY OF THE INVENTION

The present invention therefore provides a vehicle steering head of the above-mentioned type which is of a simple construction and which can operate in an easy and reliable manner. Moreover, this design avoids the drawbacks of the prior art and can in particular limit a handlebar deflection to a desired degree. The invention also has provision for locking the handlebar.

According to one aspect of the invention a latch element is secured to a fork member on a portion provided inside the support tube. A linkage element is supported in the support tube for rotation therewith. The linkage element is displaceable or moveable in a longitudinal direction of the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the latch element. Moreover, the linkage element comprises at least one locking element which is releasably connectable to the latch element.

According to another aspect of the invention a latch element is supported on the support tube. A linkage element is arranged on the fork member and connected to the tube for rotation therewith. The latch element is freely displaceable or moveable along the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the support tube. Moreover, at least one latch element is provided that is releasably connectable to the support tube.

The vehicle steering head according to the invention is characterized by a number of considerable advantages.

First of all, it is possible to install or utilize the steering head in a frame of any desired design, e.g. children's bicycles or tricycles. Ideally, the dimensions of the steering head are such that they do not interfere with the remaining structure of the frame within which it is installed. Of course, the steering head may be combined with any and all common types of frames where ever its advantageous design is desired. Accordingly, the steering head may be utilized in a variety of devices where limited deflection or rotation and/or locking are desired.

Because the invention utilizes a latch element which is arranged in the support tube, no functional parts of the steering head need be outwardly visible or accessible. Accordingly, the internal parts are less susceptible to damage, Additionally, this design is less likely to cause injury when used by children or infants.

As a result of utilizing a linkage element according to the invention, it is possible to reliably lock the fork member and thus the wheel fork and the front wheel. Such a locking provision is easily be accomplished by displacing or moving the linkage element. This design ensures a high degree of operational safety and operational reliability.

The linkage element preferably utilizes stop surfaces which cooperate with the latch element in a manner where they are brought into contact with one another. In this way, the steering angle can be limited to a particularly or desired range. This limited range of motion of the steering angle can be realized according to the invention in different ways. The invention contemplates that the available steering angle is freely selectable within a wide desired range. This is of particular advantage to vehicles for children such as tricycles, which may require a steering angle of approximately 45° to each side. Of course, other desirable steering angles can be utilized. However, by designing in the desired limited steering angle, lateral tilting of the tricycle or similar devices can be prevented or their risk significantly reduced. Additionally, the risk of injuries which may be caused by the pedals, e.g., devices which utilize pedals on the front wheel can be reduced. Finally, the risk of injury which can occur when the handlebar exceeds a controlled steering angle can be ruled out to a considerable extent.

The invention also provides for a linkage element having a locking element which is releasably connectable to the latch element. This design ensures that when a push rod is used for pushing the device, i.e., a tricycle, the front wheel thereof may be reliably locked in place during straight travel.

In an advantageous embodiment of the invention, the latch element is designed in the form of a pin which extends in a direction transverse to the fork member. The pin may extend through the fork member such that it projects at both sides of the fork member. Alternatively, the pin can project from the fork member on only one side. Moreover, the pin can be firmly connected to the fork member, e.g. by welding or other conventional attachment techniques. Additionally, it may be secured by press fitting with or without utilizing a knurled

portion. Of course, the dimensions of the pin can easily be adapted to the respective conditions of use.

It should be noted that the manufacturing costs of the steering head are reduced by the above-described construction to quite a considerable degree.

In another advantageous embodiment of the invention, the linkage element is substantially designed in the form of a hollow cylinder. Thus, the linkage element can be reliably guided in the support tube and surround the fork member Additionally, the linkage element can be designed as a single integral part or several parts which are either joined together or which cooperate together.

It is advantageous for the longitudinal displacement or movement of the linkage element to be along an axis of the support tube and the fork member. Accordingly, the support tube may comprise at least one longitudinal slot or a similar recess through which a connection element extends which is connected to the linkage element. This design also utilizes a slide which is arranged outside the support tube.

The slide facilitates the ease of handling or movement of the linkage element. In such a design, a displacement of the slide, which may additionally be provided with locking mechanism or fixing safety mechanism, effects a corresponding displacement or movement of the linkage element, The locking mechanism or fixing mechanism allows for fixing the front wheel in a single or set travel position which is preferably straight. Moreover, the invention also contemplates that the linkage element may be provided with inclined inlet surfaces or intercepting mechanisms which engage the latch element so as to initiate a locking action when the front wheel is slightly deflected angularly.

Stop surfaces on the latch element are preferably formed on at least one front attachment of the linkage element. Additionally, it is particularly advantageous when two opposite attachments or stops are in symmetry with each other and are each provided with at least one stop surface located on the linkage element. Thus, by utilizing two attachments or stops which are in symmetry with each other, this design can limit the steering angle in a symmetrical fashion to both the left and the right side.

In another advantageous embodiment of the invention, the associated stop surfaces of the attachments or stops act to limit the rotation of the fork member to a predetermined angular range at both sides. This angular range may e.g. be approximately 45° to both sides, for a total range of motion of approximately 90°.

The locking element is preferably designed in the form of at least one front recess which receives the latch element, Such an advantageous design makes it possible to grip and fix the latch element upon displacement or movement of the linkage element. Additionally, it is advantageous that the recess be retracted or set back relative to the front attachment, so that the attachments or stops can always remain in the plane of the latch element, while upon a displacement of the latch element, it is only the recess which can additionally be brought into engagement.

To implement a simple and operationally reliable structure of the steering head, it may be advantageous for the recess to be centrally arranged between the two attachments or stops.

The invention also contemplates that the fork member itself has not been changed constructionally. In other words, the invention can be adapted to work with a conventional fork member. Also, the invention makes it possible to manufacture all functional parts separately in a very simple manner. As a result, advantageous production costs can be achieved.

In a preferred design of a previously described embodiment, the linkage element is designed as part of a mudguard which extends from below into the support tube. This design allows for significant cost savings since the mudguard is normally made from plastics and is typically already included in most vehicles of the above-described type. The linkage element can thus be mounted on the mudguard or made integrally therewith, in a particularly easy way and at low costs.

A further advantage of the this embodiment is that the latch element can be designed in the form of a bolt which arranged to be parallel with the fork member. The latch element of this design can thus be given relatively large dimensions so that the diameter of the support tube itself need not be chosen with such a large size.

It may be of particular advantage when the latch element is connected to a slide which extends into the support tube so as to be able to design the lock of the front wheel in a particularly simple manner. Furthermore, the locking element may preferably be connected to the slide. Moreover, the locking element serves to reliably maintain the locked state and to prevent any unintended unlocking. The locking element also preferably engages into a recess of a bearing which supports the fork member in the support tube. As a result, it is not necessary to mount additional parts or to take installation measures on the support tube itself.

It may also be of particular advantage for the limitation of the steering angle to be accomplished by a lower bearing which supports the fork member in the support tube. This lower bearing may have formed thereon an attachment which projects in the direction of the linkage element and which can be brought into contact with the stop surfaces formed on the linkage element and thus on the mudguard. This design has the advantageous effect that the predetermined angular range can be limited at both sides as well, e.g. approximately 45° each side.

The invention provides a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured the steering head including a latch element projecting from the fork member and disposed within the support tube, and a linkage element disposed within the support tube, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member and comprises at least one stop surface for limiting a rotation of the fork member when the latch element contacts the at least one stop surface, The linkage element may further comprise at least one locking element for locking the fork member in a single position. The at least one locking element may releasably engage the latch element when the fork member is locked. The latch element may comprise a pin. The pin may project substantially perpendicular to the axis of the fork member. The linkage element may comprise a substantially cylindrical shape. The linkage element may comprise a plurality of hollow chambers separated by connecting walls, The support tube may comprise an opening which allows a connecting element to pass therethrough. The opening may comprise a longitudinal slot. The connecting element may be secured to the linkage element, The movement of the linkage element may be limited by the movement of the connecting element within the longitudinal slot. The steering head may further comprise a slide which is secured to the connecting element, the slide being disposed adjacent an outer surface of the support tube. The at least one stop surface may be disposed on at least one stop.

The at least one stop may comprise a projection which extends from the linkage element. The at least one stop may comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The at least one stop may comprise two stops which are disposed opposite one another.

Each stop may comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The two stops may define a limited range of rotational motion of the fork member in each of a clockwise and a counter-clockwise direction. The limited range of motion in the clockwise direction may be substantially equal to the range of motion in the counter-clockwise direction. The limited range of motion in one of the clockwise and counter-clockwise direction may be approximately 45 degrees.

The linkage element may further comprise at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element. The at least one recess is set back some distance from a surface of at least one stop. The at least one recess is centrally disposed between at least two stops.

The steering head may further comprise an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tuber each of the upper and lower bearings having an opening which allows the fork member to pass therethrough.

The steering head may be disposed on a tricycle frame.

The invention also provides for a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork member, and a linkage element connected to the fork member so as to rotate therewith, the linkage element comprising at least one stop surface, wherein the at least one stop surface limits the rotation of the fork member with respect to the support tube The steering head may further comprise a slide, wherein the slide is disposed within the support tube and retains the latch element. The slide may further comprise at least one locking element for releasably securing the slide to the support tube. The linkage element may comprise a mudguard. The mudguard may be disposed between one end of the support tube and a wheel fork. The latch element may comprise a rod like member which is arranged substantially parallel to the axis of the fork member. The rod like member may comprise one of a bolt and a pin. The latch element may be connected to a slide, the slide being disposed within the support tube. The slide may be moveable substantially parallel to the axis of the fork member. A locking element may be connected to the slide.

The steering head may further comprise a bearing support disposed on at least one end of the support tube. The bearing support may be disposed on a lower end of the support tube. The steering head may further comprise a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support. The bearing support may comprise at least one stop, the at least one stop comprising at least one surface which engages the linkage element. The at least one stop may comprise a projection which engages a recess in the linkage element. The projection and the recess may cooperate to limit the rotational movement of the fork member within a desired range. The range of the rotational movement may be limited by at least two stop surfaces. The at least two stop surfaces may define a limited range of rotation in one of a clockwise and a counter-clockwise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counter-clockwise direction. The limited range of rotation between the at least two stops may be approximately 45 degrees.

The steering head may be disposed on a tricycle frame.

The invention further provides for a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The fork member comprises a fork end, a handlebar, and a latch element projecting from the fork member between the fork end and the handlebar end. The latch element is disposed within the support tube and a linkage element is slidably disposed within the support tube. The linkage element comprises at least one stop surface for engaging the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element and the at least one stop cooperate to limit the rotational movement of the fork member to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element.

The invention also relates to a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The lower bearing support comprises at least one stop surface, the fork member comprising a fork end, a handlebar, and a latch element which is slidably disposed adjacent the fork member between the fork end and the handlebar end, the latch element being disposed within the support tube and a linkage element moveably disposed adjacent the lower support bearing. The linkage element comprises at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element engages only the lower bearing support and where the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork member to a second position where the latch element releasably engages a recess in the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element, The linkage element may further comprise at least one locking element for engaging a locking recess in the lower bearing support. The at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

The invention provides for a vehicle steering head including a fork member adapted to engage a handlebar, a support tube which rotatably supports the fork member, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork member from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork member to rotate with respect to the support tube in at least two directions. The latch element may comprise a rod-like member.

The invention also provides for a vehicle steering head that includes a support tube adapted to be coupled to a vehicle frame, an upper bearing support arranged at an upper end of the support tube, a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface, a cylindrical element rotatably mounted to the support tube via the upper and lower bearing supports, the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar, a latch element movably disposed within the support tube, a slide coupled to the latch element, the latch element being movable from outside the support tube, a linkage element that is rotatable with respect to the support tube, and the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube, wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, a mechanism which limits the rotational movement of the fork member in each of two directions, and a lower bearing support mounted to the support tube, wherein the mechanism and the lower bearing support cooperate to limit the rotational movement of the fork member.

The lower bearing support may be non-rotatably fixed to the support tube. The lower bearing support may comprise at least one stop surface The lower bearing support may comprise two stop surfaces. The mechanism may comprise at least one stop surface. The mechanism may comprise two stop surfaces. The mechanism may comprise a linkage element having at least one stop surface. The linkage element may rotate with the fork member, The linkage element may be arranged on a mudguard. The fork member may be cylindrically shaped. The steering head may further comprise a handlebar connected to one end of the fork member and a wheel fork connected to another end of the fork member.

The invention also provides a vehicle steering head comprising a support tube adapted to be fixed to a frame, a cylindrical member adapted to connect a wheel fork to a handlebar, the cylindrical member being rotatable with respect to the support tube, a linkage element being movable and comprising at least two stop surfaces, wherein one of the at least two stop surfaces limits the rotation of the cylindrical member in one direction, and wherein another of the at least two stop surfaces limits the rotation of the cylindrical member in another direction.

The linkage element may rotate with the cylindrical member. The linkage element may rotate with a mudguard.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a connecting element adapted to connect a wheel fork to a handlebar, the connecting element being rotatable with respect to the support tube, a linkage element being rotatable and comprising at least two stop surfaces, a mudguard that rotates with the linkage element, one of the at least two stop surfaces limiting the rotation of the connecting element in one direction, and another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, and a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

FIG. **1** is a schematic side view of a children's tricycle with one embodiment of the vehicle steering head according to the invention;

FIG. **2** is a simplified sectional side view of the steering head according to the invention in an unlocked state;

FIG. **3** is a side view, turned or oriented by 90° (a right angle) of the arrangement shown in FIG. **2**;

FIG. **4** is a sectional side view similar to FIG. **2**, in the locked state;

FIG. **5** is a side view, similar to FIG. **3**, of the view according to FIG. **4**;

FIG. **6** is a simplified perspective illustration of the linkage element according to the invention;

FIG. **7** is a schematic side view of a children's tricycle with another embodiment of the vehicle steering head according to the invention;

FIG. **8** is a sectional side view of the vehicle steering head according to the invention, in the unlocked state;

FIG. **9** is a side view, turned or oriented by 90° of the arrangement shown in FIG. **8**;

FIG. **10** is a sectional side view similar to FIG. **8**, in the locked state;

FIG. **11** is a side view, turned or oriented by 90° which is similar to FIG. **9**, in the locked state;

FIG. **12** is a top view on the linkage element according to the invention and on the associated mudguard;

FIG. **13** is a sectional view of the arrangement according to FIG. **12** along the sectional lines XIII-XIII of FIG. **12**;

FIG. **14** is an enlarged side view showing a portion of the slide and of the locking element in the locked state;

FIG. **15** is a view analogous to FIG. **14**, in the unlocked state;

FIG. **16** is a top view on the slide; and

FIG. **17** is a top view on the lower bearing.

DETAILED DESCRIPTION OF THE INVENTION

The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

A children's tricycle is shown in FIG. **1** and comprises a front wheel **14** which is supported on a wheel fork **4**. Wheel fork **4** is fixedly connected to a fork member **3**. A handlebar (not shown) can be secured to the upper end of fork member **3**.

Fork member 3 is supported in a support tube 2. This support is accomplished by utilizing slide bearings 15 and 15' which are shown in detail in FIGS. 2 to 5. The slide bearings 15 and 15' correspond to those of the prior art in this embodiment so that a detailed description is not needed.

Support tube 2 is firmly connected to a frame 16 which has mounted thereon a seat 17. The tricycle also has a rear axle 18 with rear wheels 19. Accordingly, a support tube 2 and a fork member 3 form a steering head 1.

According to the invention, support tube 2 has arranged therein a linkage element 6 which has a substantially cylindrical configuration (see also FIG. 6) and which is received with a play or clearance (so that it can slide) within support tube 2. Linkage element 6 is also provided with a central recess through which fork member 3 extends or passes.

Support tube 2 also has formed therein a longitudinal slot 9 through which a connection element 10 extends or passes. This connection element 10 is connected to a slide 11 and linkage element 6. The connection may be via a screw 4 20 (see FIGS. 2 and 4) or other conventional connecting mechanism. In the illustrated embodiment, connection element 10 is integrally connected to or formed with slide 11 and extends in a recess 21 of linkage element 6. However, connection element 10 and slide 11 may be made as separate components which are joined or secured together by any conventional attachment technique including a screw or threaded element.

On its front upper portion, linkage element 6 comprises two symmetrical opposite attachments or stops 12. Each of these stops 12 may be provided with lateral stop surfaces 7. When viewed from the top, these attachments or stops 12 are designed in a manner of a segment of a partial circle (pie shaped or wedge shaped), so that four stop surfaces 7 are formed, with each one being arranged in symmetry with one another. Of course, stops 12 may be separately formed and attached to linkage element 6 instead of being integrally formed therewith, as is shown.

In the illustrated embodiment two locking elements 8 may be utilized in which each is formed by a recess 13. These locking elements 8 are preferably provided on linkage element 6 in retracted or set back manner with respect to stops 12. As is apparent from FIG. 6, the walls of at least one recess 13 may be made resilient to ensure a releasable locking of a bolt-like latch element 5 when linkage element 6 is pushed upwards or into engagement with bolt-like latch element 5

As is apparent from FIGS. 2 to 5, fork member 3 is provided with a bolt-like or pin-like latch element 5 which extends or projects from at least one and preferably both sides of fork member 3. Of course, latch element 5 may be integrally formed with fork member. Alternatively, latch element 5 may be a threaded or partially threaded member which threads into fork member 3. However, it is preferred that latch element 5 be a pin having a centrally disposed exterior knurl which is press fit into a fork member as is shown. In its working position, latch element 5 rotates with fork member 3 when a deflection or rotation of the handlebar takes place. The deflection of the handlebar is limited by way of latch element 5 abutting on stop surfaces 7, these stop surfaces 7 defining the limited range of motion of the handlebar.

When it is desired to lock the handlebar in a set position, latch element 5 is pressed or forced into recesses 13. This engagement occurs when locking element 8, which is disposed on linkage element 6, is pushed upwards by slide 11. Recesses 13 also utilize inclined inlet surfaces because they act as guiding lead-in surfaces which facilitate entry of pin 5 into recess 13. In the locked state, which is shown in FIGS. 4 and 5, a steering movement thus becomes impossible since the handlebar or fork member 3 is locked in a single direction.

FIGS. 2 and 3 show a downwardly displaced condition of linkage element 6 in which latch element 5 is in a position which it does not cooperate with the locking element B. As a result, in this position fork member 3 and handlebar are free to rotate until latch element 5 abuts on stop surfaces 7, this range of movement or rotation corresponding to a steering angle range.

According to a preferred aspect of the invention, linkage element 6 may be made from a plastic material. Of course, other materials are also contemplated.

Another embodiment of the vehicle steering head according to the invention is described with reference to FIGS. 7 to 16. In this regard, like parts are provided with like reference numerals.

As for the description of FIG. 7, reference can be made to the description of FIG. 1 to the extent that the same features are shown. The subsequent figures are illustrations elucidating the details which have been changed.

As in FIGS. 2 to 5, FIGS. 8 and 9 and 10 and 11, respectively, are illustrations showing the vehicle steering head on an enlarged scale. Again, like parts are here also provided with like reference numerals, so that reference can be made to the preceding explanations. Slide 11 utilizes connection element 10 and screw 20. Connection element 10 also extends through a longitudinal slot 9 Morcover, slide 11 comprises an outer grip portion 11 and an interior portion 11' which is screwed to outer grip portion 11 by a screw 20. A top view of slide 11 and 11' is shown in FIG. 16, As can be seen in this figure, a central recess 24 is provided through which fork member 3 extends or passes (with a clearance which allows slide 11' to move up and down with respect to fork member 3). Furthermore, slide 11' also has a recess (see FIGS. 9, 11 and 16) which is formed so that it can accept a bolt-like latch element 5'. Of course, this latch element 5' may be pressed into this recess, threaded into the recess, or otherwise secured to slide 11' in a suitable manner. Alternatively, latch element 5' may be integrally formed with slide 11'.

As already described in conjunction with a previous embodiment, a bearing 15 which serves as a slide bearing is used on the upper portion of steering head 1.

Lower bearing 15' in this embodiment is configured such that it has an upwardly projecting contour of a linkage element 6' which can extend into bearing 15' Of course, the bearing and the upwardly projecting contour may be made as separate components which are joined together by conventional techniques rather than integrally formed as is shown. Additionally, as becomes apparent in FIG. 12, linkage element 6' may have a recess 25 into which latch element 5' can be inserted (see also FIGS. 9 and 11).

As can further be seen from the top view of FIG. 12, linkage element 6' comprises two lateral stop surfaces 7 which are angularly spaced apart from each other. This design is such that a downwardly oriented attachment or stop 26 (see FIGS. 8 to 11) of the bearing 15', which is connected to support tube 2, forms a steering limitation of plus/minus approximately 45°. Of course, as with the previous embodiment, the range of steering limitation can be designed to any desired range.

FIG. 13 shows a lateral sectional view of mudguard 22 and of linkage element 6'. Note that these components are integrally formed as a single member which reduces manufacturing costs associated with joining two separate components.

FIGS. 14 and 15 are front views of slide 11' wherein handpiece 11 has been removed to illustrate the operation of locking element 8'. Locking element 8' is U-shaped and includes two movable or flexible lateral legs which can releasably be inserted into a recess 23 of bearing 15'. Upon insertion and locking, locking element 8' is pressed against an undercut and

thereby held in position inside recess **23**. Accordingly, when it is desired to release the locked state of fork member **3'** slide **11'** must be pushed upwards which removes the legs from recess **23**. Of course, other locking mechanisms may be utilized and this embodiment is not limited to the use of this particular locking mechanism. For example, a pin may be used which has a floating ring disposed around its circumference. Alternatively, other conventional releasable locking mechanisms may be utilized.

FIG. **17** is a top view on lower bearing **15'** on an enlarged scale. The (downwardly projecting) attachment or stop **26** can be seen here as can recess **23** which receives locking element **8'**. Moreover, recess **27** is adapted to receive and guide bolt-like latch element **5'** therein. Furthermore, a surrounding collar-like edge **28** can be seen in which **29** designates two oppositely disposed attachments or projections which serve as anti-rotation engagements. These engagements are designed to engage recesses (not shown) of support tube **2**. Of course, lower bearing may be secured to support tube **2** in any conventional manner such as by bonding, welding, or screws. Moreover, this attachment may be releasable or more permanent in nature.

It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

What is claimed:

1. A vehicle steering head for a tricycle, comprising:
- a support tube adapted to be fixed to a frame;
- a connecting member adapted to connect a wheel fork to a handlebar;
- an upper bearing support mounted to an upper end of the support tube;
- a lower bearing support mounted to a lower end of the support tube and comprising a recess;
- the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports;
- a mudguard comprising an integrally formed projection; and
- a movement limiting system limiting the rotational movement of the connecting member in each of two directions when stop surfaces of the projection engage stop surfaces of the recess.

2. The steering head of claim **1**, wherein the mudguard rotates with the connecting member.

3. The steering head of claim **1**, wherein the connecting member is cylindrically shaped.

4. The steering head of claim **1**, further comprising a handlebar connected to one end of the connecting member and a wheel fork connected to another end of the connecting member.

5. The steering head of claim **4**, wherein the mudguard is arranged between the wheel fork and the lower bearing support.

6. A vehicle steering head for a tricycle, comprising:
- a hollow support;
- a connecting member adapted to connect a wheel fork to a handlebar;
- the connecting member being rotatably mounted to the hollow support; and
- a pin arranged within the hollow support and being structured and arranged to move parallel to an axis of the connecting element,
- wherein the vehicle steering head is structured and arranged to limit rotational movement of the connecting member in each of two directions.

7. The steering head of claim **6**, further comprising an upper bearing support arranged on an upper end of the hollow support.

8. The steering head of claim **7**, further comprising a lower bearing support arranged on a lower end of the hollow support.

9. The steering head of claim **8**, wherein the connecting member is rotatably mounted to the hollow support via the upper and lower bearing supports.

10. The steering head of claim **6**, wherein the connecting member is cylindrically shaped.

11. The steering head of claim **6**, further comprising a handlebar connected to one end of the connecting member and a wheel fork connected to another end of the connecting member.

12. A tricycle steering head, comprising:
- a hollow support;
- a connecting member connecting a wheel fork to a handlebar;
- the connecting member being rotatably mounted to the hollow support; and
- a pin arranged within the hollow support and being structured and arranged to move parallel to an axis of the connecting element,
- wherein the vehicle steering head is structured and arranged to limit rotational movement of the connecting member in each of two directions.

13. The steering head of claim **12**, wherein the connecting member is rotatably mounted to upper and lower bearing supports of the hollow support.

14. The steering head of claim **12**, wherein the connecting member is cylindrically shaped.

15. A vehicle steering head for a tricycle, comprising:
- a support tube adapted to be fixed to a frame;
- a connecting member adapted to connect a wheel fork to a handlebar;
- an upper bearing support mounted to an upper end of the support tube;
- a lower bearing support mounted to a lower end of the support tube and comprising a recess;
- the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports;
- a mudguard; and
- a projection which rotates with the connecting member, is oriented upwardly, and extends into the recess of the lower bearing support,
- wherein the projection and recess limit rotational movement of the connecting member in each of two directions.

16. The steering head of claim **15**, wherein an upper portion of the projection extends into the support tube.

17. The steering head of claim **15**, wherein the recess is an arcuate recess.

18. The steering head of claim 15, wherein the mudguard is arranged between the wheel fork and the lower bearing support and the lower bearing support is non-rotatably mounted to the lower end of the support tube.

19. The steering head of claim 15, further comprising a locking system for preventing rotational movement of the connecting member.

20. A vehicle steering head for a tricycle, comprising:

a support tube adapted to be fixed to a frame;

a connecting member adapted to connect a wheel fork to a handlebar;

an upper bearing support mounted to an upper end of the support tube;

a lower bearing support mounted to a lower end of the support tube and comprising an arcuate recess;

the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports;

a projection which rotates with the connecting member, extends upwardly, and is oriented to extend into the recess of the lower bearing support,

wherein the projection and recess limit rotational movement of the connecting member in each of two directions.

21. The steering head of claim 20, wherein an upper portion of the projection extends into the support tube.

22. The steering head of claim 20, further comprising a mudguard and a locking system for preventing rotational movement of the connecting member.

23. The steering head of claim 20, further comprising a locking system for preventing rotational movement of the connecting member.

24. The steering head of claim 20, wherein the lower bearing support is non-rotatably mounted to the lower end of the support tube.

* * * * *

Exhibit D

US007156408B2

(12) **United States Patent**
Kettler et al.

(10) **Patent No.: US 7,156,408 B2**
(45) **Date of Patent: Jan. 2, 2007**

(54) **VEHICLE STEERING HEAD**

(75) Inventors: **Heinz Kettler**, Ense-Parsit (DE); **Joachim Kettler**, Werl (DE); **Reinhard Rocholl**, Werl (DE)

(73) Assignee: **Heinz Kettler GmbH & Co. KG.**, Ense-Parsit (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/671,668**

(22) Filed: **Sep. 29, 2003**

(65) **Prior Publication Data**

US 2004/0090038 A1 May 13, 2004

Related U.S. Application Data

(63) Continuation of application No. 10/298,002, filed on Nov. 18, 2002, now Pat. No. 6,799,772, which is a continuation of application No. 10/092,516, filed on Mar. 8, 2002, now abandoned, which is a continuation of application No. 09/584,497, filed on Jun. 1, 2000, now Pat. No. 6,378,884.

(30) **Foreign Application Priority Data**

Jul. 5, 1999 (DE) ..... 299 11 652 U

(51) **Int. Cl.**
B62K 5/02 (2006.01)

(52) **U.S. Cl.** 280/279; 280/272; 74/495

(58) **Field of Classification Search** 280/279, 280/272, 271, 282, 89; 403/354, 83; 74/495
See application file for complete search history.

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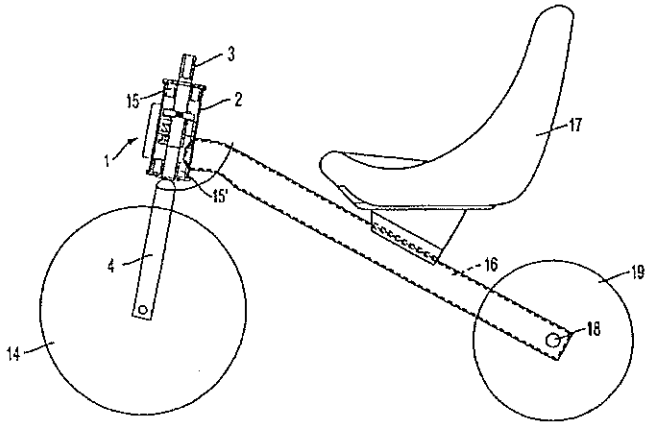
Primary Examiner—Tony Winner
(74) *Attorney, Agent, or Firm*—Greenblum & Bernstein, P.L.C.

(57) **ABSTRACT**

Vehicle steering head including a connecting element adapted to engage a handlebar. A support tube rotatably supports the connecting element. A connecting member is adapted to connect a wheel fork to a handlebar. The connecting member is rotatable with respect to the support tube. A mechanism limits the rotational movement of the connecting member in each of two directions. A lower bearing support is mounted to the support tube. The mechanism and the lower bearing support cooperate to limit the rotational movement of the connecting member.

71 Claims, 9 Drawing Sheets



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Three sheets labeled "ACKNOWLEDGMENT" which Radio Flyer alleges to be evidence that the Radio Flyer model No. 77 was sold during 1998.

A sheet entitled "Restricted Turning Prior Art" which Radio Flyer alleges to be evidence that the Radio Flyer model No. 77 was released Feb. 19, 1998.

A sheet entitled "Product Name: Roll N Ride" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Grow-With-Me-Trike" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Baby Too" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Tough Trikes" and "Product Name: Push'n Pedal Trike" which Radio Flyer alleges to be evidence that the products shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "HBC Model 29875 CS 04G" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Smoby Pilot Alu Plus Jugueles Pico S.A." which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Fisher Price Rock, Roll and Ride XL" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Charton Baby Driver 2 39150 St. Laurent France" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Processed Plastics West Coast Choppers" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Processed Plastic Item 17800-2" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799.772.

Two sheets entitled "Fischer Price Kawasaki (US Patent 6,651,528)" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Mattel Hot Wheels" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Tek-Net Toys Int'l Inc. USA 020821 Emergency 911" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Fischer Price L&S Ride on Harley" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Friendly Toys Item #7112 Fold-Up Trike" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

English Language Abstract of GB 815,456.

English Language Abstract of DE 32 42 863.

English Language Abstract of DE 39 14 050.

English Language Translation of Swiss No. 290478.

Document showing Radio Flyer model #77 entitled "Restricted Turning Prior Art" asserted by Radio Flyer to be prior art against the instant application in Civil Action No. 204-CV-614. During litigation, Radio Flyer presented to Applicant two Radio Flyer model #77 trikes and asserted that these trikes were prior art. One trike had an adhesive label with the following text "P.D. Jun. 1999" and another trike had an adhesive label with the text "P.D. Jul. 1998".

Applicant has no knowledge with regard to the meaning of "P.D.". Additionally, during litigation, Applicant ordered three Radio Flyer model #77 trikes on ebay rom three different individuals. One trike had an adhesive label with the following text "P.D. Jan. 1999", another trike had an adhesive label with the text "P.D. Jul. 1999", and another trike had an adhesive label with the text "P.D. Oct. 1999". Applicant has no knowledge with regard to whether or when any of these five trikes was sold or offered for sale in the U.S.

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Radio Flyer catalog (in color) pp. RF01358-RF01388.
Radio Flyer 1998 catalog (in color) pp. RF01389-RF01396.
Hand made drawing page No. RF12204 on ITALTRIKE letterhead. The drawing has a handwritten date of Jan. 21, 1987.
Hand made drawing page No. RF12206 on ITALTRIKE letterhead. The drawing has a handwritten date of Jan. 21, 1987.
Black and while picture allegedly showing a mold having page No. RF12208.
Black and white picture allegedly showing mold parts having page No. RF12209.
Sheet table in Italian having a stamp entitled "N. CITTON & C, s.a.s.".
Cover page of Europeo (in color) having page RF12230 and dated Feb. 1, 1991.
Four sheets with page Nos. RF12244-A, -B, -C and -D (in color) showing various pictures of trikes and a scooter on what appears to be notebook pages.
Four sheets with page Nos. RF12245-A, -B, -C and -D (in color) showing various pictures of trikes and a bike on what appears to be notebook pages.

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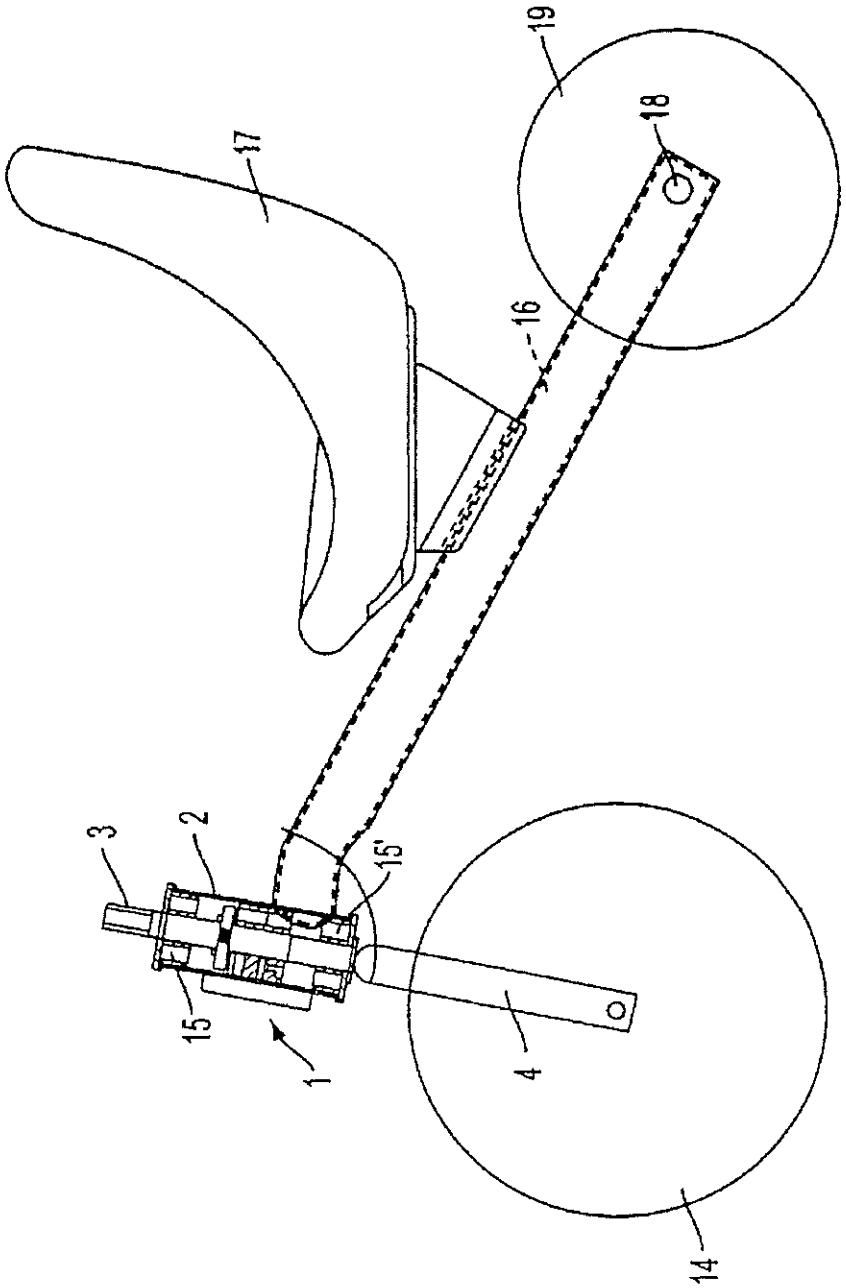


FIG. 1

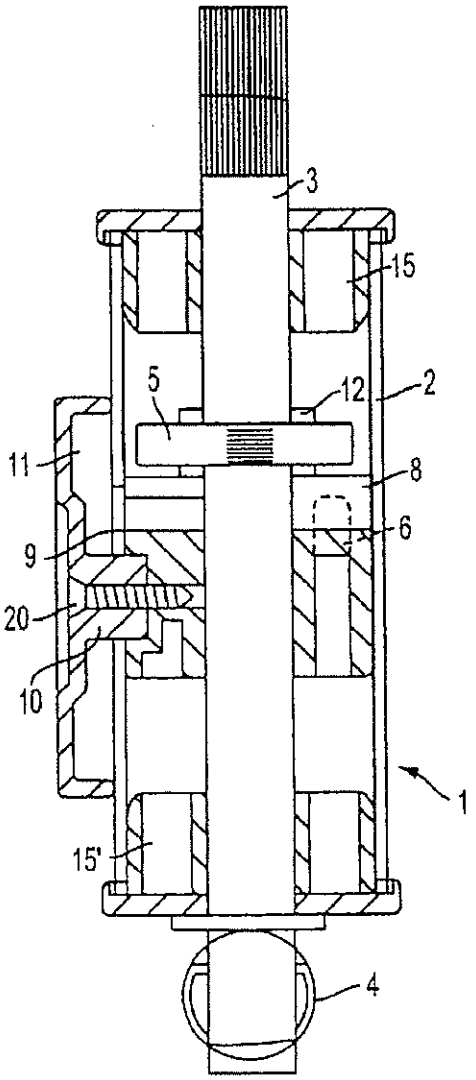


FIG. 2

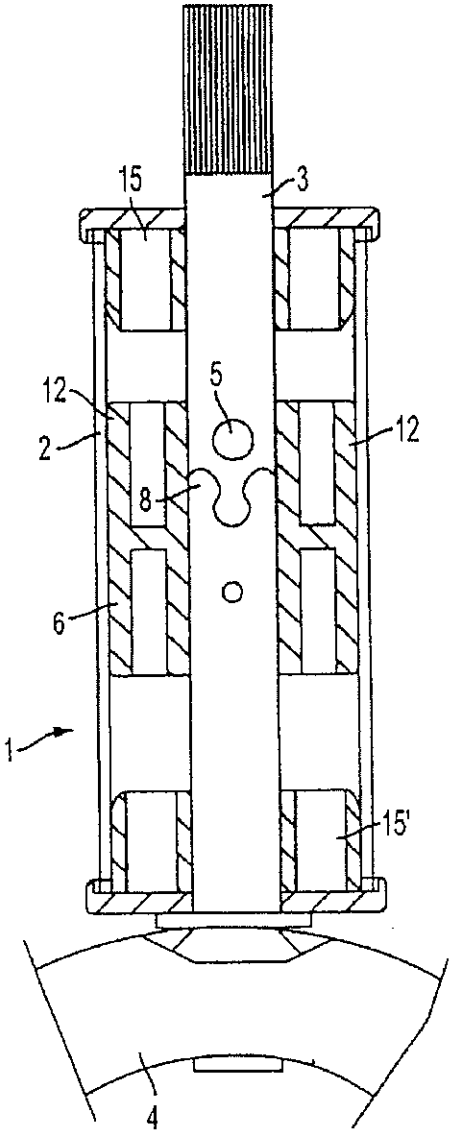


FIG. 3

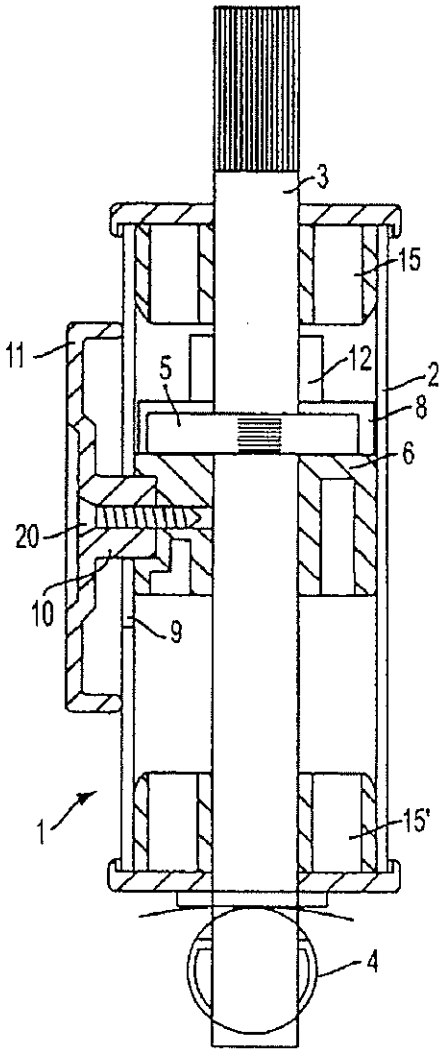


FIG. 4

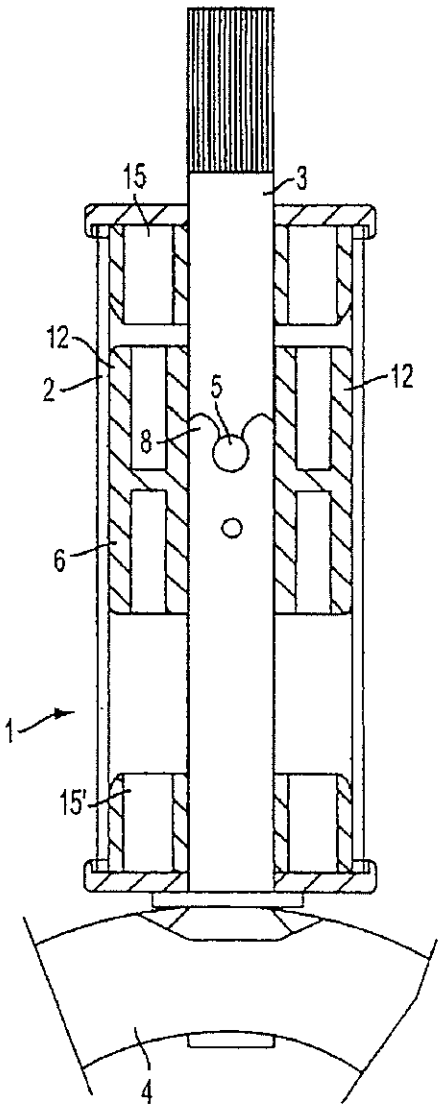


FIG. 5

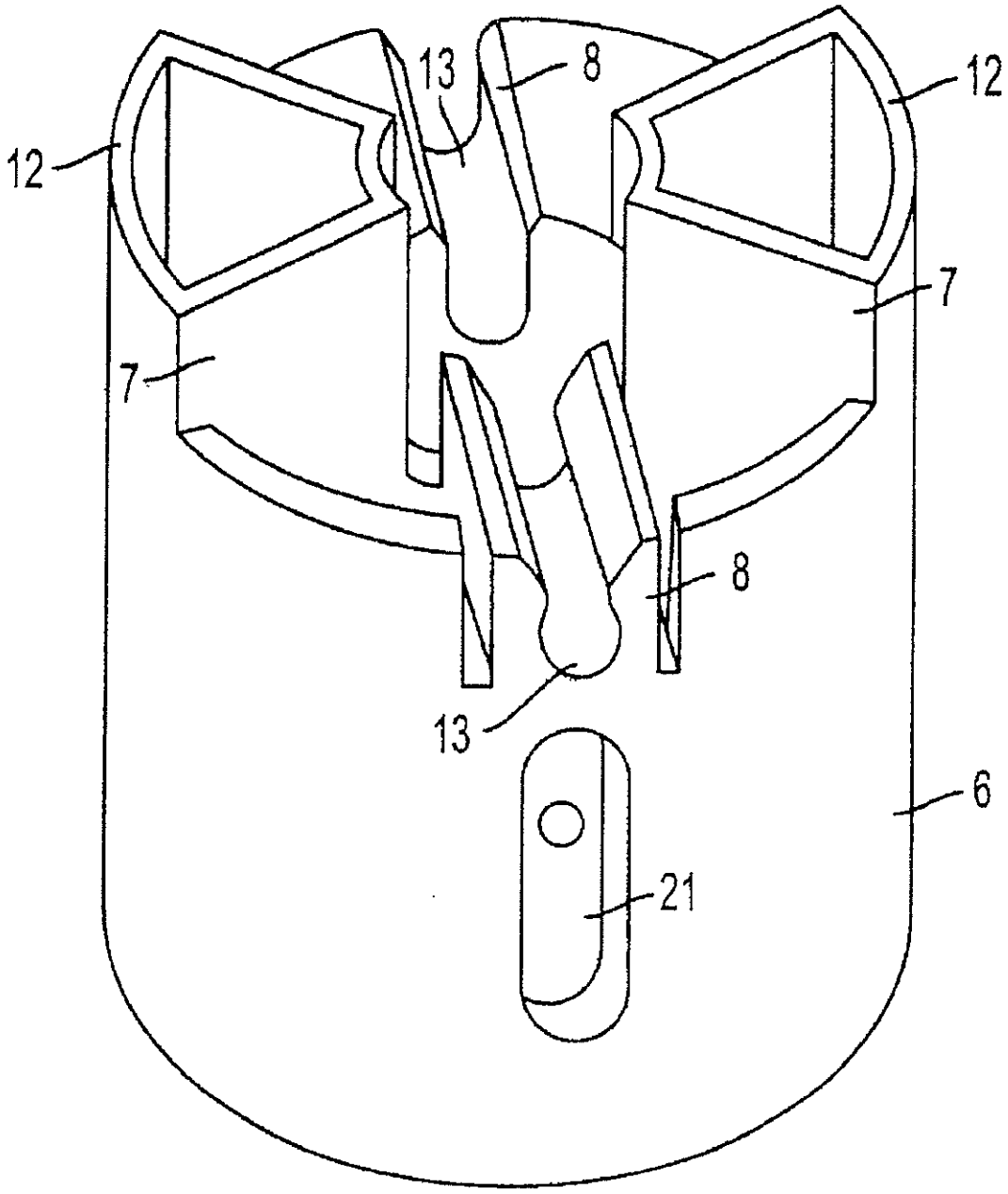


FIG. 6

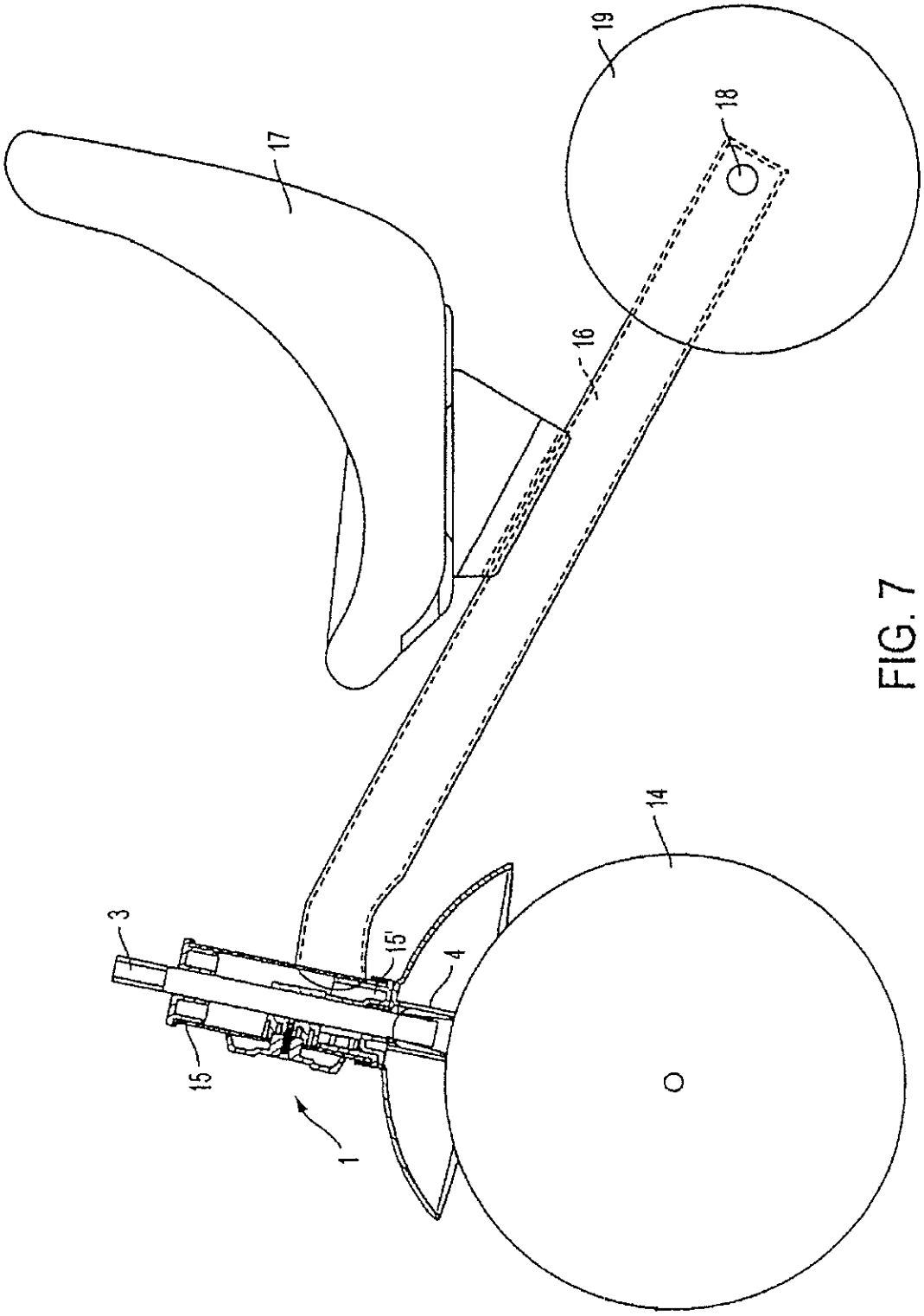
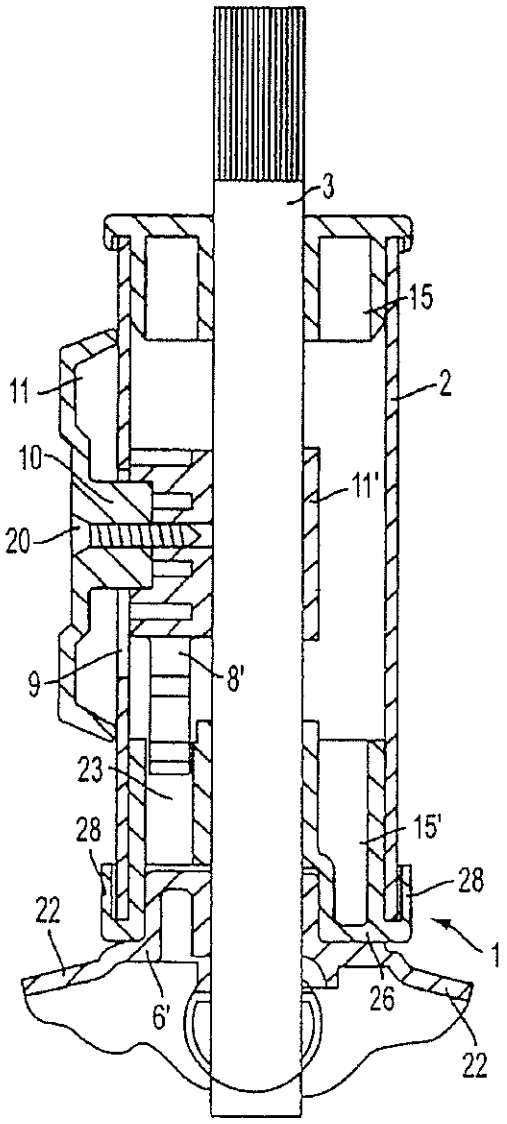


FIG. 7


3
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8'
23
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1
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22

FIG. 8

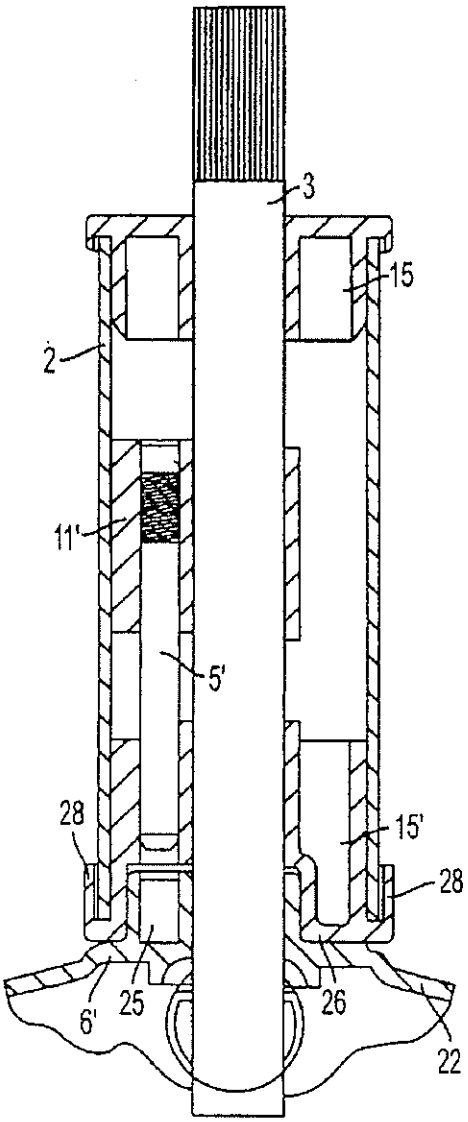
3
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FIG. 9

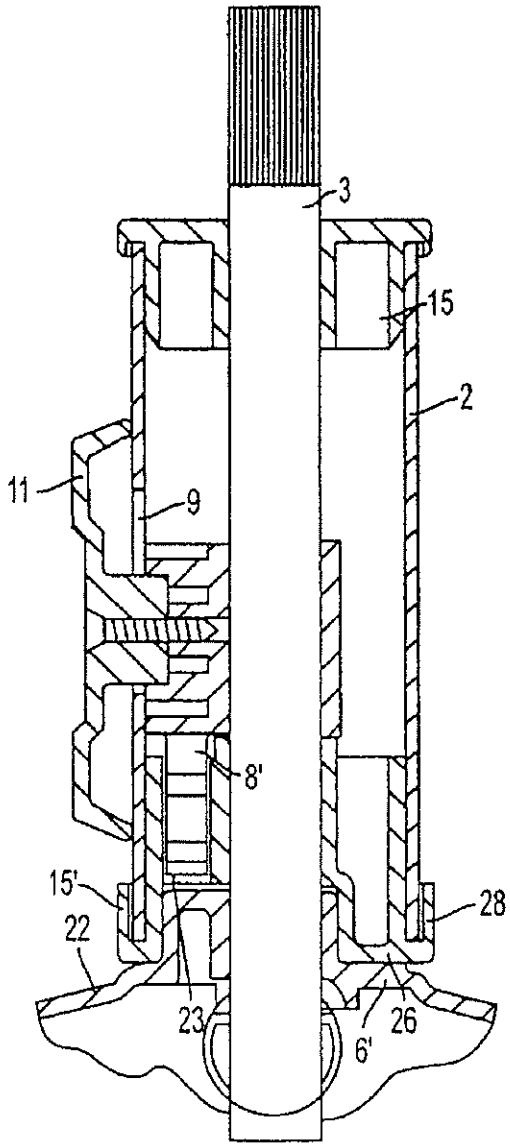

FIG. 10

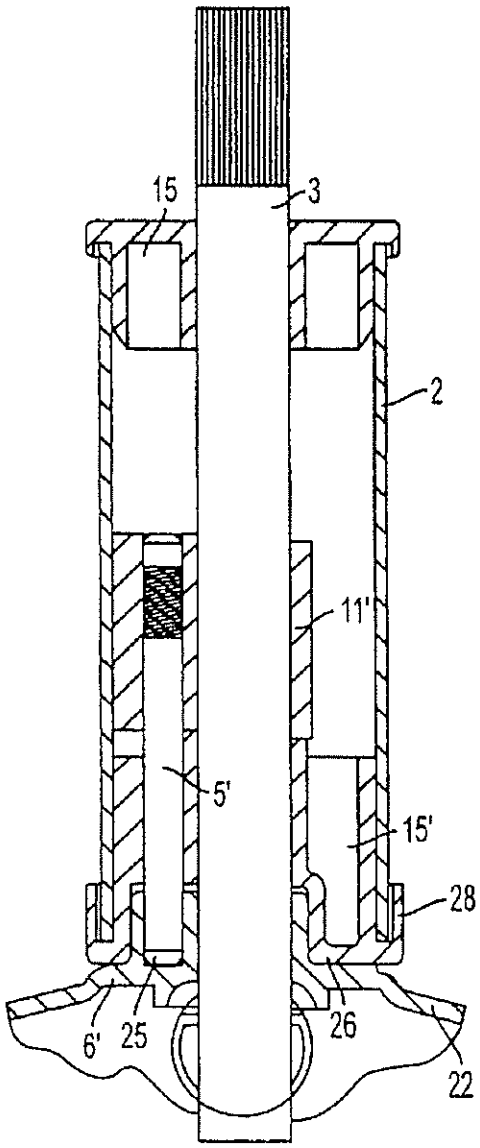

FIG. 11

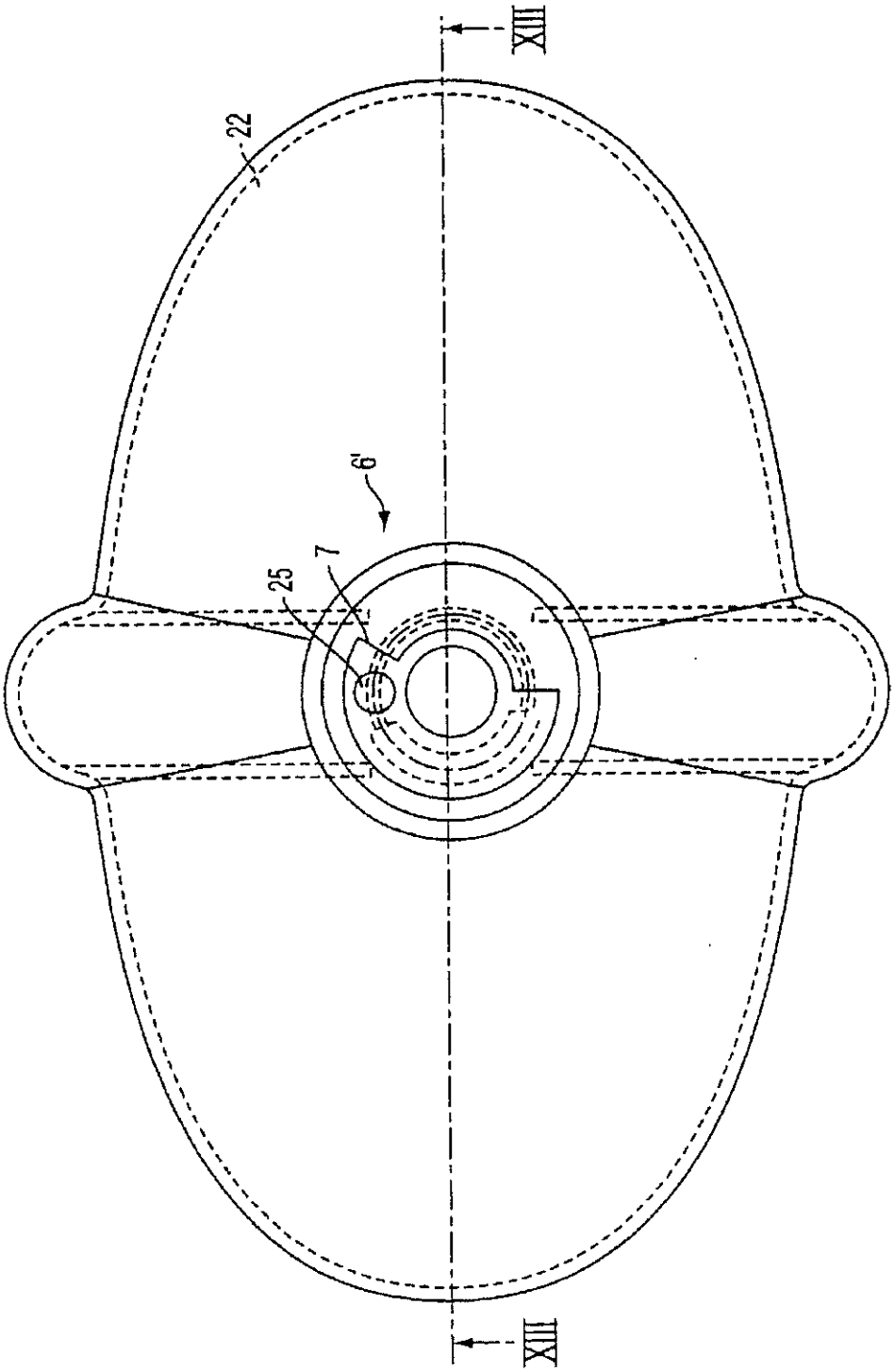

FIG. 12

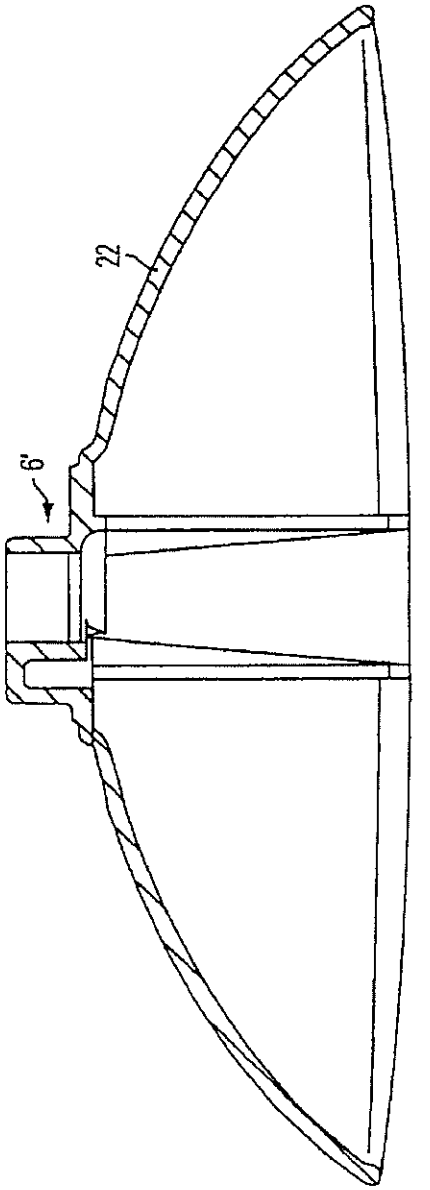

FIG. 13

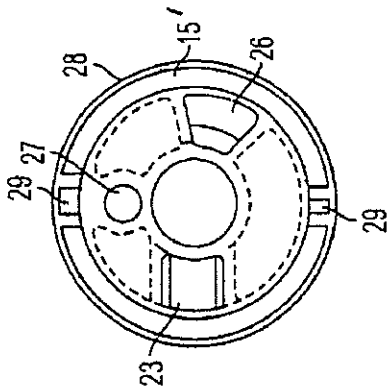

FIG. 17

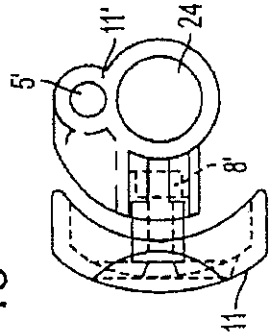

FIG. 16

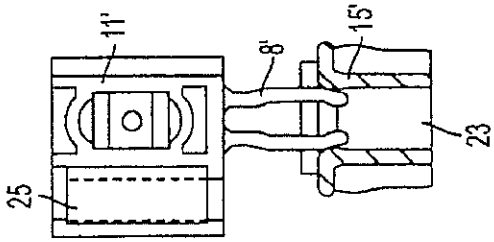

FIG. 15

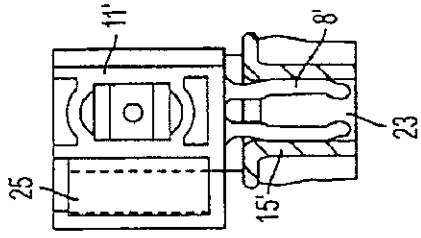

FIG. 14

VEHICLE STEERING HEAD

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of U.S. application Ser. No. 10/298,002 which was filed Nov. 18, 2002 now U.S. Pat. No. 6,799,772, which is a continuation of U.S. application Ser. No. 10/092,516 filed Mar. 8, 2002 now abandoned which is a continuation of U.S. application Ser. No. 09/584,497 filed Jun. 1, 2000, now U.S. Pat. No. 6,378,884, the disclosures of which are expressly incorporated by reference herein in their entireties. Further, the present application claims priority under 35 U.S.C. § 119 of German Patent Application No. 299 11 652.2, filed on Jul. 5, 1999, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle steering head and in particular, to a steering head for a vehicle comprising a support tube which has rotatably supported therein a fork member to which a wheel cover and a handlebar can be secured.

2. Discussion of Background Information

Vehicle steering heads of the above-described type are in particular used in bicycles or tricycles, and in particular in tricycles or bicycles for children.

In devices of the above-described type it is desirable for safety reasons that accidents be avoided which may be caused by an excessively large handlebar deflection. It has been found that when there is an excessively large handlebar deflection (e.g., the handle bar rotates beyond a point where effective steering occurs), the vehicle may tilt to the side. Moreover, such deflections or excessive rotation may run the risk that a user impacts his body against the handlebar. Additionally, the user may get caught with his/her feet in the front wheel and may be even be injured by the pedals.

A further drawback or disadvantage of prior-art devices occurs when they are pushed with a push rod type device. In such cases, these devices have a tendency towards uncontrolled steering movements of the front wheel which cannot be mastered or effectively controlled by small children, in particular.

SUMMARY OF THE INVENTION

The present invention therefore provides a vehicle steering head of the above-mentioned type which is of a simple construction and which can operate in an easy and reliable manner. Moreover, this design avoids the drawbacks of the prior art and can in particular limit a handlebar deflection to a desired degree. The invention also has provision for locking the handlebar.

According to one aspect of the invention a latch element is secured to a fork member on a portion provided inside the support tube. A linkage element is supported in the support tube for rotation therewith. The linkage element is displaceable or moveable in a longitudinal direction of the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the latch element. Moreover, the linkage element comprises at least one locking element which is releasably connectable to the latch element.

According to another aspect of the invention a latch element is supported on the support tube. A linkage element is arranged on the fork member and connected to the tube for rotation therewith. The latch element is freely displaceable or moveable along the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the support tube. Moreover, at least one latch element is provided that is releasably connectable to the support tube.

The vehicle steering head according to the invention is characterized by a number of considerable advantages.

First of all, it is possible to install or utilize the steering head in a frame of any desired design, e.g. children's bicycles or tricycles. Ideally, the dimensions of the steering head are such that they do not interfere with the remaining structure of the frame within which it is installed. Of course, the steering head may be combined with any and all common types of frames where ever its advantageous design is desired. Accordingly, the steering head may be utilized in a variety of devices where limited deflection or rotation and/or locking are desired.

Because the invention utilizes a latch element which is arranged in the support tube, no functional parts of the steering head need be outwardly visible or accessible. Accordingly, the internal parts are less susceptible to damage. Additionally, this design is less likely to cause injury when used by children or infants.

As a result of utilizing a linkage element according to the invention, it is possible to reliably lock the fork member and thus the wheel fork and the front wheel. Such a locking provision is easily be accomplished by displacing or moving the linkage element. This design ensures a high degree of operational safety and operational reliability.

The linkage element preferably utilizes stop surfaces which cooperate with the latch element in a manner where they are brought into contact with one another. In this way, the steering angle can be limited to a particularly or desired range. This limited range of motion of the steering angle can be realized according to the invention in different ways. The invention contemplates that the available steering angle is freely selectable within a wide desired range. This is of particular advantage to vehicles for children such as tricycles, which may require a steering angle of approximately 45° to each side. Of course, other desirable steering angles can be utilized. However, by designing in the desired limited steering angle, lateral tilting of the tricycle or similar devices can be prevented or their risk significantly reduced. Additionally, the risk of injuries which may be caused by the pedals, e.g., devices which utilize pedals on the front wheel can be reduced. Finally, the risk of injury which can occur when the handlebar exceeds a controlled steering angle can be ruled out to a considerable extent.

The invention also provides for a linkage element having a locking element which is releasably connectable to the latch element. This design ensures that when a push rod is used for pushing the device, i.e., a tricycle, the front wheel thereof may be reliably locked in place during straight travel.

In an advantageous embodiment of the invention, the latch element is designed in the form of a pin which extends in a direction transverse to the fork member. The pin may extend through the fork member such that it projects at both sides of the fork member. Alternatively, the pin can project from the fork member on only one side. Moreover, the pin can be firmly connected to the fork member, e.g. by welding or other conventional attachment techniques. Additionally, it may be secured by press fitting with or without utilizing a

knurled portion. Of course, the dimensions of the pin can easily be adapted to the respective conditions of use.

It should be noted that the manufacturing costs of the steering head are reduced by the above-described construction to quite a considerable degree.

In another advantageous embodiment of the invention, the linkage element is substantially designed in the form of a hollow cylinder. Thus, the linkage element can be reliably guided in the support tube and surround the fork member. Additionally, the linkage element can be designed as a single integral part or several parts which are either joined together or which cooperate together.

It is advantageous for the longitudinal displacement or movement of the linkage element to be along an axis of the support tube and the fork member. Accordingly, the support tube may comprise at least one longitudinal slot or a similar recess through which a connection element extends which is connected to the linkage element. This design also utilizes a slide which is arranged outside the support tube.

The slide facilitates the ease of handling or movement of the linkage element. In such a design, a displacement of the slide, which may additionally be provided with locking mechanism or fixing safety mechanism, effects a corresponding displacement or movement of the linkage element. The locking mechanism or fixing mechanism allows for fixing the front wheel in a single or set travel position which is preferably straight. Moreover, the invention also contemplates that the linkage element may be provided with inclined inlet surfaces or intercepting mechanisms which engage the latch element so as to initiate a locking action when the front wheel is slightly deflected angularly.

Stop surfaces on the latch element are preferably formed on at least one front attachment of the linkage element. Additionally, it is particularly advantageous when two opposite attachments or stops are in symmetry with each other and are each provided with at least one stop surface located on the linkage element. Thus, by utilizing two attachments or stops which are in symmetry with each other, this design can limit the steering angle in a symmetrical fashion to both the left and the right side.

In another advantageous embodiment of the invention, the associated stop surfaces of the attachments or stops act to limit the rotation of the fork member to a predetermined angular range at both sides. This angular range may e.g. be approximately 45° to both sides, for a total range of motion of approximately 90°.

The locking element is preferably designed in the form of at least one front recess which receives the latch element. Such an advantageous design makes it possible to grip and fix the latch element upon displacement or movement of the linkage element. Additionally, it is advantageous that the recess be retracted or set back relative to the front attachment, so that the attachments or stops can always remain in the plane of the latch element, while upon a displacement of the latch element, it is only the recess which can additionally be brought into engagement.

To implement a simple and operationally reliable structure of the steering head, it may be advantageous for the recess to be centrally arranged between the two attachments or stops.

The invention also contemplates that the fork member itself has not been changed constructionally. In other words, the invention can be adapted to work with a conventional fork member. Also, the invention makes it possible to manufacture all functional parts separately in a very simple manner. As a result, advantageous on costs can be achieved.

In a preferred design of a previously described embodiment, the linkage element is designed as part of a mudguard which extends from below into the support tube. This design allows for significant cost savings since the mudguard is normally made from plastics and is typically already included in most vehicles of the above described type. The linkage element can thus be mounted on the mudguard or made integrally therewith, in a particularly easy way and at low costs.

A further advantage of the this embodiment is that the latch element can be designed in the form of a bolt which arranged to be parallel with the fork member. The latch element of this design can thus be given relatively large dimensions so that the diameter of the support tube itself need not be chosen with such a large size.

It may be of particular advantage when the latch element is connected to a slide which extends into the support tube so as to be able to design the lock of the front wheel in a particularly simple manner. Furthermore, the locking element may preferably be connected to the slide. Moreover, the locking element serves to reliably maintain the locked state and to prevent any unintended unlocking. The locking element also preferably engages into a recess of a bearing which supports the fork member in the support tube. As a result, it is not necessary to mount additional parts or to take installation measures on the support tube itself.

It may also be of particular advantage for the limitation of the steering angle to be accomplished by a lower bearing which supports the fork member in the support tube. This lower bearing may have formed thereon an attachment which projects in the direction of the linkage element and which can be brought into contact with the stop surfaces formed on the linkage element and thus on the mudguard. This design has the advantageous effect that the predetermined angular range can be limited at both sides as well, e.g. approximately 45° each side.

The invention provides a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element projecting from the fork member and disposed within the support tube, and a linkage element disposed within the support tube, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member and comprises at least one stop surface for limiting a rotation of the fork member when the latch element contacts the at least one stop surface. The linkage element may further comprise at least one locking element for locking the fork member in a single position. The at least one locking element may releasably engage the latch element when the fork member is locked. The latch element may comprise a pin. The pin may project substantially perpendicular to the axis of the fork member. The linkage element may comprise a substantially cylindrical shape. The linkage element may comprise a plurality of hollow chambers separated by connecting walls. The support tube may comprise an opening which allows a connecting element to pass therethrough. The opening may comprise a longitudinal slot. The connecting element may be secured to the linkage element. The movement of the linkage element may be limited by the movement of the connecting element within the longitudinal slot. The steering head may further comprise a slide which is secured to the connecting element, the slide being disposed adjacent an outer surface of the support tube. The at least one stop surface may be disposed on at least one stop.

The at least one stop may comprise a projection which extends from the linkage element. The at least one stop may

comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The at least one stop may comprise two stops which are disposed opposite one another. Each stop may comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The two stops may define a limited range of rotational motion of the fork member in each of a clockwise and a counter-clockwise direction. The limited range of motion in the clockwise direction may be substantially equal to the range of motion in the counter-clockwise direction. The limited range of motion in one of the clockwise and counter-clockwise direction may be approximately 45 degrees.

The linkage element may further comprise at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element. The at least one recess is set back some distance from a surface of at least one stop. The at least one recess is centrally disposed between at least two stops.

The steering head may further comprise an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tube, each of the upper and lower bearings having an opening which allows the fork member to pass therethrough.

The steering head may be disposed on a tricycle frame.

The invention also provides for a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork member, and a linkage element connected to the fork member so as to rotate therewith, the linkage element comprising at least one stop surface, wherein the at least one stop surface limits the rotation of the fork member with respect to the support tube. The steering head may further comprise a slide, wherein the slide is disposed within the support tube and retains the latch element. The slide may further comprise at least one locking element for releasably securing the slide to the support tube. The linkage element may comprise a mudguard. The mudguard may be disposed between one end of the support tube and a wheel fork. The latch element may comprise a rod like member which is arranged substantially parallel to the axis of the fork member. The rod like member may comprise one of a bolt and a pin. The latch element may be connected to a slide, the slide being disposed within the support tube. The slide may be moveable substantially parallel to the axis of the fork member. A locking element may be connected to the slide.

The steering head may further comprise a bearing support disposed on at least one end of the support tube. The bearing support may be disposed on a lower end of the support tube. The steering head may further comprise a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support. The bearing support may comprise at least one stop, the at least one stop comprising at least one surface which engages the linkage element. The at least one stop may comprise a projection which engages a recess in the linkage element. The projection and the recess may cooperate to limit the rotational movement of the fork member within a desired range. The range of the rotational movement may be limited by at least two stop surfaces. The at least two stop surfaces may define a limited range of rotation in one of a clockwise and a counter-clockwise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counter-clockwise direction. The limited range of rotation between the at least two stops may be approximately 45 degrees.

The steering head may be disposed on a tricycle frame.

The invention further provides for a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The fork member comprises a fork end, a handlebar, and a latch element projecting from the fork member between the fork end and the handlebar end. The latch element is disposed within the support tube and a linkage element is slidably disposed within the support tube. The linkage element comprises at least one stop surface for engaging the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element and the at least one stop cooperate to limit the rotational movement of the fork member to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element.

The invention also relates to a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The lower bearing support comprises at least one stop surface, the fork member comprising a fork end, a handlebar, and a latch element which is slidably disposed adjacent the fork member between the fork end and the handlebar end, the latch element being disposed within the support tube and a linkage element moveably disposed adjacent the lower support bearing. The linkage element comprises at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element engages only the lower bearing support and where the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork member to a second position where the latch element releasably engages a recess in the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element. The linkage element may further comprise at least one locking element for engaging a locking recess in the lower bearing support. The at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

The invention provides for a vehicle steering head including a fork member adapted to engage a handlebar, a support tube which rotatably supports the fork member, a latch

element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork member from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork member to rotate with respect to the support tube in at least two directions. The latch element may comprise a rod-like member.

The invention also provides for a vehicle steering head that includes a support tube adapted to be coupled to a vehicle frame, an upper bearing support arranged at an upper end of the support tube, a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface, a cylindrical element rotatably mounted to the support tube via the upper and lower bearing supports, the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar, a latch element movably disposed within the support tube, a slide coupled to the latch element, the latch element being movable from outside the support tube, a linkage element that is rotatable with respect to the support tube, and the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube, wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, a mechanism which limits the rotational movement of the fork member in each of two directions, and a lower bearing support mounted to the support tube, wherein the mechanism and the lower bearing support cooperate to limit the rotational movement of the fork member.

The lower bearing support may be non-rotatably fixed to the support tube. The lower bearing support may comprise at least one stop surface. The lower bearing support may comprise two stop surfaces. The mechanism may comprise at least one stop surface. The mechanism may comprise two stop surfaces. The mechanism may comprise a linkage element having at least one stop surface. The linkage element may rotate with the fork member. The linkage element may be arranged on a mudguard. The fork member may be cylindrically shaped. The steering head may further comprise a handlebar connected to one end of the fork member and a wheel fork connected to another end of the fork member.

The invention also provides a vehicle steering head comprising a support tube adapted to be fixed to a frame, a cylindrical member adapted to connect a wheel fork to a handlebar, the cylindrical member being rotatable with respect to the support tube, a linkage element being movable and comprising at least two stop surfaces, wherein one of the at least two stop surfaces limits the rotation of the cylindrical member in one direction, and wherein another of the at least two stop surfaces limits the rotation of the cylindrical member in another direction.

The linkage element may rotate with the cylindrical member. The linkage element may rotate with a mudguard.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a connecting element adapted to connect a wheel fork to a handlebar, the connecting element being rotatable with respect to the support tube, a linkage element being rotatable and comprising at least two stop surfaces, a mudguard that rotates with the linkage element, one of the at least two stop surfaces limiting the rotation of the connecting element in one direction, and another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, and a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

FIG. **1** is a schematic side view of a children's tricycle with one embodiment of the vehicle steering head according to the invention;

FIG. **2** is a simplified sectional side view of the steering head according to the invention in an unlocked state;

FIG. **3** is a side view, turned or oriented by 90° (a right angle) of the arrangement shown in FIG. **2**;

FIG. **4** is a sectional side view similar to FIG. **2**, in the locked state;

FIG. **5** is a side view, similar to FIG. **3**, of the view according to FIG. **4**;

FIG. **6** is a simplified perspective illustration of the linkage element according to the invention;

FIG. **7** is a schematic side view of a children's tricycle with another embodiment of the vehicle steering head according to the invention;

FIG. **8** is a sectional side view of the vehicle steering head according to the invention, in the unlocked state;

FIG. **9** is a side view, turned or oriented by 90° of the arrangement shown in FIG. **8**;

FIG. **10** is a sectional side view similar to FIG. **8**, in the locked state;

FIG. **11** is a side view, turned or oriented by 90° which is similar to FIG. **9**, in the locked state;

FIG. **12** is a top view on the linkage element according to the invention and on the associated mudguard;

FIG. **13** is a sectional view of the arrangement according to FIG. **12** along the sectional lines XIII—XIII of FIG. **12**;

FIG. **14** is an enlarged side view showing a portion of the slide and of the locking element in the locked state;

FIG. **15** is a view analogous to FIG. **14**, in the unlocked state;

FIG. **16** is a top view on the slide; and

FIG. **17** is a top view on the lower bearing.

DETAILED DESCRIPTION OF THE INVENTION

The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is

made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

A children's tricycle is shown in FIG. 1 and comprises a front wheel 14 which is supported on a wheel fork 4. Wheel fork 4 is fixedly connected to a fork member 3. A handlebar (not shown) can be secured to the upper end of fork member 3.

Fork member 3 is supported in a support tube 2. This support is accomplished by utilizing slide bearings 15 and 15' which are shown in detail in FIGS. 2 to 5. The slide bearings 15 and 15' correspond to those of the prior art in this embodiment so that a detailed description is not needed.

Support tube 2 is firmly connected to a frame 16 which has mounted thereon a seat 17. The tricycle also has a rear axle 18 with rear wheels 19. Accordingly, a support tube 2 and a fork member 3 form a steering head 1.

According to the invention, support tube 2 has arranged therein a linkage element 6 which has a substantially cylindrical configuration (see also FIG. 6) and which is received with a play or clearance (so that it can slide) within support tube 2. Linkage element 6 is also provided with a central recess through which fork member 3 extends or passes.

Support tube 2 also has formed therein a longitudinal slot 9 through which a connection element 10 extends or passes. This connection element 10 is connected to a slide 11 and linkage element 6. The connection may be via a screw 20 (see FIGS. 2 and 4) or other conventional connecting mechanism. In the illustrated embodiment, connection element 10 is integrally connected to or formed with slide 11 and extends in a recess 21 of linkage element 6. However, connection element 10 and slide 11 may be made as separate components which are joined or secured together by any conventional attachment technique including a screw or threaded element.

On its front upper portion, linkage element 6 comprises two symmetrical opposite attachments or stops 12. Each of these stops 12 may be provided with lateral stop surfaces 7. When viewed from the top, these attachments or stops 12 are designed in a manner of a segment of a partial circle (pie shaped or wedge shaped), so that four stop surfaces 7 are formed, with each one being arranged in symmetry with one another. Of course, stops 12 may be separately formed and attached to linkage element 6 instead of being integrally formed therewith, as is shown.

In the illustrated embodiment two locking elements 8 may be utilized in which each is formed by a recess 13. These locking elements 8 are preferably provided on linkage element 6 in retracted or set back manner with respect to stops 12. As is apparent from FIG. 6, the walls of at least one recess 13 may be made resilient to ensure a releasable locking of a bolt-like latch element 5 when linkage element 6 is pushed upwards or into engagement with bolt-like latch element 5.

As is apparent from FIGS. 2 to 5, fork member 3 is provided with a bolt-like or pin-like latch element 5 which extends or projects from at least one and preferably both sides of fork member 3. Of course, latch element 5 may be integrally formed with fork member. Alternatively, latch element 5 may be a threaded or partially threaded member which threads into fork member 3. However, it is preferred that latch element 5 be a pin having a centrally disposed exterior knurl which is press fit into a fork member as is shown. In its working position, latch element 5 rotates with fork member 3 when a deflection or rotation of the handlebar takes place. The deflection of the handlebar is limited by way of latch element 5 abutting on stop surfaces 7, these stop surfaces 7 defining the limited range of motion of the handlebar.

When it is desired to lock the handlebar in a set position, latch element 5 is pressed or forced into recesses 13. This engagement occurs when locking element 8, which is disposed on linkage element 6, is pushed upwards by slide 11. Recesses 13 also utilize inclined inlet surfaces because they act as guiding lead-in surfaces which facilitate entry of pin 5 into recess 13. In the locked state, which is shown in FIGS. 4 and 5, a steering movement thus becomes impossible since the handlebar or fork member 3 is locked in a single direction. FIGS. 2 and 3 show a downwardly displaced condition of linkage element 6 in which latch element 5 is in a position which it does not cooperate with the locking element 8. As a result, in this position fork member 3 and handlebar are free to rotate until latch element 5 abuts on stop surfaces 7, this range of movement or rotation corresponding to a steering angle range.

According to a preferred aspect of the invention, linkage element 6 may be made from a plastic material. Of course, other materials are also contemplated.

Another embodiment of the vehicle steering head according to the invention is described with reference to FIGS. 7 to 16. In this regard, like parts are provided with like reference numerals.

As for the description of FIG. 7, reference can be made to the description of FIG. 1 to the extent that the same features are shown. The subsequent figures are illustrations elucidating the details which have been changed.

As in FIGS. 2 to 5, FIGS. 8 and 9 and 10 and 11, respectively, are illustrations showing the vehicle steering head on an enlarged scale. Again, like parts are here also provided with like reference numerals, so that reference can be made to the preceding explanations. Slide 11 utilizes connection element 10 and screw 20. Connection element 10 also extends through a longitudinal slot 9. Moreover, slide 11 comprises an outer grip portion 11 and an interior portion 11' which is screwed to outer grip portion 11 by a screw 20. A top view of slide 11 and 11' is shown in FIG. 16. As can be seen in this figure, a central recess 24 is provided through which fork member 3 extends or passes (with a clearance which allows slide 11' to move up and down with respect to fork member 3). Furthermore, slide 11' also has a recess (see FIGS. 9, 11 and 16) which is formed so that it can accept a bolt-like latch element 5'. Of course, this latch element 5' may be pressed into this recess, threaded into the recess, or otherwise secured to slide 11' in a suitable manner. Alternatively, latch element 5' may be integrally formed with slide 11'.

As already described in conjunction with a previous embodiment, a bearing 15 which serves as a slide bearing is used on the upper portion of steering head 1.

Lower bearing 15' in this embodiment is configured such that it has an upwardly projecting contour of a linkage element 6' which can extend into bearing 15'. Of course, the bearing and the upwardly projecting contour may be made as separate components which are joined together by conventional techniques rather than integrally formed as is shown. Additionally, as becomes apparent in FIG. 12, linkage element 6' may have a recess 25 into which latch element 5' can be inserted (see also FIGS. 9 and 11).

As can further be seen from the top view of FIG. 12, linkage element 6' comprises two lateral stop surfaces 7 which are angularly spaced apart from each other. This

design is such that a downwardly oriented attachment or stop **26** (see FIGS. **8** to **11**) of the bearing **15'**, which is connected to support tube **2**, forms a steering limitation of plus/minus approximately 45°. Of course, as with the previous embodiment, the range of steering limitation can be designed to any desired range.

FIG. **13** shows a lateral sectional view of mudguard **22** and of linkage element **6'**. Note that these components are integrally formed as a single member which reduces manufacturing costs associated with joining two separate components.

FIGS. **14** and **15** are front views of slide **11'** wherein handpiece **11** has been removed to illustrate the operation of locking element **8'**. Locking element **8'** is U-shaped and includes two movable or flexible lateral legs which can releasably be inserted into a recess **23** of bearing **15'**. Upon insertion and locking, locking element **8'** is pressed against an undercut and thereby held in position inside recess **23**. Accordingly, when it is desired to release the locked state of fork member **3**, slide **11'** must be pushed upwards which removes the legs from recess **23**. Of course, other locking mechanisms may be utilized and this embodiment is not limited to the use of this particular locking mechanism. For example, a pin may be used which has a floating ring disposed around its circumference. Alternatively, other conventional releasable locking mechanisms may be utilized.

FIG. **17** is a top view on lower bearing **15'** on an enlarged scale. The (downwardly projecting) attachment or stop **26** can be seen here as can recess **23** which receives locking element **8'**. Moreover, recess **27** is adapted to receive and guide bolt-like latch element **5'** therein. Furthermore, a surrounding collar-like edge **28** can be seen in which **29** designates two oppositely disposed attachments or projections which serve as anti-rotation engagements. These engagements are designed to engage recesses (not shown) of support tube **2**. Of course, lower bearing may be secured to support tube **2** in any conventional manner such as by bonding, welding, or screws. Moreover, this attachment may be releasable or more permanent in nature.

It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

What is claimed:

1. A tricycle vehicle steering head comprising:
- a support tube adapted to be fixed to a frame;
- a connecting member adapted to connect a wheel fork to a handlebar;
- a mechanism which limits the rotational movement of the connecting member in each of two directions;
- the mechanism being arranged on a mudguard;
- an upper bearing support mounted to an upper end of the support tube;
- a lower bearing support mounted to a lower end of the support tube,
- the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports; and
- a locking device that engages an opening in the mechanism;
- wherein the mechanism and the lower bearing support cooperate to limit the rotational movement of the connecting member.

2. The steering head of claim **1**, wherein the upper and lower bearing supports are each non-rotatably fixed to the support tube.

3. The steering head of claim **1**, wherein the lower bearing support comprises at least one stop surface.

4. The steering head of claim **3**, wherein the lower bearing support comprises two stop surfaces.

5. The steering head of claim **1**, wherein the mechanism comprises at least one stop surface.

6. The steering head of claim **5**, wherein the mechanism comprises two stop surfaces.

7. The steering head of claim **1**, wherein the mechanism comprises a linkage element having at least one stop surface.

8. The steering head of claim **7**, wherein the linkage element rotates with the connecting member.

9. The steering head of claim **7**, wherein the linkage element and the mudguard comprise a one-piece structure.

10. The steering head of claim **1**, wherein the connecting member is cylindrically shaped.

11. The steering head of claim **1**, further comprising a handlebar connected to one end of the connecting member and a wheel fork connected to another end of the connecting member.

12. A tricycle vehicle steering head comprising:
- a support tube adapted to be fixed to a frame;
- a cylindrical member adapted to connect a wheel fork to a handlebar;
- the cylindrical member being rotatable with respect to the support tube;
- a recessed portion arranged at a lower end of the support tube and comprising first and second stop surfaces;
- an arcuate projecting portion configured to rotate within the recessed portion and comprising first and second stop surfaces; and
- an arc length of the arcuate protecting portion being greater than 180 degrees between the first and second stop surfaces,
- wherein contact between the first stop surfaces of the projecting portion and the recessed portion limits the rotation of the cylindrical member in one direction, and
- wherein contact between the second stop surfaces of the projecting portion and the recessed portion limits the rotation of the cylindrical member in another direction.

13. The steering head of claim **12**,
- wherein the arcuate projecting portion rotates with the cylindrical member; and
- wherein a lower bearing support includes the recessed portion.

14. The steering head of claim **12**, wherein the arcuate projecting portion is coupled to a mudguard.

15. A tricycle vehicle steering head comprising:
- a support tube adapted to be fixed to a frame;
- a connecting element adapted to connect a wheel fork to a handlebar;
- the connecting element being rotatably mounted to the support tube via upper and lower bearing supports;

a rotatably mounted linkage element comprising at least two stop surfaces and an opening;

the linkage element engaging the lower bearing support;

a mudguard that rotates with the linkage element;

a movably mounted pin that engages the opening in the linkage element in a locking position and that does not engage the opening in the linkage element in a unlocked position:

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

16. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting member adapted to connect a wheel fork to a handlebar;

the connecting element being rotatably mounted to the support tube via upper and lower bearing supports;

a locking device that, in a locked position, prevents rotational movement of the fork member and that, in an unlocked position, allows rotational movement of the fork member in each of two directions;

a system which is arranged at a lower end of the support tube and that limits the rotational movement of the fork member in each of the two directions,

wherein the system includes an arcuate projecting part and a recessed part which is configured to receive the arcuate projecting part, and

wherein the recessed part is non-rotatably mounted and wherein the arcuate projecting part rotates with the connecting member.

17. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatably mounted to the support tube via upper and lower bearing supports;

a mechanism that is rotatable and comprises an opening and at least two stop surfaces arranged on an arcuate projecting portion;

the mechanism engaging with the lower bearing support;

a movably mounted pin that, in a locking position, engages with the opening in the mechanism;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

18. The vehicle steering head of claim 17, the mechanism is arranged on a mudguard.

19. The vehicle steering head of claim 18, wherein the movably mounted pin moves parallel to an axis of the connecting element.

20. The vehicle steering head of claim 17, wherein the lower bearing support comprises at least two stop surfaces that are engagable with the at least two stop surfaces of the arcuate projecting portion.

21. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a movable locking member which engages with an opening to prevent rotational movement of the connecting element and which disengages from the opening to allow rotational movement of the connecting element;

a first stop surface limiting the rotation of the connecting element in one direction; and

a second stop surface limiting the rotation of the connecting element in another direction,

wherein the opening, the first stop surface and the second stop surface are each arranged on a mudguard.

22. The vehicle steering head of claim 21, wherein the first and second stop surfaces rotate with the mudguard.

23. The vehicle steering head of claim 21, wherein the first and second stop surfaces are disposed on an arcuate projecting portion of the mudguard.

24. The vehicle steering head of claim 21, wherein the opening rotates with the connecting element.

25. The vehicle steering head of claim 21, wherein the movable locking member comprises a pin.

26. The vehicle steering head of claim 21, wherein the first and second stop surfaces moveably engage two stop surfaces which do not move.

27. The vehicle steering head of claim 21, further comprising a lower bearing support that comprises the two stop surfaces which do not move, wherein the two stop surfaces which do not move engage the first and second stop surfaces.

28. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting member adapted to connect a wheel fork to a handlebar;

the connecting member being rotatable with respect to the support tube; and

a system which limits the rotational movement of the fork member in each of two directions;

the system including one part which is non-rotatably mounted to an end of the support tube and another part which rotates with the connecting member;

a pin that engages, in a locking position, an opening in the other part,

wherein the other part is an arcuate projection and the one part is an arcuate guiding recess within which the arcuate projection moves.

29. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a cylindrical member adapted to connect a wheel fork to a handlebar;

the cylindrical member being rotatably mounted to the support tube; and

a system which limits the rotational movement of the cylindrical member in each of two directions, the system including one part which is non-rotatably mounted to the support tube and another part which rotates with the cylindrical member;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being configured to move in a direction which is parallel to an axis of the support tube; and

the opening being arranged on the other part and being configured to rotate with the cylindrical member,

wherein, when the pin engages the opening, the cylindrical member is prevented from rotating, and

wherein when the pin does not engage the opening, the cylindrical member is free to rotate in each of two directions.

30. A tricycle vehicle steering head coupled to a frame, said steering head comprising:

a support tube adapted to be fixed to the frame;

a lower bearing support non-movably mounted to the support tube;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that limits rotational movement of the connecting element;

the mechanism comprising at least two stop surfaces which engage with first and second stop surfaces of the lower bearing support;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mechanism comprises an arcuate projection, an arc length of the arcuate projection between the at least two stop surfaces being greater than an arc length of a space defined by the at least two stop surfaces, whereby the arcuate projection and the space comprise an arc length equal to a circle.

31. The vehicle steering head of claim 30, wherein the mechanism is coupled to a mudguard.

32. The vehicle steering head of claim 30, further comprising a device that engages the mechanism to prevent movement thereof.

33. The vehicle steering head of claim 32, wherein the device that engages the mechanism comprises a pin.

34. A tricycle vehicle steering head coupled to a frame, comprising:

a support tube fixed to the frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being configured to rotate with respect to the support tube;

a mechanism that limits rotational movement of the connecting element;

the mechanism comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a locking system that prevents rotational movement of the connecting element,

the locking system comprising a movable engaging member and an opening that can receive the engaging member and which can rotate with the connecting element,

wherein the opening is arranged on the mechanism.

35. The vehicle steering head of claim 34, wherein the engaging member can move between a first position that allows the connecting element to rotate in each of two directions and a second position wherein the connecting element is prevented from rotational movement in each of the two directions.

36. The vehicle steering head of claim 34, wherein the engaging member can move from a first position to a second position, wherein, in the first position, the connecting element can rotate in each of two directions and wherein, in the second position, the engaging member enters the opening and the connecting element is prevented from rotational movement in each of the two directions.

37. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting member rotatably mounted to the support tube;

a mechanism that limits rotational movement of the connecting member in each of two directions;

the mechanism comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting member in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting member in another direction; and

a locking system which utilizes a movable locking member and an opening;

wherein, when the locking member does not engage the opening, the connecting member can rotate in each of the two directions, and wherein, when the locking member engages the opening, the connecting member is prevented from rotating in each of the two directions.

38. The vehicle steering head of claim 37, further comprising a mudguard.

39. The vehicle steering head of claim 37, wherein the locking member moves in a direction that is parallel to an axis of the connecting member.

40. The vehicle steering head of claim 37, wherein the connecting member is mounted to the support tube via upper and lower bearing supports.

41. The vehicle steering head of claim 37, wherein the mechanism moves when the connecting member moves.

42. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element rotatably mounted to the support tube via upper and lower bearing supports;

a mudguard;

a system which limits the rotational movement of the connecting element in each of two directions;

a locking system comprising a movable locking member and an opening arranged on the mudguard;

wherein, when the locking member does not engage the opening, the connecting element can rotate in each of the two directions, and wherein, when the locking member engages the opening, the connecting element is prevented from rotating in each of the two directions.

43. The vehicle steering head of claim 42, wherein the locking member moves in a direction that is parallel to an axis of the connecting element.

44. The vehicle steering head of claim 42, wherein the mechanism moves when the connecting element moves.

45. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member rotatably mounted to the support tube via upper and lower bearing supports;

a system which limits the rotational movement of the fork member in each of two directions; and

a locking system comprising a movable locking member and an opening,

wherein the locking member moves in a direction that is parallel to an axis of the support tube, and

wherein, when the locking member does not engage the opening, the fork member can rotate in each of the two directions, and wherein, when the locking member engages the opening, the fork member is prevented from rotating in each of the two directions.

46. The vehicle steering head of claim 45, wherein the locking member comprises a pin.

47. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member rotatably mounted to the support tube;

a mudguard;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being movably mounted; and

the opening being arranged on a surface of the mudguard;

wherein, when the pin engages the opening, the fork member is prevented from rotating, and

wherein, when the pin does not engage the opening, the fork member is free to rotate in each of two directions.

48. The vehicle steering head of claim **47**, wherein the pin can move in a direction that is parallel to an axis of the support tube.

49. The vehicle steering head of claim 47, further comprising a system which limits the rotational movement of the fork member in each of the two directions.

50. The vehicle steering head of claim **47**, wherein the fork member can rotate approximately 45 degrees in each of the two directions.

51. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard; and

a movement limiting system that limits rotational movement of the connecting element in each of two directions,

wherein the movement limiting system comprises an arcuate recess and an arcuate projection, the arcuate projection having an arc length between two stop surfaces that is

greater and an arc length of a space defined by the two stop surfaces of the arcuate projection, whereby the arcuate projection and the space comprise an arc length equal to a circle, and the arcuate recess having an arc length between two other stop surfaces that is greater than the arc length of the arcuate projection.

52. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mechanism which limits rotational movement of the connecting element; and

a locking system which cooperates with the lower bearing support and which can be moved by a user,

wherein, when moved to one position, the locking system is structured and arranged to prevent the connecting element from rotating in each of the two directions, and wherein, when moved to another position, the locking system is structured and arranged to allow the connecting element to rotate in each of the two directions.

53. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard comprising a mechanism for limiting rotational movement of the connecting element and an opening; and

a locking system which can be moved by a user to engage the opening,

wherein, when moved to one position, the locking system is structured and arranged to prevent the connecting element from rotating in each of the two directions, and wherein, when moved to another position, the locking system is structured and arranged to allow the connecting element to rotate in each of the two directions.

54. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard;

a movement limiting system that limits rotational movement of the connecting

element in each of two directions;

the movement limiting system comprising one part arranged on the mudguard and another part arranged on the lower bearing support; and

a locking system which can be moved by a user,

wherein, when moved to one position, the locking system is structured and arranged to prevent the connecting element from rotating in each of the two directions, and wherein, when moved to another position, the locking system is structured and arranged to allow the connecting element to rotate in each of the two directions.

55. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard;

a locking system comprising a pin and an opening arranged on the mudguard; and

a movement limiting system that limits rotational movement of the connecting element in each of two directions,

the movement limiting system comprising an arcuate recess arranged on the lower bearing support and an arcuate projection arranged on the mudguard,

wherein the arcuate projection has an arc length between two stop surfaces that is greater and an arc length of a space defined by the two stop surfaces of the arcuate projection, whereby the arcuate projection and the space comprise an arc length equal to a circle, and

wherein the arcuate recess has an arc length between two other stop surfaces that is greater than the arc length the arcuate projection.

56. The vehicle steering head of claim **55**, further comprising a device for locking the pin in a locking position.

57. The vehicle steering head of claim **56**, wherein the device for locking the pin in the locking position engages the lower bearing support.

58. The vehicle steering head of claim **55**, wherein the pin moves parallel to an axis of the connecting element.

59. The vehicle steering head of claim **55**, wherein the arcuate projection extends from a surface of the mudguard which rotatably engages the lower bearing support.

60. The vehicle steering head of claim **55**, wherein the lower bearing support comprises an opening which allows an end of the pin to pass therethrough.

61. The vehicle steering head of claim **55**, wherein the arcuate projection and the mudguard comprise a one-piece structure.

62. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element mounted to the support tube via the upper and lower bearing supports;

a wheel fork rotating with respect to the support tube;

a first part comprising stop surfaces;

a second part comprising stop surfaces;

one stop surface of the first part contacting one stop surface of the second part when the wheel fork is rotated in one direction and another stop surface of the first part contacting another stop surface of the second part when the wheel fork is rotated in another direction;

the first part and the second part being structured and arranged to allow rotational movement of the wheel fork in each of two directions while also limiting rotational movement of the wheel fork in each of the two directions within an angular range; and

a locking system which, in a locked position, prevents rotational movement of the wheel fork and which, in an unlocked position, allows the wheel fork to rotate in each of the

two directions within the angular range.

63. The vehicle steering head of claim **62**, wherein the first part comprises a projecting part and the second part comprises a recess which receives therein the projecting part.

64. The vehicle steering head of claim **62**, wherein the locking system comprises a movable first member and a second member that receives therein an end of the movable first member.

65. The vehicle steering head of claim **64**, wherein the movable first member moves parallel to an axis of the connecting member and the second member comprises an opening.

66. The vehicle steering head of claim **62**, wherein each of the first part and the second part are arcuate-shaped.

67. The vehicle steering head of claim **66**, wherein the first part has an arc length between the stop surfaces that is greater and an arc length of a space defined by the stop surfaces of the first part, whereby the first part and the space comprise an arc length equal to a circle, and wherein the second part has an arc length between the stop surfaces of the second part that is greater than the arc length the first part.

68. The vehicle steering head of claim **62**, further comprising a mudguard, wherein the first part is arranged on the mudguard and the second part is arranged on the lower bearing support.

69. The vehicle steering head of claim **62**, wherein the locking system comprises a pin and an opening that receives therein an end of the pin in the locked position.

70. The vehicle steering head of claim **62**, wherein the locking system comprises a device that is movably mounted and an opening that, in the locked position,

receives therein an end of the device.

71. The vehicle steering head of claim **62**, wherein the locking system comprises one part having an opening which receives therein the connecting element and another part having an opening which, in the locked position, receives therein a portion of the one part.

* * * * *

Exhibit E

US006799772B2

(12) **United States Patent**
Kettler et al.

(10) **Patent No.: US 6,799,772 B2**
(45) **Date of Patent: *Oct. 5, 2004**

(54) **VEHICLE STEERING HEAD**

(75) Inventors: **Heinz Kettler**, Ense-Parsit (DE); **Joachim Kettler**, Werl (DE); **Reinhard Rocholl**, Werl (DE)

(73) Assignee: **Heinz Kettler GmbH & Co.**, Ense-Parsit (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/298,002**

(22) Filed: **Nov. 18, 2002**

(65) **Prior Publication Data**

US 2003/0132597 A1 Jul. 17, 2003

Related U.S. Application Data

(63) Continuation of application No. 10/092,516, filed on Mar. 8, 2002, now abandoned, which is a continuation of application No. 09/584,497, filed on Jun. 1, 2000, now Pat. No. 6,378,884.

(30) **Foreign Application Priority Data**

Jul. 5, 1999 (DE) ..... 299 11 652 U

(51) **Int. Cl.**[7] **B62K 5/02**
(52) **U.S. Cl.** **280/279**; 280/272; 74/495
(58) **Field of Search** 280/279, 272, 280/271, 282, 89; 403/354, 83; 74/495

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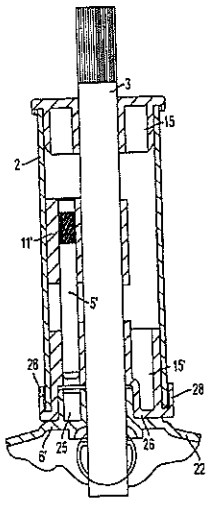
Primary Examiner—Lesley D. Morris
Assistant Examiner—Tony Winner
(74) *Attorney, Agent, or Firm*—Greenblum & Bernstein, P.L.C.

(57) **ABSTRACT**

Vehicle steering head including a connecting element adapted to engage a handlebar. A support tube rotatably supports the connecting element. A fork member adapted to connect a wheel fork to a handlebar. The fork member is rotatable with respect to the support tube. A mechanism limits the rotational movement of the fork member in each of two directions. A lower bearing support is mounted to the support tube. The mechanism and the lower bearing support cooperate to limit the rotational movement of the fork member.

69 Claims, 9 Drawing Sheets



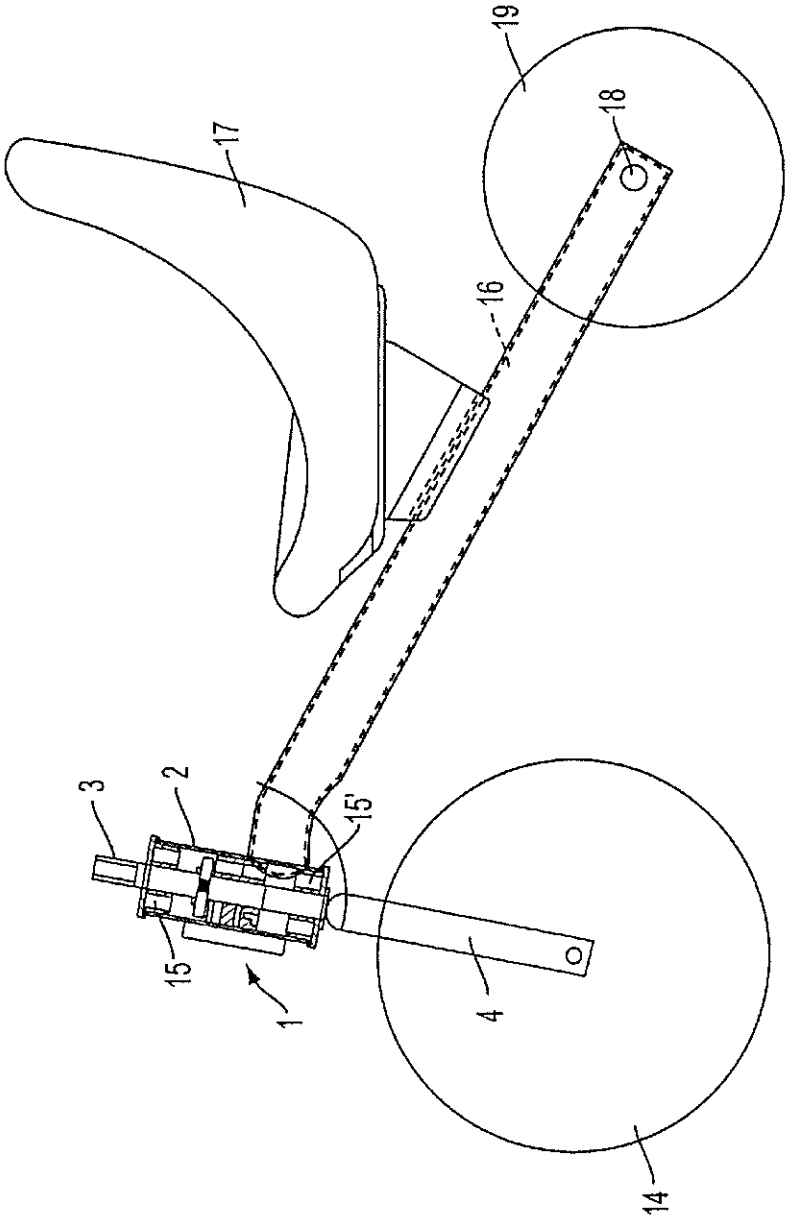


FIG. 1

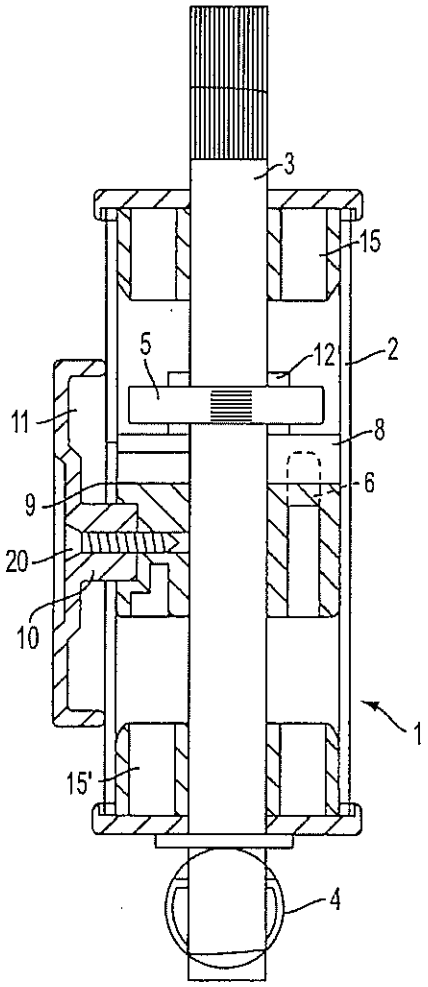


FIG. 2

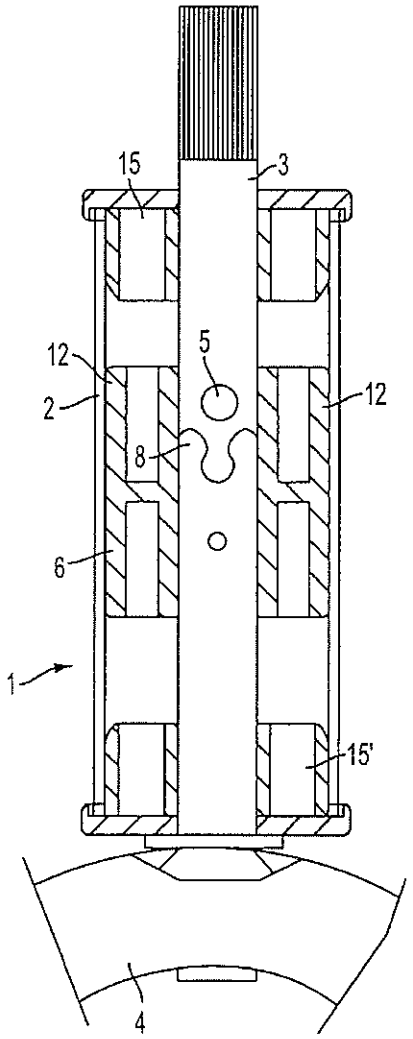
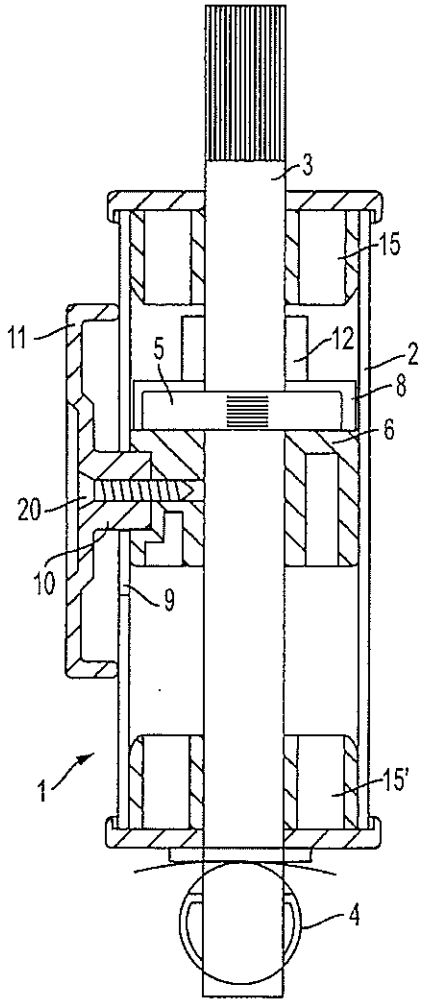


FIG. 3



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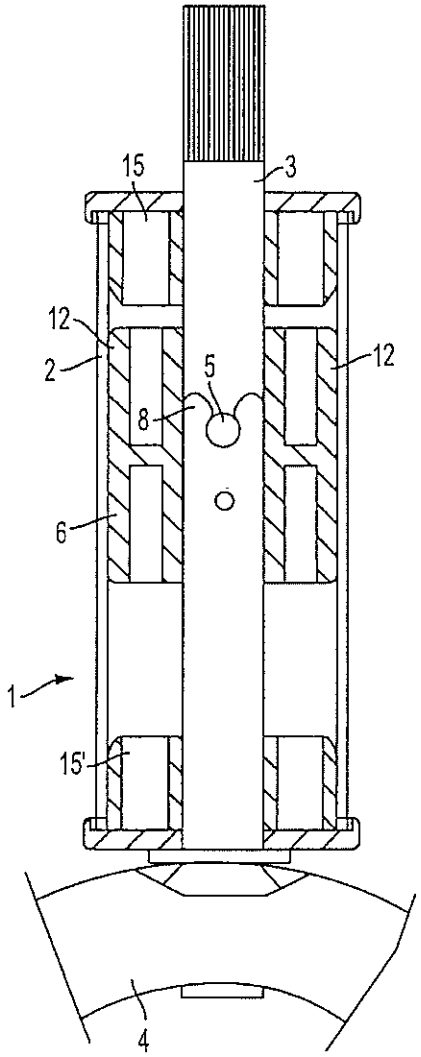

FIG. 5

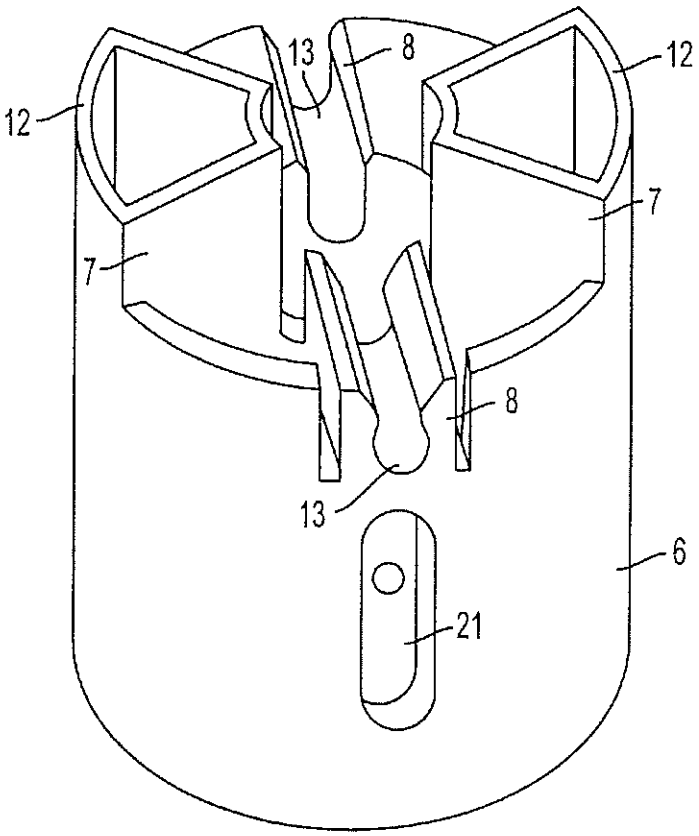

FIG. 6

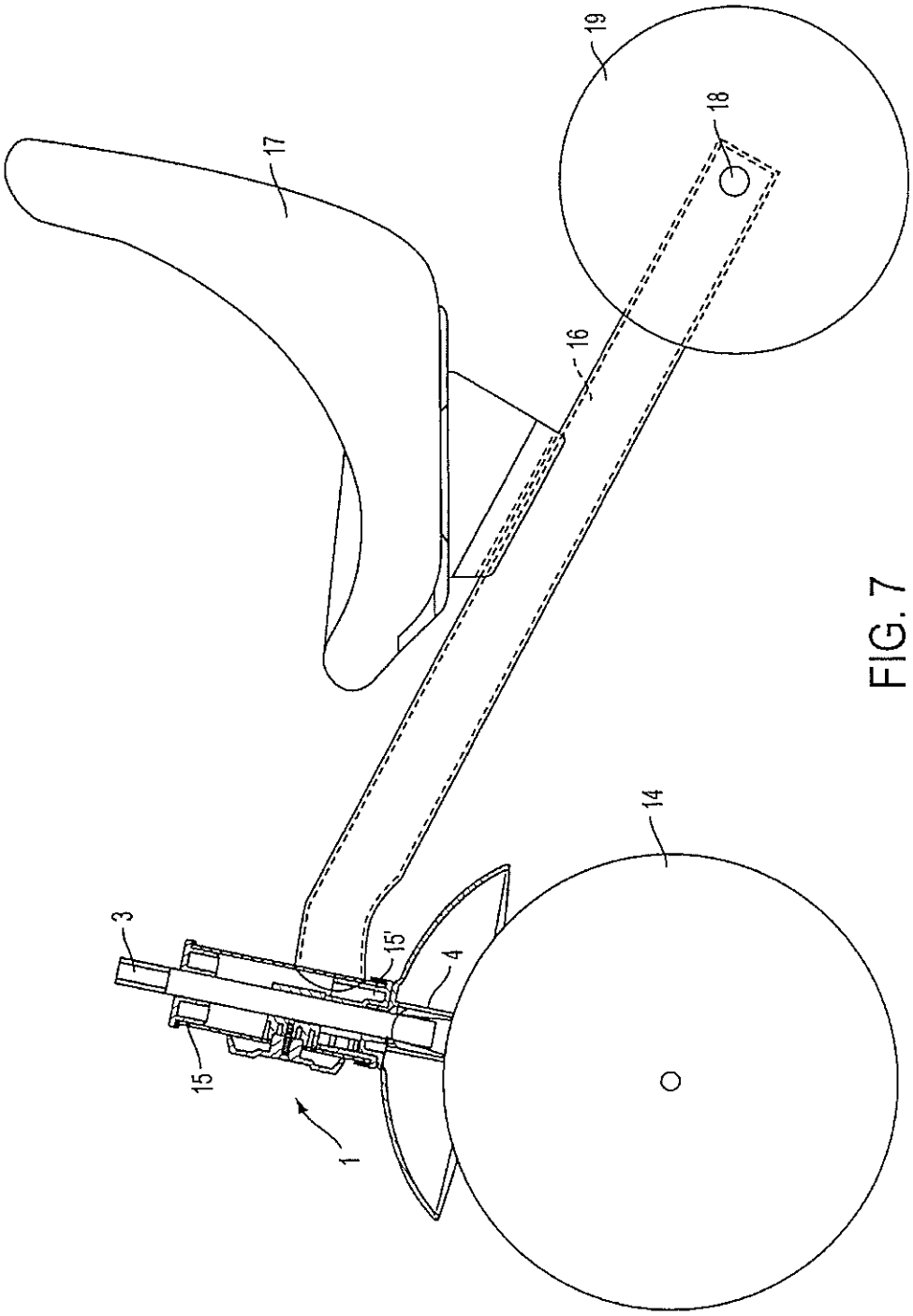

FIG. 7

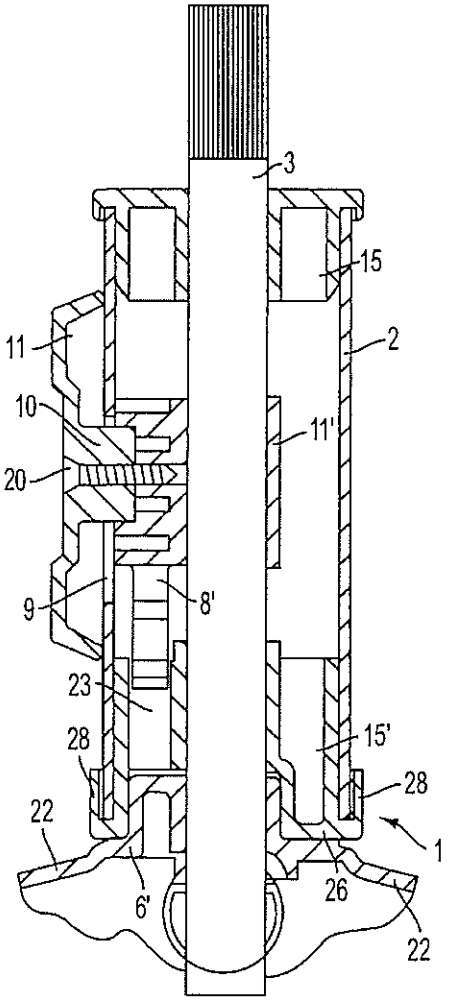
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FIG. 8

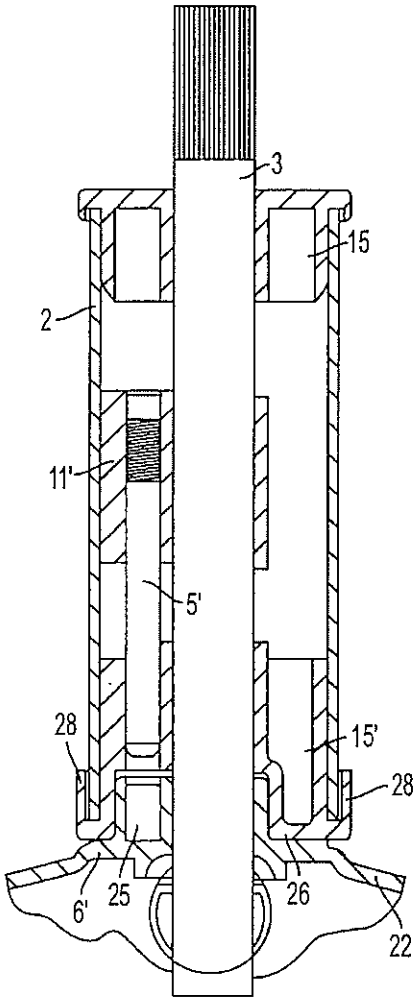
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FIG. 9

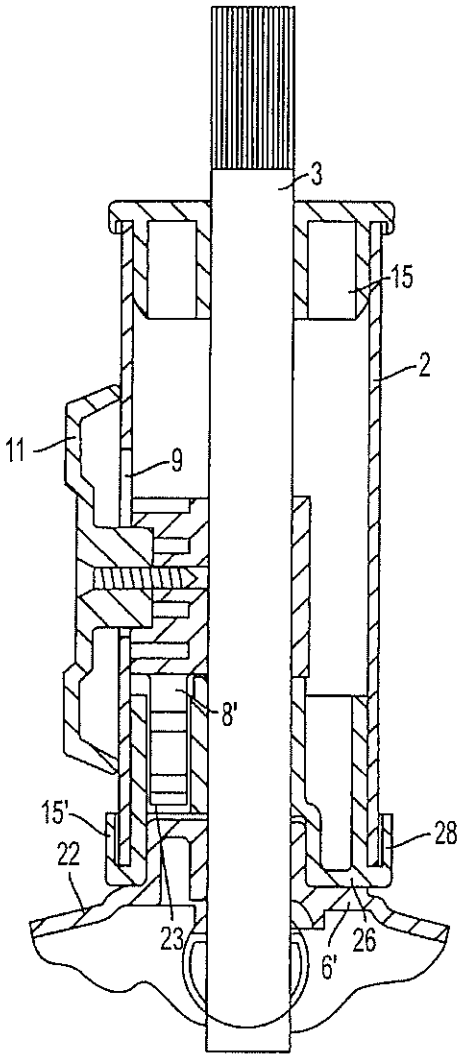

FIG. 10

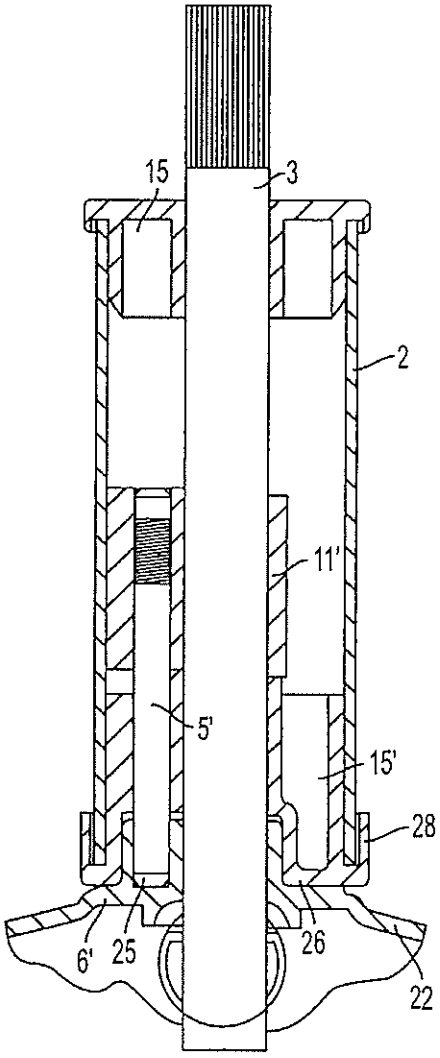

FIG. 11

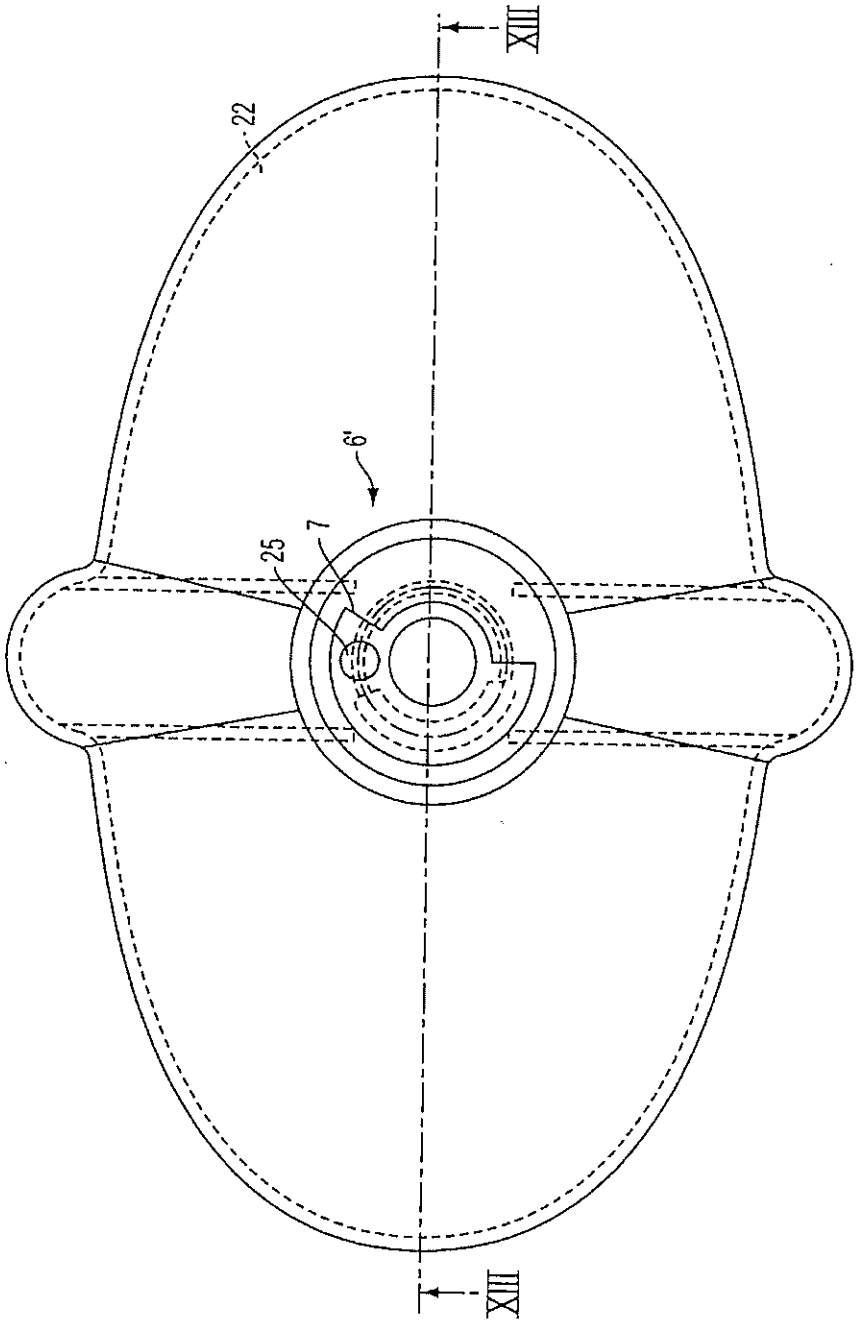

FIG. 12

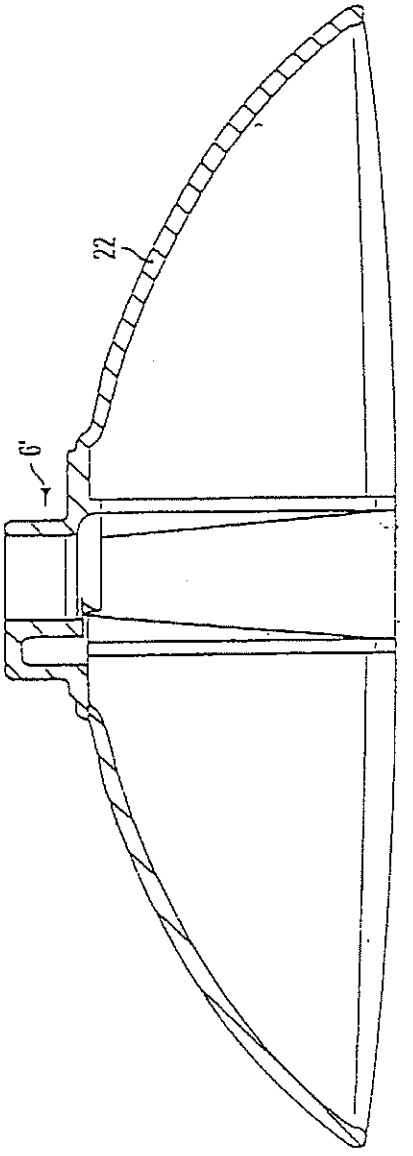

FIG. 13

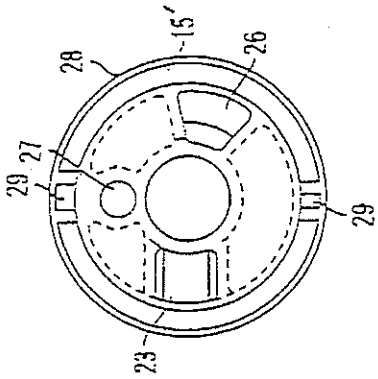

FIG. 17

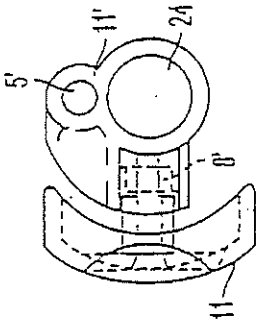

FIG. 16

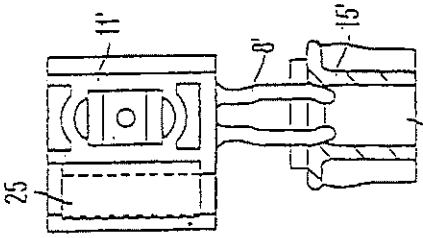

FIG. 15

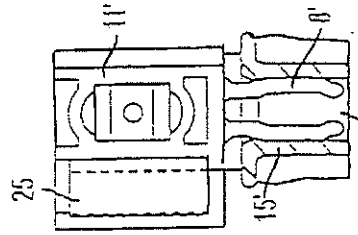

FIG. 14

VEHICLE STEERING HEAD

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of U.S. application Ser. No. 10/092,516 filed Mar. 8, 2002 now abandoned, which is a continuation of U.S. application Ser. No. 09/584,497 filed Jun. 1, 2000, now U.S. Pat. No. 6,378,884, the disclosures of which are expressly incorporated by reference herein in their entireties. Further, the present application claims priority under 35 U.S.C. § 119 of German Patent Application No. 299 11 652.2, filed on Jul. 5, 1999, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle steering head and in particular, to a steering head for a vehicle comprising a support tube which has rotatably supported therein a fork member to which a wheel cover and a handlebar can be secured.

2. Discussion of Background Information

Vehicle steering heads of the above-described type are in particular used in bicycles or tricycles, and in particular in tricycles or bicycles for children.

In devices of the above-described type it is desirable for safety reasons that accidents be avoided which may be caused by an excessively large handlebar deflection. It has been found that when there is an excessively large handlebar deflection (e.g., the handle bar rotates beyond a point where effective steering occurs), the vehicle may tilt to the side. Moreover, such deflections or excessive rotation may run the risk that a user impacts his body against the handlebar. Additionally, the user may get caught with his/her feet in the front wheel and may be even be injured by the pedals.

A further drawback or disadvantage of prior-art devices occurs when they are pushed with a push rod type device. In such cases, these devices have a tendency towards uncontrolled steering movements of the front wheel which cannot be mastered or effectively controlled by small children, in particular.

SUMMARY OF THE INVENTION

The present invention therefore provides a vehicle steering head of the above-mentioned type which is of a simple construction and which can operate in an easy and reliable manner. Moreover, this design avoids the drawbacks of the prior art and can in particular limit a handlebar deflection to a desired degree. The invention also has provision for locking the handlebar.

According to one aspect of the invention a latch element is secured to a fork member on a portion provided inside the support tube. A linkage element is supported in the support tube for rotation therewith. The linkage element is displaceable or moveable in a longitudinal direction of the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the latch element. Moreover, the linkage element comprises at least one locking element which is releasably connectable to the latch element.

According to another aspect of the invention a latch element is supported on the support tube. A linkage element is arranged on the fork member and connected to the tube for rotation therewith. The latch element is freely displaceable or moveable along the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the support tube. Moreover, at least one latch element is provided that is releasably connectable to the support tube.

The vehicle steering head according to the invention is characterized by a number of considerable advantages.

First of all, it is possible to install or utilize the steering head in a frame of any desired design, e.g. children's bicycles or tricycles. Ideally, the dimensions of the steering head are such that they do not interfere with the remaining structure of the frame within which it is installed. Of course, the steering head may be combined with any and all common types of frames where ever its advantageous design is desired. Accordingly, the steering head may be utilized in a variety of devices where limited deflection or rotation and/or locking are desired.

Because the invention utilizes a latch element which is arranged in the support tube, no functional parts of the steering head need be outwardly visible or accessible. Accordingly, the internal parts are less susceptible to damage. Additionally, this design is less likely to cause injury when used by children or infants.

As a result of utilizing a linkage element according to the invention, it is possible to reliably lock the fork member and thus the wheel fork and the front wheel. Such a locking provision is easily be accomplished by displacing or moving the linkage element. This design ensures a high degree of operational safety and operational reliability.

The linkage element preferably utilizes stop surfaces which cooperate with the latch element in a manner where they are brought into contact with one another. In this way, the steering angle can be limited to a particularly or desired range. This limited range of motion of the steering angle can be realized according to the invention in different ways. The invention contemplates that the available steering angle is freely selectable within a wide desired range. This is of particular advantage to vehicles for children such as tricycles, which may require a steering angle of approximately 45° to each side. Of course, other desirable steering angles can be utilized. However, by designing in the desired limited steering angle, lateral tilting of the tricycle or similar devices can be prevented or their risk significantly reduced. Additionally, the risk of injuries which may be caused by the pedals, e.g., devices which utilize pedals on the front wheel can be reduced. Finally, the risk of injury which can occur when the handlebar exceeds a controlled steering angle can be ruled out to a considerable extent.

The invention also provides for a linkage element having a locking element which is releasably connectable to the latch element. This design ensures that when a push rod is used for pushing the device, i.e., a tricycle, the front wheel thereof may be reliably locked in place during straight travel.

In an advantageous embodiment of the invention, the latch element is designed in the form of a pin which extends in a direction transverse to the fork member. The pin may extend through the fork member such that it projects at both sides of the fork member. Alternatively, the pin can project from the fork member on only one side. Moreover, the pin can be firmly connected to the fork member, e.g. by welding or other conventional attachment techniques. Additionally, it may be secured by press fitting with or without utilizing a knurled portion. Of course, the dimensions of the pin can easily be adapted to the respective conditions of use.

It should be noted that the manufacturing costs of the steering head are reduced by the above-described construction to quite a considerable degree.

In another advantageous embodiment of the invention, the linkage element is substantially designed in the form of a hollow cylinder. Thus, the linkage element can be reliably guided in the support tube and surround the fork member. Additionally, the linkage element can be designed as a single integral part or several parts which are either joined together or which cooperate together.

It is advantageous for the longitudinal displacement or movement of the linkage element to be along an axis of the support tube and the fork member. Accordingly, the support tube may comprise at least one longitudinal slot or a similar recess through which a connection element extends which is connected to the linkage element. This design also utilizes a slide which is arranged outside the support tube.

The slide facilitates the ease of handling or movement of the linkage element. In such a design, a displacement of the slide, which may additionally be provided with locking mechanism or fixing safety mechanism, effects a corresponding displacement or movement of the linkage element. The locking mechanism or fixing mechanism allows for fixing the front wheel in a single or set travel position which is preferably straight. Moreover, the invention also contemplates that the linkage element may be provided with inclined inlet surfaces or intercepting mechanisms which engage the latch element so as to initiate a locking action when the front wheel is slightly deflected angularly.

Stop surfaces on the latch element are preferably formed on at least one front attachment of the linkage element. Additionally, it is particularly advantageous when two opposite attachments or stops are in symmetry with each other and are each provided with at least one stop surface located on the linkage element. Thus, by utilizing two attachments or stops which are in symmetry with each other, this design can limit the steering angle in a symmetrical fashion to both the left and the right side.

In another advantageous embodiment of the invention, the associated stop surfaces of the attachments or stops act to limit the rotation of the fork member to a predetermined angular range at both sides. This angular range may e.g. be approximately 45° to both sides, for a total range of motion of approximately 90°.

The locking element is preferably designed in the form of at least one front recess which receives the latch element. Such an advantageous design makes it possible to grip and fix the latch element upon displacement or movement of the linkage element. Additionally, it is advantageous that the recess be retracted or set back relative to the front attachment, so that the attachments or stops can always remain in the plane of the latch element, while upon a displacement of the latch element, it is only the recess which can additionally be brought into engagement.

To implement a simple and operationally reliable structure of the steering head, it may be advantageous for the recess to be centrally arranged between the two attachments or stops.

The invention also contemplates that the fork member itself has not been changed constructionally. In other words, the invention can be adapted to work with a conventional fork member. Also, the invention makes it possible to manufacture all functional parts separately in a very simple manner. As a result, advantageous production costs can be achieved.

In a preferred design of a previously described embodiment, the linkage element is designed as part of a

mudguard which extends from below into the support tube. This design allows for significant cost savings since the mudguard is normally made from plastics and is typically already included in most vehicles of the above-described type. The linkage element can thus be mounted on the mudguard or made integrally therewith, in a particularly easy way and at low costs.

A further advantage of the this embodiment is that the latch element can be designed in the form of a bolt which arranged to be parallel with the fork member. The latch element of this design can thus be given relatively large dimensions so that the diameter of the support tube itself need not be chosen with such a large size.

It may be of particular advantage when the latch element is connected to a slide which extends into the support tube so as to be able to design the lock of the front wheel in a particularly simple manner. Furthermore, the locking element may preferably be connected to the slide. Moreover, the locking element serves to reliably maintain the locked state and to prevent any unintended unlocking. The locking element also preferably engages into a recess of a bearing which supports the fork member in the support tube. As a result, it is not necessary to mount additional parts or to take installation measures on the support tube itself.

It may also be of particular advantage for the limitation of the steering angle to be accomplished by a lower bearing which supports the fork member in the support tube. This lower bearing may have formed thereon an attachment which projects in the direction of the linkage element and which can be brought into contact with the stop surfaces formed on the linkage element and thus on the mudguard. This design has the advantageous effect that the predetermined angular range can be limited at both sides as well, e.g. approximately 45° each side.

The invention provides a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element projecting from the fork member and disposed within the support tube, and a linkage element disposed within the support tube, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member and comprises at least one stop surface for limiting a rotation of the fork member when the latch element contacts the at least one stop surface. The linkage element may further comprise at least one locking element for locking the fork member in a single position. The at least one locking element may releasably engage the latch element when the fork member is locked. The latch element may comprise a pin. The pin may project substantially perpendicular to the axis of the fork member. The linkage element may comprise a substantially cylindrical shape. The linkage element may comprise a plurality of hollow chambers separated by connecting walls. The support tube may comprise an opening which allows a connecting element to pass therethrough. The opening may comprise a longitudinal slot. The connecting element may be secured to the linkage element. The movement of the linkage element may be limited by the movement of the connecting element within the longitudinal slot. The steering head may further comprise a slide which is secured to the connecting element, the slide being disposed adjacent an outer surface of the support tube. The at least one stop surface may be disposed on at least one stop.

The at least one stop may comprise a projection which extends from the linkage element. The at least one stop may comprise a wedge-shaped hollow projection having two

angled lateral stop surfaces. The at least one stop may comprise two stops which are disposed opposite one another. Each stop may comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The two stops may define a limited range of rotational motion of the fork member in each of a clockwise and a counter-clockwise direction. The limited range of motion in the clockwise direction may be substantially equal to the range of motion in the counter-clockwise direction. The limited range of motion in one of the clockwise and counter-clockwise direction may be approximately 45 degrees.

The linkage element may further comprise at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element. The at least one recess is set back some distance from a surface of at least one stop. The at least one recess is centrally disposed between at least two stops.

The steering head may further comprise an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tube, each of the upper and lower bearings having an opening which allows the fork member to pass therethrough.

The steering head may be disposed on a tricycle frame.

The invention also provides for a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork member, and a linkage element connected to the fork member so as to rotate therewith, the linkage element comprising at least one stop surface, wherein the at least one stop surface limits the rotation of the fork member with respect to the support tube. The steering head may further comprise a slide, wherein the slide is disposed within the support tube and retains the latch element. The slide may further comprise at least one locking element for releasably securing the slide to the support tube. The linkage element may comprise a mudguard. The mudguard may be disposed between one end of the support tube and a wheel fork. The latch element may comprise a rod like member which is arranged substantially parallel to the axis of the fork member. The rod like member may comprise one of a bolt and a pin. The latch element may be connected to a slide, the slide being disposed within the support tube. The slide may be moveable substantially parallel to the axis of the fork member. A locking element may be connected to the slide.

The steering head may further comprise a bearing support disposed on at least one end of the support tube. The bearing support may be disposed on a lower end of the support tube. The steering head may further comprise a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support. The bearing support may comprise at least one stop, the at least one stop comprising at least one surface which engages the linkage element. The at least one stop may comprise a projection which engages a recess in the linkage element. The projection and the recess may cooperate to limit the rotational movement of the fork member within a desired range. The range of the rotational movement may be limited by at least two stop surfaces. The at least two stop surfaces may define a limited range of rotation in one of a clockwise and a counter-clockwise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counter-clockwise direction. The limited range of rotation between the at least two stops may be approximately 45 degrees.

The steering head may be disposed on a tricycle frame.

The invention further provides for a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The fork member comprises a fork end, a handlebar, and a latch element projecting from the fork member between the fork end and the handlebar end. The latch element is disposed within the support tube and a linkage element is slidably disposed within the support tube. The linkage element comprises at least one stop surface for engaging the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element and the at least one stop cooperate to limit the rotational movement of the fork member to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element.

The invention also relates to a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The lower bearing support comprises at least one stop surface, the fork member comprising a fork end, a handlebar, and a latch element which is slidably disposed adjacent the fork member between the fork end and the handlebar end, the latch element being disposed within the support tube and a linkage element moveably disposed adjacent the lower support bearing. The linkage element comprises at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element engages only the lower bearing support and where the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork member to a second position where the latch element releasably engages a recess in the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element. The linkage element may further comprise at least one locking element for engaging a locking recess in the lower bearing support. The at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

The invention provides for a vehicle steering head including a fork member adapted to engage a handlebar, a support tube which rotatably supports the fork member, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage

element prevents the fork member from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork member to rotate with respect to the support tube in at least two directions. The latch element may comprise a rod-like member.

The invention also provides for a vehicle steering head that includes a support tube adapted to be coupled to a vehicle frame, an upper bearing support arranged at an upper end of the support tube, a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface, a cylindrical element rotatably mounted to the support tube via the upper and lower bearing supports, the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar, a latch element movably disposed within the support tube, a slide coupled to the latch element, the latch element being movable from outside the support tube, a linkage element that is rotatable with respect to the support tube, and the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube, wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, a mechanism which limits the rotational movement of the fork member in each of two directions, and a lower bearing support mounted to the support tube, wherein the mechanism and the lower bearing support cooperate to limit the rotational movement of the fork member.

The lower bearing support may be non-rotatably fixed to the support tube. The lower bearing support may comprise at least one stop surface. The lower bearing support may comprise two stop surfaces. The mechanism may comprise at least one stop surface. The mechanism may comprise two stop surfaces. The mechanism may comprise a linkage element having at least one stop surface. The linkage element may rotate with the fork member. The linkage element may be arranged on a mudguard. The fork member may be cylindrically shaped. The steering head may further comprise a handlebar connected to one end of the fork member and a wheel fork connected to another end of the fork member.

The invention also provides a vehicle steering head comprising a support tube adapted to be fixed to a frame, a cylindrical member adapted to connect a wheel fork to a handlebar, the cylindrical member being rotatable with respect to the support tube, a linkage element being movable and comprising at least two stop surfaces, wherein one of the at least two stop surfaces limits the rotation of the cylindrical member in one direction, and wherein another of the at least two stop surfaces limits the rotation of the cylindrical member in another direction.

The linkage element may rotate with the cylindrical member. The linkage element may rotate with a mudguard.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a connecting element adapted to connect a wheel fork to a handlebar, the connecting element being rotatable with respect to the support tube, a linkage element being rotatable and comprising at least two stop surfaces, a mudguard that rotates with the linkage element, one of the at least two stop surfaces limiting the rotation of the connecting element in one direction, and another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, and a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

FIG. **1** is a schematic side view of a children's tricycle with one embodiment of the vehicle steering head according to the invention;

FIG. **2** is a simplified sectional side view of the steering head according to the invention in an unlocked state;

FIG. **3** is a side view, turned or oriented by 90° (a night angle) of the arrangement shown in FIG. **2**;

FIG. **4** is a sectional side view similar to FIG. **2**, in the locked state;

FIG. **5** is a side view, similar to FIG. **3**, of the view according to FIG. **4**;

FIG. **6** is a simplified perspective illustration of the linkage element according to the invention;

FIG. **7** is a schematic side view of a children's tricycle with another embodiment of the vehicle steering head according to the invention;

FIG. **8** is a sectional side view of the vehicle steering head according to the invention, in the unlocked state;

FIG. **9** is a side view, turned or oriented by 90° of the arrangement shown in FIG. **8**;

FIG. **10** is a sectional side view similar to FIG. **8**, in the locked state;

FIG. **11** is a side view, turned or oriented by 90° which is similar to FIG. **9**, in the locked state;

FIG. **12** is a top view on the linkage element according to the invention and on the associated mudguard;

FIG. **13** is a sectional view of the arrangement according to FIG. **12** along the sectional lines XIII—XIII of FIG. **12**;

FIG. **14** is an enlarged side view showing a portion of the slide and of the locking element in the locked state;

FIG. **15** is a view analogous to FIG. **14**, in the unlocked state;

FIG. **16** is a top view on the slide; and

FIG. **17** is a top view on the lower bearing.

DETAILED DESCRIPTION OF THE INVENTION

The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is

made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

A children's tricycle is shown in FIG. 1 and comprises a front wheel 14 which is supported on a wheel fork 4. Wheel fork 4 is fixedly connected to a fork member 3. A handlebar (not shown) can be secured to the upper end of fork member 3.

Fork member 3 is supported in a support tube 2. This support is accomplished by utilizing slide bearings 15 and 15' which are shown in detail in FIGS. 2 to 5. The slide bearings 15 and 15' correspond to those of the prior art in this embodiment so that a detailed description is not needed.

Support tube 2 is firmly connected to a frame 16 which has mounted thereon a seat 17. The tricycle also has a rear axle 18 with rear wheels 19. Accordingly, a support tube 2 and a fork member 3 form a steering head 1.

According to the invention, support tube 2 has arranged therein a linkage element 6 which has a substantially cylindrical configuration (see also FIG. 6) and which is received with a play or clearance (so that it can slide) within support tube 2. Linkage element 6 is also provided with a central recess through which fork member 3 extends or passes.

Support tube 2 also has formed therein a longitudinal slot 9 through which a connection element 10 extends or passes. This connection element 10 is connected to a slide 11 and linkage element 6. The connection may be via a screw 20 (see FIGS. 2 and 4) or other conventional connecting mechanism. In the illustrated embodiment, connection element 10 is integrally connected to or formed with slide 11 and extends in a recess 21 of linkage element 6. However, connection element 10 and slide 11 may be made as separate components which are joined or secured together by any conventional attachment technique including a screw or threaded element.

On its front upper portion, linkage element 6 comprises two symmetrical opposite attachments or stops 12. Each of these stops 12 may be provided with lateral stop surfaces 7. When viewed from the top, these attachments or stops 12 are designed in a manner of a segment of a partial circle (pie shaped or wedge shaped), so that four stop surfaces 7 are formed, with each one being arranged in symmetry with one another. Of course, stops 12 may be separately formed and attached to linkage element 6 instead of being integrally formed therewith, as is shown.

In the illustrated embodiment two locking elements 8 may be utilized in which each is formed by a recess 13. These locking elements 8 are preferably provided on linkage element 6 in retracted or set back manner with respect to stops 12. As is apparent from FIG. 6, the walls of at least one recess 13 may be made resilient to ensure a releasable locking of a bolt-like latch element 5 when linkage element 6 is pushed upwards or into engagement with bolt-like latch element 5.

As is apparent from FIGS. 2 to 5, fork member 3 is provided with a bolt-like or pin-like latch element 5 which extends or projects from at least one and preferably both sides of fork member 3. Of course, latch element 5 may be integrally formed with fork member. Alternatively, latch element 5 may be a threaded or partially threaded member which threads into fork member 3. However, it is preferred that latch element 5 be a pin having a centrally disposed exterior knurl which is press fit into a fork member as is shown. In its working position, latch element 5 rotates with fork member 3 when a deflection or rotation of the handlebar takes place. The deflection of the handlebar is limited by way of latch element 5 abutting on stop surfaces 7, these stop surfaces 7 defining the limited range of motion of the handlebar.

When it is desired to lock the handlebar in a set position, latch element 5 is pressed or forced into recesses 13. This engagement occurs when locking element 8, which is disposed on linkage element 6, is pushed upwards by slide 11. Recesses 13 also utilize inclined inlet surfaces because they act as guiding lead-in surfaces which facilitate entry of pin 5 into recess 13. In the locked state, which is shown in FIGS. 4 and 5, a steering movement thus becomes impossible since the handlebar or fork member 3 is locked in a single direction. FIGS. 2 and 3 show a downwardly displaced condition of linkage element 6 in which latch element 5 is in a position which it does not cooperate with the locking element 8. As a result, in this position fork member 3 and handlebar are free to rotate until latch element 5 abuts on stop surfaces 7, this range of movement or rotation corresponding to a steering angle range.

According to a preferred aspect of the invention, linkage element 6 may be made from a plastic material. Of course, other materials are also contemplated.

Another embodiment of the vehicle steering head according to the invention is described with reference to FIGS. 7 to 16. In this regard, like parts are provided with like reference numerals.

As for the description of FIG. 7, reference can be made to the description of FIG. 1 to the extent that the same features are shown. The subsequent figures are illustrations elucidating the details which have been changed.

As in FIGS. 2 to 5, FIGS. 8 and 9 and 10 and 11, respectively, are illustrations showing the vehicle steering head on an enlarged scale. Again, like parts are here also provided with like reference numerals, so that reference can be made to the preceding explanations. Slide 11 utilizes connection element 10 and screw 20. Connection element 10 also extends through a longitudinal slot 9. Moreover, slide 11 comprises an outer grip portion 11 and an interior portion 11' which is screwed to outer grip portion 11 by a screw 20. A top view of slide 11 and 11' is shown in FIG. 16. As can be seen in this figure, a central recess 24 is provided through which fork member 3 extends or passes (with a clearance which allows slide 11' to move up and down with respect to fork member 3). Furthermore, slide 11' also has a recess (see FIGS. 9, 11 and 16) which is formed so that it can accept a bolt-like latch element 5'. Of course, this latch element 5' may be pressed into this recess, threaded into the recess, or otherwise secured to slide 11' in a suitable manner. Alternatively, latch element 5' may be integrally formed with slide 11'.

As already described in conjunction with a previous embodiment, a bearing 15 which serves as a slide bearing is used on the upper portion of steering head 1.

Lower bearing 15' in this embodiment is configured such that it has an upwardly projecting contour of a linkage element 6' which can extend into bearing 15'. Of course, the bearing and the upwardly projecting contour may be made as separate components which are joined together by conventional techniques rather than integrally formed as is shown. Additionally, as becomes apparent in FIG. 12, linkage element 6' may have a recess 25 into which latch element 5' can be inserted (see also FIGS. 9 and 11).

As can further be seen from the top view of FIG. 12, linkage element 6' comprises two lateral stop surfaces 7

which are angularly spaced apart from each other. This design is such that a downwardly oriented attachment or stop 26 (see FIGS. 8 to 11) of the bearing 15', which is connected to support tube 2, forms a steering limitation of plus/minus approximately 45°. Of course, as with the previous embodiment, the range of steering limitation can be designed to any desired range.

FIG. 13 shows a lateral sectional view of mudguard 22 and of linkage element 6'. Note that these components are integrally formed as a single member which reduces manufacturing costs associated with joining two separate components.

FIGS. 14 and 15 are front views of slide 11' wherein handpiece 11 has been removed to illustrate the operation of locking element 8'. Locking element 8' is U-shaped and includes two movable or flexible lateral legs which can releasably be inserted into a recess 23 of bearing 15'. Upon insertion and locking, locking element 8' is pressed against an undercut and thereby held in position inside recess 23. Accordingly, when it is desired to release the locked state of fork member 3, slide 11' must be pushed upwards which removes the legs from recess 23. Of course, other locking mechanisms may be utilized and this embodiment is not limited to the use of this particular locking mechanism. For example, a pin may be used which has a floating ring disposed around its circumference. Alternatively, other conventional releasable locking mechanisms may be utilized.

FIG. 17 is a top view on lower bearing 15' on an enlarged scale. The (downwardly projecting) attachment or stop 26 can be seen here as can recess 23 which receives locking element 8'. Moreover, recess 27 is adapted to receive and guide bolt-like latch element 5' therein. Furthermore, a surrounding collar-like edge 28 can be seen in which 29 designates two oppositely disposed attachments or projections which serve as anti-rotation engagements. These engagements are designed to engage recesses (not shown) of support tube 2. Of course, lower bearing may be secured to support tube 2 in any conventional manner such as by bonding, welding, or screws. Moreover, this attachment may be releasable or more permanent in nature.

It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

What is claimed:

1. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatable with respect to the support tube;

a latch element movably disposed within the support tube; and

a linkage element being movable and comprising at least one stop surface,

wherein the at least one stop surface limits the rotation of the fork member with respect to the support tube, and

wherein the latch element moves in a direction parallel to an axis of the fork member.

2. The steering head of claim 1, wherein the latch element is connected to a slide, the slide being disposed within the support tube.

3. The steering head of claim 2, wherein the slide is moveable substantially parallel to the axis of the fork member.

4. The steering head of claim 1, further comprising a locking element connected to one of a slide and the linkage element.

5. The steering head of claim 1, wherein the linkage element rotates with the fork member.

6. The steering head of claim 1, wherein the fork member is cylindrical.

7. The steering head of claim 1, further comprising a handlebar connected to one end of the fork member and a wheel fork connected to another end of the fork member.

8. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a cylindrical member adapted to connect a wheel fork to a handlebar;

the cylindrical member being rotatable with respect to the support tube;

a latch element movably disposed within the support tube; and

a linkage element being movable and comprising at least two stop surfaces,

wherein one of the at least two stop surfaces limits the rotation of the cylindrical member in one direction,

wherein another of the at least two stop surfaces limits the rotation of the cylindrical member in another direction,

wherein the latch element is connected to a slide, the slide being disposed within the support tube, and

wherein the slide is moveable substantially parallel to the axis of the cylindrical member.

9. The steering head of claim 8, further comprising a locking element connected to one of a slide and the linkage element.

10. The steering head of claim 8, wherein the latch element moves in a direction parallel to an axis of the cylindrical member.

11. The steering head of claim 8, wherein the linkage element rotates with the cylindrical member.

12. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a linkage element being movable and comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a latch element that is movable parallel to an axis of the connecting element between at least a first position and at least a second position,

wherein, when the latch element is in the first position, the connecting element is rotatable, and wherein, when the latch element is in the second position, the connecting element is prevented from rotating.

13. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mechanism is coupled to the mudguard.

14. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mechanism and the mudguard comprise a one-piece structure.

15. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a device that engages the mechanism to prevent movement thereof,

wherein the device that engages the mechanism comprises a pin, and

wherein the pin is movable.

16. The vehicle steering head of claim 15, wherein the pin can move parallel to an axis of the connecting element.

17. The vehicle steering head of claim 16, wherein the pin engages an opening in the mechanism in a locking position.

18. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mudguard comprises the mechanism.

19. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mudguard;

a first stop surface limiting the rotation of the connecting element in one direction;

a second stop surface limiting the rotation of the connecting element in another direction; and

a device that engages the mudguard to prevent movement thereof,

wherein the device that engages the mudguard comprises a pin, and

wherein the pin is movably mounted.

20. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mudguard;

a first stop surface limiting the rotation of the connecting element in one direction;

a second stop surface limiting the rotation of the connecting element in another direction; and

a device that engages the mudguard to prevent movement thereof,

wherein the device that engages the mudguard comprises a pin, and

wherein the pin can move parallel to an axis of the connecting element.

21. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mudguard;

a first stop surface limiting the rotation of the connecting element in one direction;

a second stop surface limiting the rotation of the connecting element in another direction; and

a device that engages the mudguard to prevent movement thereof,

wherein the device that engages the mudguard comprises a pin, and

wherein the pin engages an opening in the mudguard.

22. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mudguard;

a first stop surface limiting the rotation of the connecting element in one direction;

a second stop surface limiting the rotation of the connecting element in another direction; and

a device that engages an opening that moves when the mudguard moves, wherein, when the device engages the opening, the mudguard is prevented from moving.

23. The vehicle steering head of claim 22, wherein the device that engages the opening comprises a pin.

24. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatable with respect to the support tube; and

a system which limits the rotational movement of the fork member in each of two directions,

wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member, and

wherein the one part which is non-rotatably mounted to the support tube comprises a lower bearing support.

25. The vehicle steering head of claim 24, wherein the other part which rotates with the fork member comprises a mechanism that has two stop surfaces.

26. The vehicle steering head of claim 25, wherein the mechanism that has two stop surfaces comprises a mudguard.

27. The vehicle steering head of claim 25, wherein the mechanism that has two stop surfaces is coupled to a mudguard.

28. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatable with respect to the support tube; and

a system which limits the rotational movement of the fork member in each of two directions,

wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member, and

a device that engages an opening that moves when the fork member moves, wherein, when the device engages the opening, the fork member is prevented from moving.

29. The vehicle steering head of claim 28, wherein the device that engages the opening comprises a pin.

30. The vehicle steering head of claim 29, wherein the pin can move in a direction that is parallel to an axis of the support tube.

31. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatably mounted to the support tube;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being movably mounted; and

the opening being arranged on a surface that can rotate in each of two directions,

wherein, when the pin engages the opening, the fork member is prevented from rotating, and

wherein, when the pin does not engage the opening, the fork member is free to rotate in each of two directions.

32. The vehicle steering head of claim 31, wherein the pin can move in a direction that is parallel to an axis of the support tube.

33. The vehicle steering head of claim 31, further comprising a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

34. The vehicle steering head of claim 33, wherein the one part which is non-rotatably mounted to the support tube comprises two stop surfaces and wherein the other part which rotates with the fork member comprises two stop surfaces.

35. The vehicle steering head of claim 34, wherein the fork member can rotate approximately 45 degrees to each side.

36. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatably mounted to the support tube;

a locking system comprising an opening and a locking device;

the locking device comprising a button portion and an engaging portion;

the locking device being movably mounted and being capable of moving in a direction that is parallel to an axis of the support tube;

the opening being arranged on a surface that can rotate in each of two directions and being capable of receiving the engaging portion of the locking device,

wherein, when the engaging portion engages the opening, the fork member is prevented from rotating, and

wherein, when the engaging portion does not engage the opening, the fork member is free to rotate in each of two directions.

37. The vehicle steering head of claim 36, further comprising a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

38. The vehicle steering head of claim 36, wherein the one part which is non-rotatably mounted to the support tube comprises two stop surfaces and wherein the other part which rotates with the fork member comprises two stop surfaces.

39. A vehicle steering head for one of a bicycle or a tricycle having a frame, said steering head comprising:

a support tube adapted to be fixed to the frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that limits rotational movement of the connecting element;

the mechanism comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mechanism is coupled to a mudguard, and

wherein the mechanism and the mudguard comprise a one-piece structure.

40. A vehicle steering head for one of a bicycle or a tricycle having a frame, said steering head comprising:

a support tube adapted to be fixed to the frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that limits rotational movement of the connecting element;

the mechanism comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a device that engages the mechanism to prevent movement thereof,

wherein the device that engages the mechanism comprises a pin, and

wherein the pin is movable parallel to an axis of the connecting element.

41. The vehicle steering head of claim **40**, wherein the pin engages an opening in the mechanism in a locking position.

42. A vehicle steering head for one of a bicycle or a tricycle having a frame, said steering head comprising:

a support tube adapted to be fixed to the frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatably mounted to the support tube;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being movably mounted; and

the opening being arranged on a surface that can rotate in each of two directions,

wherein, when the pin engages the opening, the fork member is prevented from rotating, and

wherein, when the pin does not engage the opening, the fork member is free to rotate in each of two directions.

43. The vehicle steering head of claim **42**, wherein the pin is moveable in a direction that is parallel to an axis of the support tube.

44. The vehicle steering head of claim **42**, further comprising a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

45. The vehicle steering head of claim **44**, wherein the one part which is non-rotatably mounted to the support tube comprises two stop surfaces and wherein the other part which rotates with the fork member comprises two stop surfaces.

46. The vehicle steering head of claim **45**, wherein the fork member can rotate approximately 45 degrees to each side.

47. A vehicle steering head for a bicycle or a tricycle having a frame, comprising:

a support tube fixed to the frame;

an upper bearing support non-movably mounted to the support tube;

a lower bearing support non-movably mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess formed in the lower bearing support and a protrusion that rotates when the connecting element rotates;

the protrusion comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a locking system that prevents rotational movement of the connecting element.

48. The vehicle steering head of claim **47**, wherein the locking system comprises an engaging member that can be moved between a first position that allows the connecting element to rotate in each of two directions to a second position wherein the connecting element is prevented from rotational movement in each of the two directions.

49. The vehicle steering head of claim **47**, wherein the locking system comprises a movable engaging member that can move parallel to an axis of the connecting element to prevent rotational movement of the connecting element.

50. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support non-movably mounted to the support tube;

a lower bearing support non-movably mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which movably engages with the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

the projecting portion being movable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion extends into the recess and rotates with the connecting element about an axis that runs through the connecting element.

51. The vehicle steering head of claim 50, further comprising a locking system that prevents rotational movement of the connecting element.

52. The vehicle steering head of claim 51, wherein the locking system comprises a locking member that moves parallel to an axis of the support tube and an opening which rotates with the connecting element, wherein when the locking member engages the opening the connecting element is prevented from rotating, and wherein when the locking member disengages from the opening the connecting element is allowed to rotate.

53. The vehicle steering head of claim 51, wherein the locking system comprises a movable locking member and a recess which rotates with the connecting element, wherein when the locking member engages the recess the connecting element is prevented from rotating, and wherein when the locking member disengages from the recess the connecting element is allowed to rotate.

54. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a device that engages an opening in the mechanism to prevent movement of the mechanism.

55. The vehicle steering head of claim 54, wherein the device that engages the mechanism comprises a pin.

56. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to an upper end of the support tube;

a lower bearing support mounted to a lower end of the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which movably engages with the recess;

the recess comprising two stop surfaces and being arranged on the lower bearing support;

the projecting portion being rotatable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion extends into the recess and rotates with the connecting element about an axis that runs through the connecting element.

57. The vehicle steering head of claim 56, wherein the projecting portion is arranged on a mudguard.

58. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to an upper end of the support tube;

a lower bearing support mounted to a lower end of the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which movably engages with the recess;

the recess comprising two stop surfaces and being arranged on the lower bearing support;

the projecting portion being arranged on a mudguard and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion extends into the recess and rotates with the connecting element about an axis that runs through the connecting element, and

wherein the projecting portion and the mudguard comprise a one-piece member.

59. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which moves within the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion rotates with the connecting element about an axis that runs through the connecting element.

60. The vehicle steering head of claim 59, further comprising a locking system that prevents rotational movement of the connecting element.

61. The vehicle steering head of claim 60, wherein the locking system comprises a locking member that moves parallel to the axis and an opening adapted to receive the locking member, and wherein the locking member is movable between a first position that allows the connecting element to rotate in each of two directions to a second position wherein the connecting element is prevented from rotational movement in each of the two directions, whereby, in the first position, the locking member does not extend into the opening, and whereby, in the second position, the locking member extends into the opening.

62. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which moves within the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

the projecting portion being movable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion rotates with the connecting element about an axis that runs through the connecting element.

63. The vehicle steering head of claim 62, wherein the projecting portion is arranged on a mudguard.

64. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which moves within the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

the projecting portion being arranged on a mudguard;

the projecting portion being movable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion rotates with the connecting element about an axis that runs through the connecting element, and

wherein the projecting portion and the mudguard comprise a one-piece member.

65. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which moves within the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

the projecting portion being movable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion rotates with the connecting element about an axis that runs through the connecting element.

66. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being movably mounted within the support tube; and

the opening being arranged on a surface that can rotate with the connecting element in each of two directions,

wherein, when the pin engages the opening, the connecting element is prevented from rotating, and

wherein, when the pin does not engage the opening, the connecting element is free to rotate in each of two directions.

67. The vehicle steering head of claim 66, further comprising a mudguard.

68. The vehicle steering head of claim 66, wherein the pin moves parallel to an axis of the connecting element.

69. The vehicle steering head of claim 66, wherein the pin moves parallel to an axis of the connecting element and is configured to pass through the lower bearing support and into the opening.

* * * * *

Exhibit F

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
Alexandria Division

KETTLER INTERNATIONAL, INC.	
Plaintiff,	
v.	**Civil Action No.: 1:10-cv-708**
	JURY TRIAL DEMANDED
RAZOR USA, LLC	
Defendant.	

AMENDED COMPLAINT

Plaintiff KETTLER INTERNATIONAL, INC. (hereinafter referred to as "KETTLER" or "Plaintiff") submits this Amended Complaint against Defendant Razor USA, LLC (hereinafter referred to as "Razor" or "Defendant") pursuant to Rule 15(a)(1)(B) of the Federal Rules of Civil Procedure.

THE PARTIES

1. KETTLER is a corporation established under the laws of the Commonwealth of Virginia, with its principal place of business at 1355 London Bridge Road, Virginia Beach, Virginia 23453.

2. Razor is a manufacturer of children's scooters and ride-on toys and, upon information and belief, is a limited liability company organized and existing under the laws of Delaware, with its principal place of business in Cerritos, California. Upon information and belief, Razor also has other manufacturing, sourcing and distribution facilities in Europe and Australia, and is a privately held company.

JURISDICTION AND VENUE

3. This Court has jurisdiction over the subject matter of this controversy pursuant to 28 U.S.C. §§ 1331, 1332 and 1338.

4. This Court can properly exercise personal jurisdiction over the Defendant because the Defendant and its agents have sold, continue to sell, and/or import infringing devices in the Eastern District of the Commonwealth of Virginia, including within the Norfolk and Alexandria Divisions.

5. Venue for the present action properly lies against Defendant in this District and Division pursuant to 28 U.S.C. §§ 1391(c).

BACKGROUND

6. This action is based upon Defendant's unauthorized appropriation and use of KETTLER's patented technology.

7. HEINZ KETTLER GMBH & CO., KG, formerly known as HEINZ KETTLER GMBH & CO., previously obtained patents covering various features of its trikes in countries throughout the world, including U.S. patent No. 6,378,884 (the "'884 patent"), which issued in the United States on April 30, 2002.

8. U.S. Patent No. 7,487,988 (the "'988 Patent") issued on February 10, 2009 from a continuation of application of U.S. Patent No. 7,156,408 (the "'408 patent"), issued on January 2, 2007 from a U.S. continuation application of parent U.S. Patent No. 6,799,772 (the "'772 patent"), which, in turn, issued on October 5, 2004 from a U.S. continuation application of parent U.S. patent No. 6,378,884. The '988 patent, '884 patent, the '772 patent, and the '408 patent are directed to a vehicle steering head, limited turn system, and/or steering lock system and were duly and legally issued to Heinz KETTLER. The '988 patent, '884 patent, '772 patent and the '408 patent are collectively referred to as "the patents-in-suit."

9. By virtue of assignment, KETTLER is presently the sole owner of the '988 patent, '884 patent, the '772 patent, and the '408 patent. KETTLER, by virtue of assignment, is presently the sole and exclusive holder of the patents-in-suit, and has exclusive rights to import, distribution, marketing, offer for sale and sell in the United States of any commercial embodiment of the patents-in-suit. Also by virtue of assignment, KETTLER is vested with the exclusive right to enforce, defend and prosecute the patents-in-suit in the United States.

10. The patents-in-suit contain claims covering, among other things, a vehicle steering head, limited turn system, and/or steering lock system which can, among other things, prevent a child user from over-steering the vehicle and which allows an adult to lock the front wheel of a vehicle in a straight position. KETTLER's children's "ride-on" vehicles, which incorporate the patents-in-suit, are sold throughout the United States.

11. Upon information and belief, Razor copied the vehicle steering head, limited turn system, and/or steering lock system used on one or more of KETTLER's trike models, and used such copied system in a number of Defendant's trike models, including but not limited to the Razor RipRider 360, Item Number 20036540.

12. Upon information and belief, Razor sells and imports the infringing tricycles in the United States, including to some of KETTLER's long time customers.

13. Defendant has imported, distributed, sold and offered for sale, and continues to import, distribute, sell, and offer for sale, tricycle models, through certain retailers and over the Internet, which include a limited turning system and locking device that infringes the patents-in-suit.

14. True and correct copies of these the '988 patent, '884 patent, '772 patent and the '408 patent are attached hereto as Exhibits 1, 2, 3, and 4, respectively.

15. KETTLER has been damaged by Defendant's unauthorized use, adoption, appropriation, and/or copying of KETTLER's patented technology.

16. On information and belief, Defendant knows and/or has known of the patents-in-suit and the subject matter of the patents-in-suit.

17. On information and belief, Razor knew or should have known that the above mentioned RipRider 360 model infringes the patents-in-suit and has willfully infringed the valid intellectual property of KETTER and is thus liable for damages or lost profits in an amount to be proved at trial and for that amount to be trebled.

COUNT I
(Patent Infringement)

18. KETTLER incorporates herein and realleges, as if fully set forth in this paragraph, the allegations in the foregoing paragraphs above, inclusive.

19. Razor has made, used, offered to sell, and/or sold in the United States, and/or imported into the United States, trikes or tricycles covered by one or more claims of the patents-in-suit, without KETTLER's authorization.

20. Razor continues to make, use, offer to sell, and/or sell in the United States, and/or import into the United States, trikes or tricycles covered by one or more claims of the patents-in-suit, without KETTLER's authorization.

21. One or more claims of the patents-in-suit is infringed by one or more trikes or tricycles made, used, offered for sale, sold and/or imported by Defendant, including but not limited to the Razor RipRider 360 (Item Number 20036540).

22. Defendant does not have a license to make, use, sell, offer for sale, or import products which incorporate the technology which infringes the patents-in-suit.

23. Defendant's infringement of the patents-in-suit has been, and continues to be, willful.

PRAYER FOR RELIEF.

WHEREFORE, Plaintiff prays for the following relief and seek a judgment against Defendant:

1. Declaring that Defendant has infringed the '988 patent, '884 patent, '772 patent and the '408 patent;

2. Declaring that Defendant, its agents, servants, employees, representatives, attorneys, related companies, successors, assigns, and all others in active concert or participation with Defendant be preliminarily and permanently enjoined and restrained from further infringing the patents-in-suit pursuant to 35 U.S.C. § 283;

3. Awarding KETTLER damages for Defendant's infringement of the patents-in-suit;

4. Awarding judgment in favor of KETTLER on all counts of the Complaint;

5. Declaring that Defendant's infringement of the patents-in-suit is and has been willful;

6. Awarding KETTLER increased damages in the amount of three times the damages found or assessed in accordance with 35 U.S.C. § 284;

7. Declaring the case exceptional and awarding KETTLER their costs and attorney fees in accordance with 35 U.S.C. § 285;

8. Requiring Defendant to provide a full accounting of all tricycles, trikes, and ride-on vehicles which infringe the patents-in-suit, including but not limited to the Razor RipRider 360 (Item Number 20036540).

9. Ordering Defendant to recall all infringing products and products in the U.S. and its territories which have not been sold and/or shipped to consumers from all retailers, re-sellers and shippers, and others in possession of such products; and

10. Awarding KETTLER such other and further relief as the Court may deem just and proper.

DEMAND FOR JURY TRIAL

Pursuant to Federal Rules of Civil Procedure 38(b), KETTLER hereby demands trial by jury as to all claims in this litigation.

KETTLER INTERNATIONAL, INC.

By: /s/ John C. Lynch
Of Counsel

John C. Lynch (VSB # 39267)
Ethan G. Ostroff (VSB # 71610)
Elizabeth S. Flowers (VSB # 78487)
TROUTMAN SANDERS LLP
222 Central Park Avenue, Suite 2000
Virginia Beach, Virginia 23462
Telephone: (757) 687-7765
Facsimile: (757) 687-1504
E-mail: john.lynch@troutmansanders.com
E-mail: ethan.ostroff@troutmansanders.com
E-mail: liz.flowers@troutmansanders.com

Counsel for Plaintiff KETTLER International Inc.

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
Alexandria Division

KETTLER INTERNATIONAL, INC.	)	
	)	
Plaintiff,	)	
	)	**Civil Action No.: 1:10-cv-708**
v.	)	
	)	
RAZOR USA, LLC	)	
	)	
Defendant.	)	
	)	

CERTIFICATE OF SERVICE

I hereby certify that on this 9th day of September, 2010, I electronically filed the foregoing document with the Clerk of the Court using the CM/ECF system, which will send notification of such filing to the following CM/ECF participants:

Counsel for Razor USA, LLC
Stephen E. Noona
Kaufman & Canoles, P.C.
150 West Main Street, Suite 2100
Norfolk, Virginia 23510
E-mail: senoona@kaufcan.com

Alexander F. Mackinnon, admitted *pro hac vice*
Allison W. Buchner, admitted *pro hac vice*
Kirkland & Ellis LLP
333 South Hope St., 30th Floor
Los Angeles, California 90071
alexander.mackinnon@kirkland.com
allison.buchner@kirkland.com

Charanjit Brahma, admitted *pro hac vice*
Kirkland & Ellis LLP
655 Fifteenth St., N.W.
Washington, D.C. 20005
charanjit.brahma@kirkland.com

/s/ John C. Lynch

John C. Lynch (VSB # 39267)
Counsel for KETTLER International, Inc.
TROUTMAN SANDERS LLP
222 Central Park Avenue, Suite 2000
Virginia Beach, Virginia 23462
Telephone: (757) 687-7541
Facsimile: (757) 687-1541
E-mail: john.lynch@troutmansanders.com

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US007487988B2

(12) United States Patent
Kettler et al.

(10) Patent No.: US 7,487,988 B2
(45) Date of Patent: *Feb. 10, 2009

(54) VEHICLE STEERING HEAD

(75) Inventors: **Heinz Kettler**, Ense-Parsit (DE); **Joachim Kettler**, Werl (DE); **Reinhard Rocholl**, Werl (DE)

(73) Assignee: **Heinz Kettler GmbH & Co. KG**, Ense-Parsit (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **11/562,694**

(22) Filed: **Nov. 22, 2006**

(65) **Prior Publication Data**

US 2007/0096425 A1 May 3, 2007

Related U.S. Application Data

(63) Continuation of application No. 10/671,668, filed on Sep. 29, 2003, now Pat. No. 7,156,408, which is a continuation of application No. 10/298,002, filed on Nov. 18, 2002, now Pat. No. 6,799,772, which is a continuation of application No. 10/092,516, filed on Mar. 8, 2002, now abandoned, which is a continuation of application No. 09/584,497, filed on Jun. 1, 2000, now Pat. No. 6,378,884.

(30) **Foreign Application Priority Data**

Jul. 5, 1999 (DE) ..... 299 11 652 U

(51) **Int. Cl.**
B62K 5/02 (2006.01)

(52) **U.S. Cl.** **280/279**; 280/272; 74/495

(58) **Field of Classification Search** 280/279, 280/272, 271, 282, 89; 403/354, 83; 74/495
See application file for complete search history.

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(Continued)

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Hand made drawing page No. RF12204 of Italtrike letterhead. The drawing has a handwritten date of Jan. 21, 1987.

(Continued)

Primary Examiner—Tony H. Winner
(74) *Attorney, Agent, or Firm*—Greenblum & Bernstein, P.L.C.

(57) **ABSTRACT**

Vehicle steering head for a trike includes a hollow support. A connecting member is adapted to connect a wheel fork to a handlebar. The connecting member is rotatably mounted to the hollow support. A pin is arranged within the hollow support and is structured and arranged to move parallel to an axis of the connecting element. The vehicle steering head is structured and arranged to limit rotational movement of the connecting member in each of two directions.

24 Claims, 9 Drawing Sheets

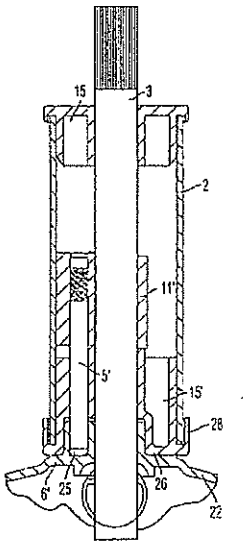

Exhibit 1

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Hand made drawing page No. RF12206 on Italtrike letterhead. The drawing has a handwritten date of Jan. 21, 1987.
Black and while picture allegedly showing a mold having page No. RF12208.
Black and white picture allegedly showing mold parts having page No. RF12209.
Sheet table in Italian having a stamp entitled "N. CITTON & C, s.a.s.".
Cover page of Europeo (in color) having page RF12230 and dated Feb. 1, 1991.
Four sheets with page Nos. RF12244-A, -B, -C and -D (in color) showing vaious pictures of trikes and a scooter on what appears to be notebook pages.
Four sheets with page Nos. RF12245-A, -B, -C and -D (in color) showing various pictures of trikes and a bike on what appears to be notebook pages.
Pages 1 and 2 of a 1998 Radio Flyer catalog.
Three sheets labeled "Acknowledgment".
A sheet entitled "Restricted Turning Prior Art".
A sheet entitled "Product Name: Roll N Ride".
A sheet entitled "Product Name: Grow-With-Me-Trike".
A sheet entitled "Product Name: Baby Too".
A sheet entitled "Product Name: Tough Trikes" and "Product Name: Push'n Pedal Trike".
Two sheets entitled "HBC Model 29875 CS 04G".
Two sheets entitled "Smoby Pilot Alu Plus Juguetes Pico S.A.".
Two sheets entitled "Fisher Price Rock, Roll and Ride XL".
Two sheets entitled "Charton Baby Driver 2 39150 St. Laurent France".
Two sheets entitled "Processed Plastics West Coast Choppers".
Two sheets entitled "Processed Plastic Item 17800-2".
Two sheets entitled "Fischer Price Kawasaki (US Patent 6,651,528)".
Two sheets entitled "Mattel Hot Wheels".
Two sheets entitled "Tek-Net Toys Int'l Inc. USA 020821 Emergency 911".
Two sheets entitled "Fischer Price L&S Ride on Harley".
Two sheets entitled "Friendly Toys Item #7112 Fold-Up Trike".
Document showing Radio Flyer model #77 entitled "Restricted Turning Prior Art".
Italtrike "Kids on wheels" catalog (in color) pp. KET2818-KET2841 dated Jan. 2005.
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Radio Flyer catalog (in color) pp. RF01358-RF01388.
Radio Flyer 1998 catalog (in color) pp. RF01389-RF01396.
Six Catalog pages of company Processed Plastic Company showing a TimMee toy (1997).
Four pages of assembly Instructions for Push, Pedal & Ride Trike, date unknown.
Figs. 1, 2A and 2B purporting to show the Push, Pedal & Ride Trike in a fully assembled state and a partially disassembled state, date unknown.
English language Translation of DE 29901449.
English language Abstract of GB 815456.
English language Abstract of DE 3242863.
English language Abstract of 3914050.
English language Translation of Swiss 290478.

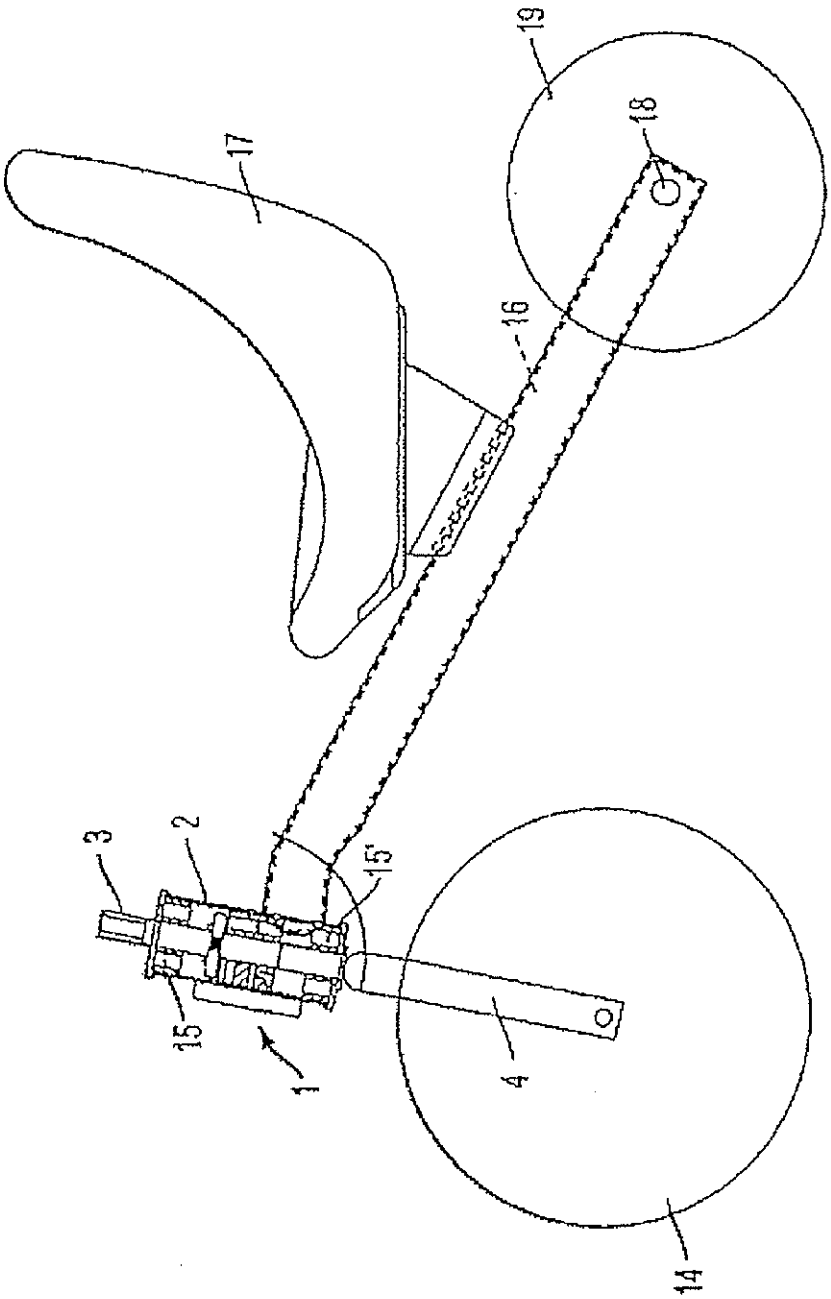

FIG. 1

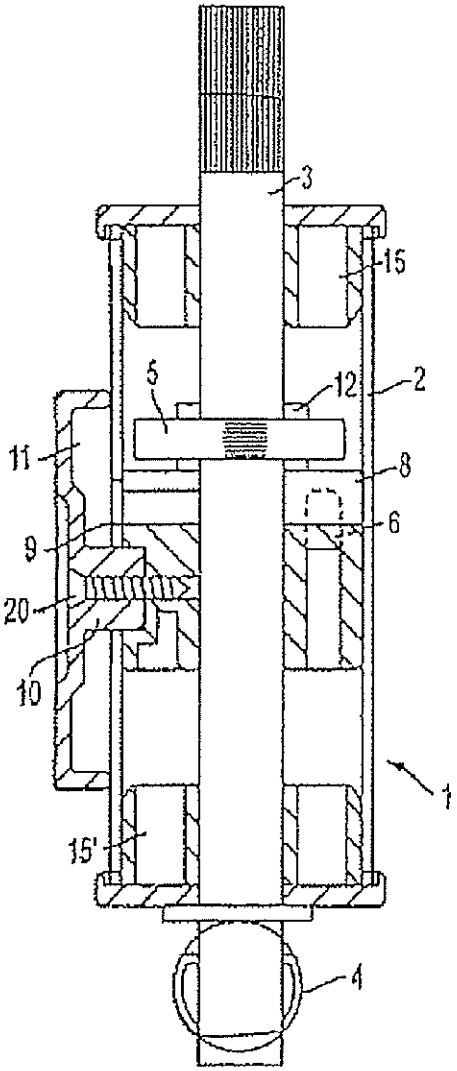

FIG. 2

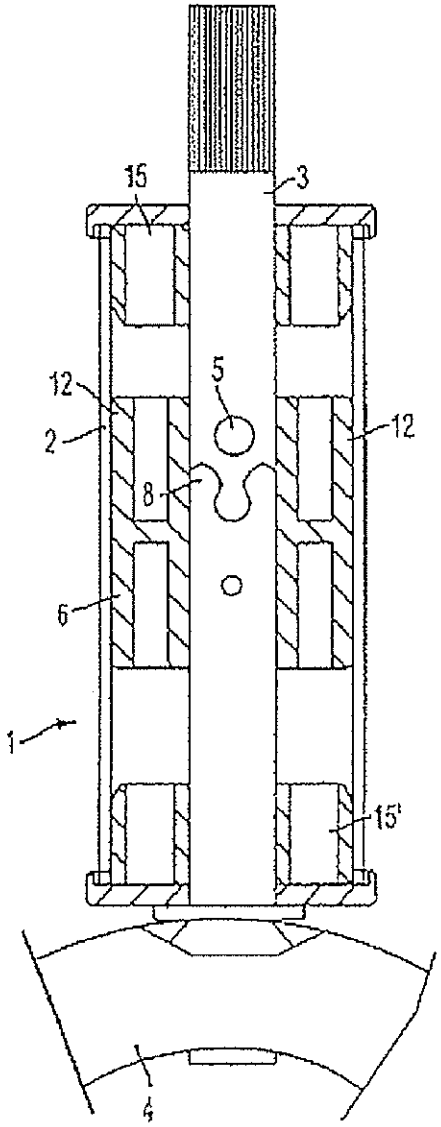

FIG. 3

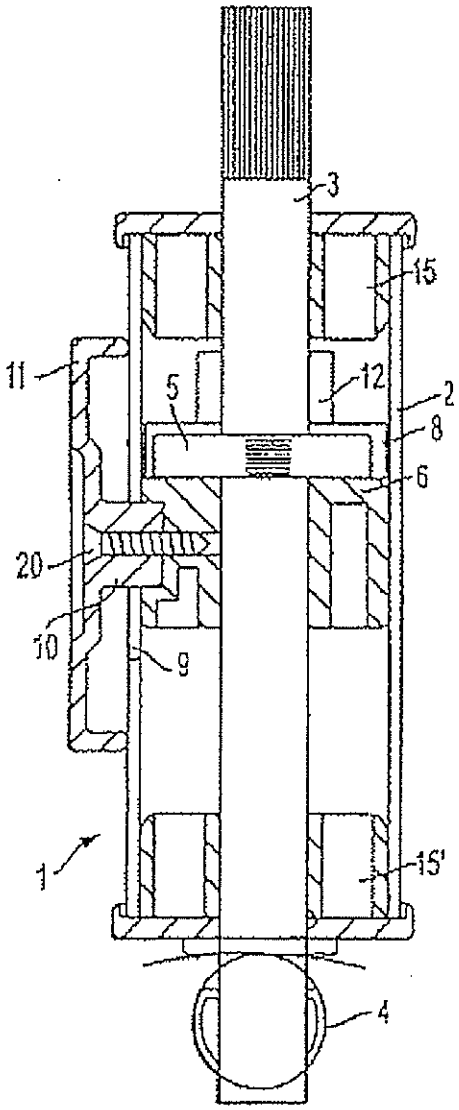

FIG. 4

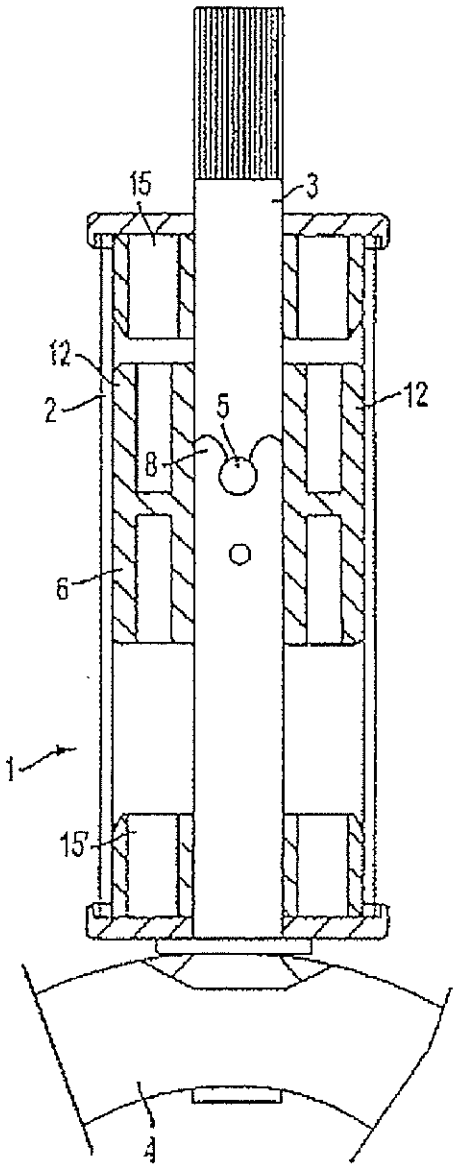

FIG. 5

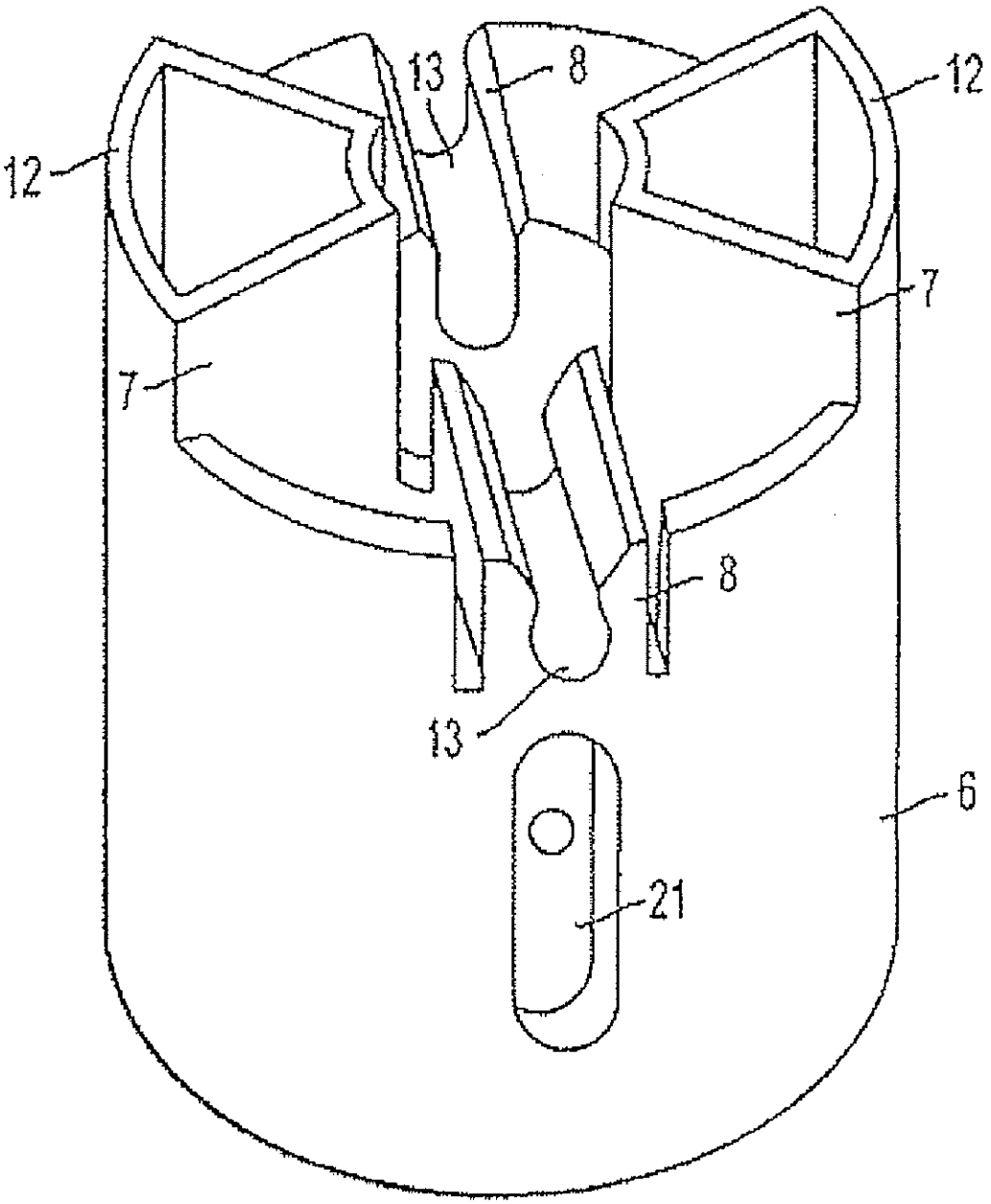

FIG. 6

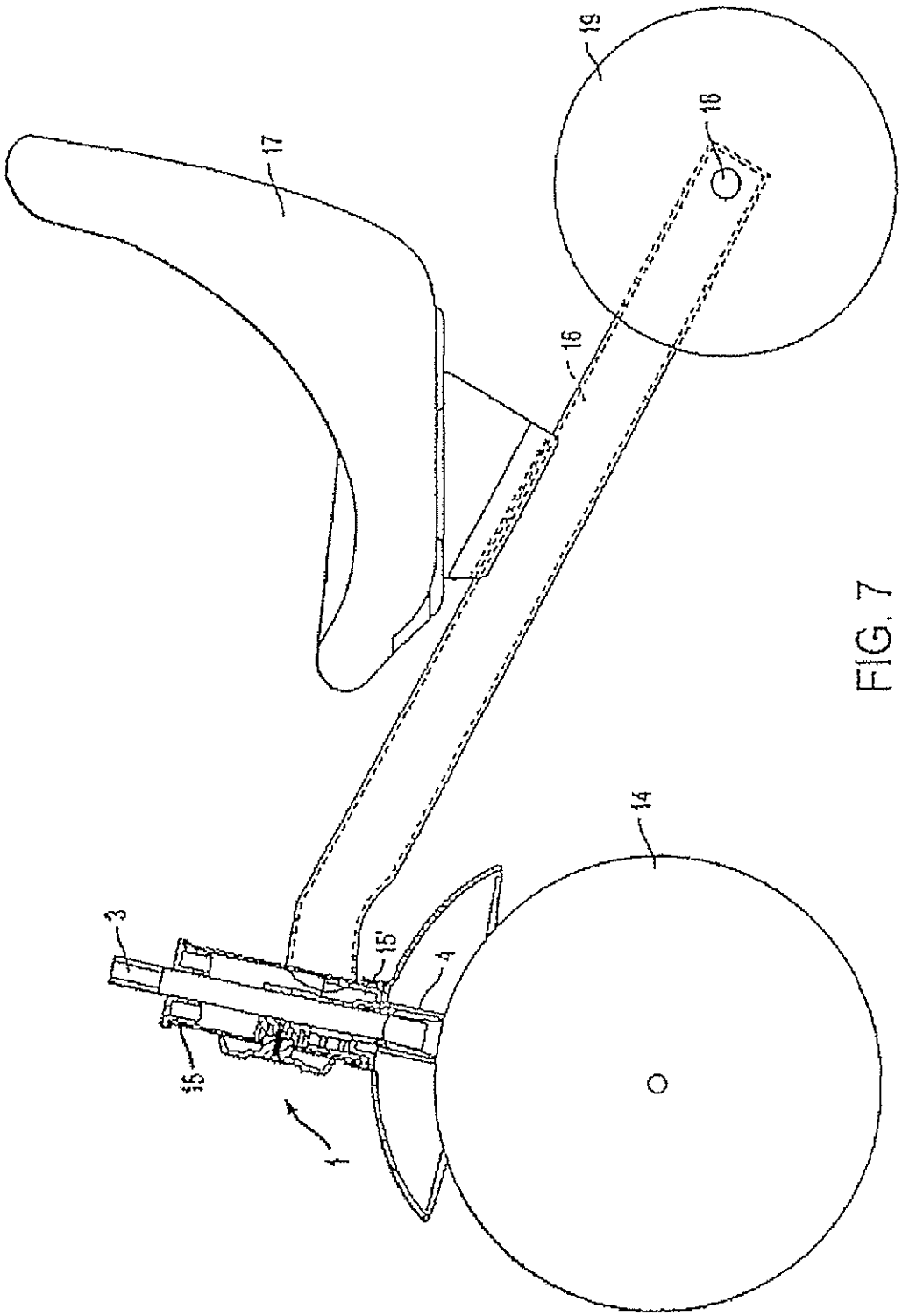

FIG. 7

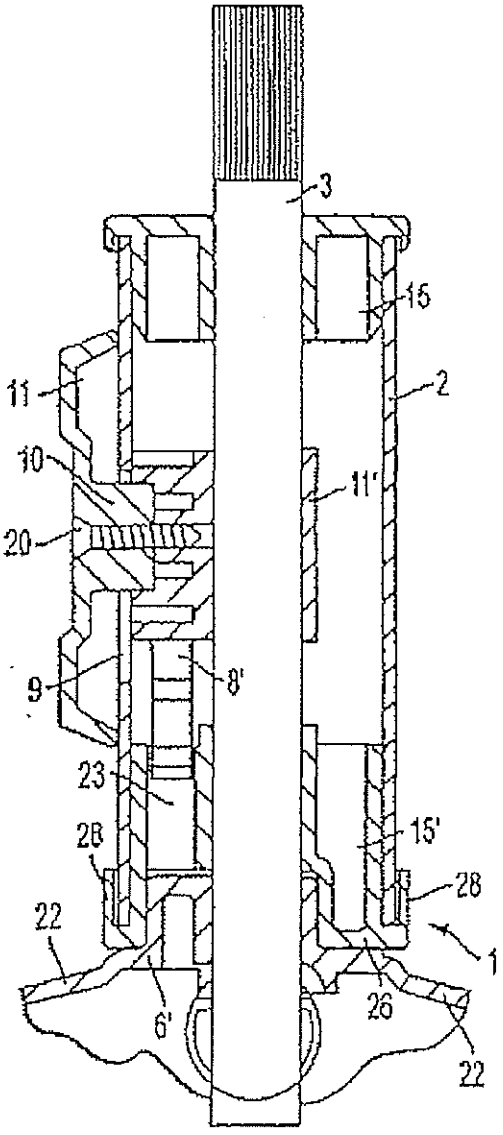
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FIG. 8

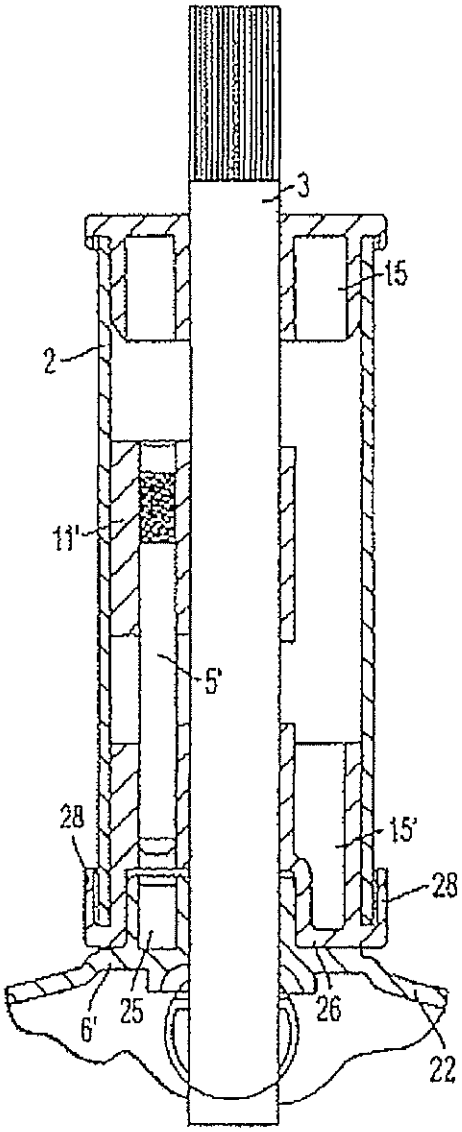
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FIG. 9

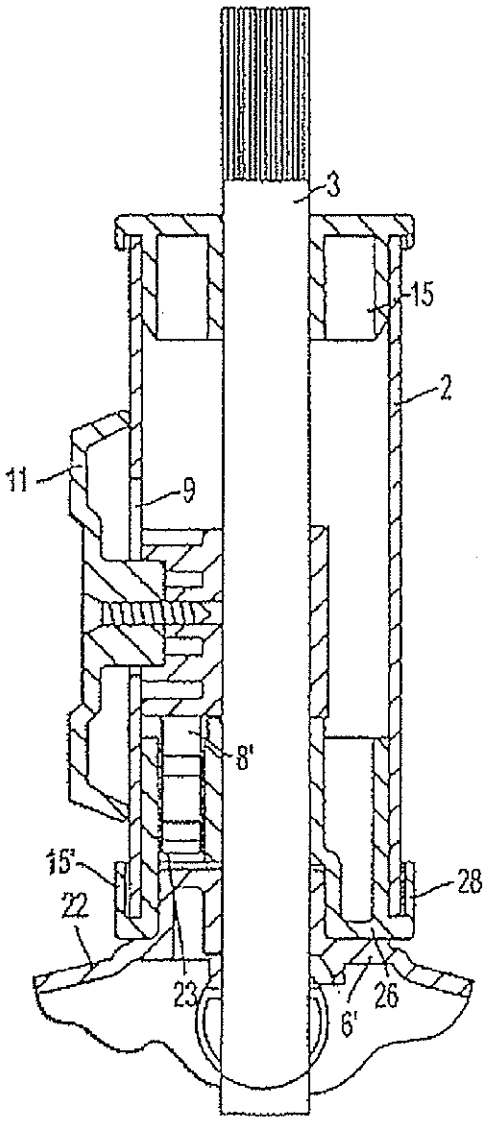

FIG. 10

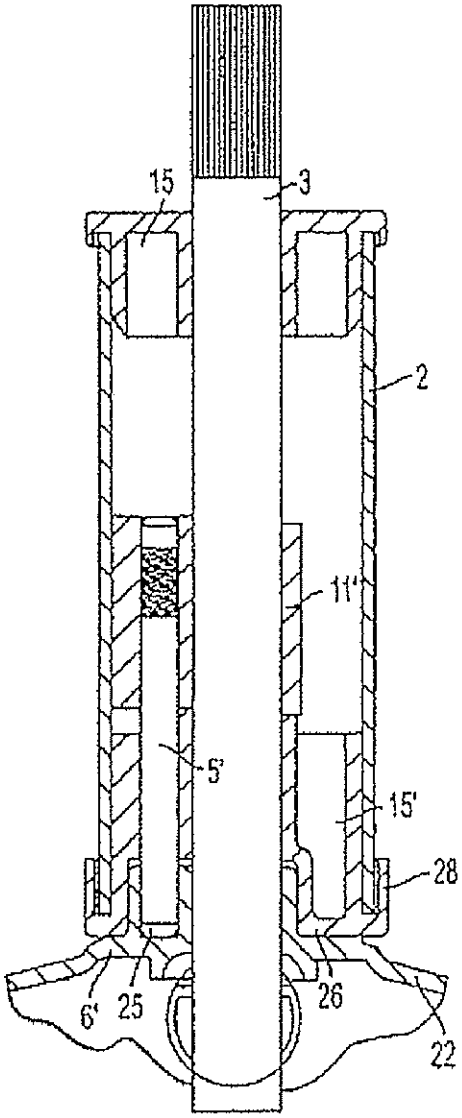

FIG. 11

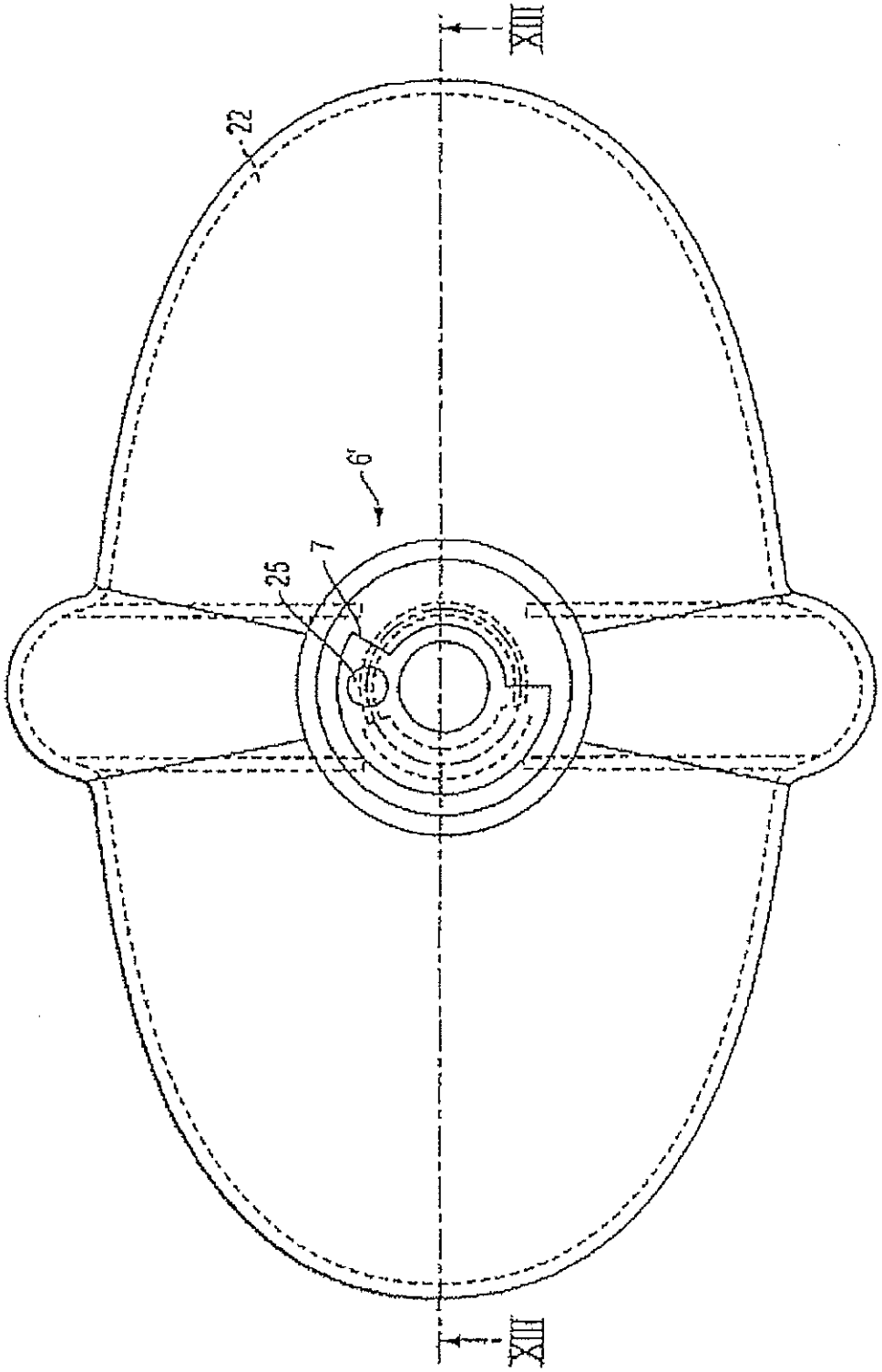

FIG. 12

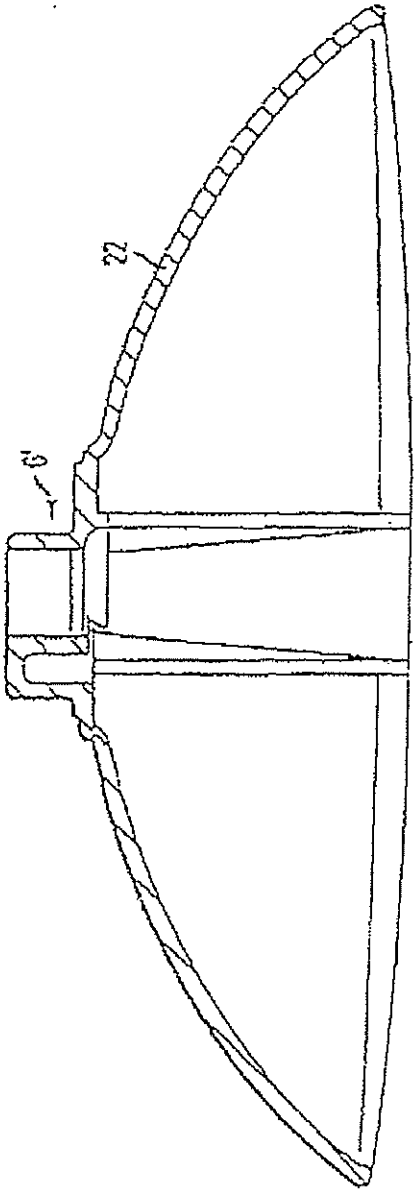

FIG. 13

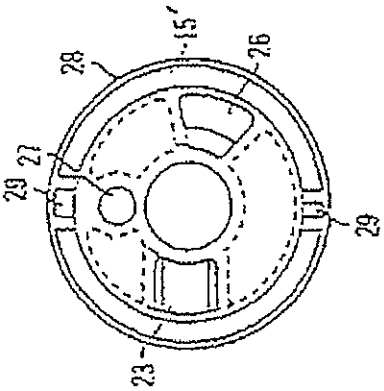

FIG. 17

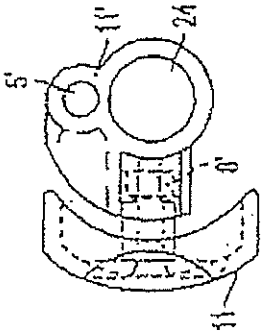

FIG. 16

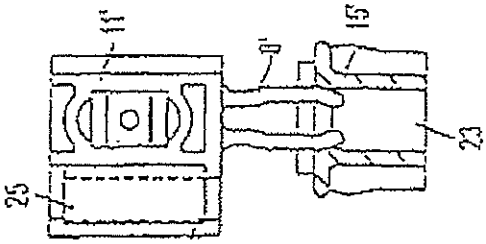

FIG. 15

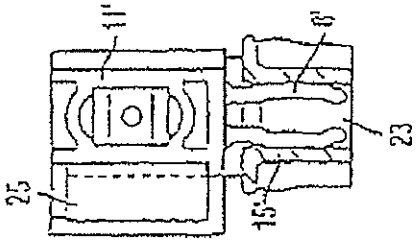

FIG. 14

VEHICLE STEERING HEAD

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of U.S. application Ser. No. 10/671,668 which was filed Sep. 29, 2003, which is a continuation of U.S. application Ser. No. 10/298,002, which was filed Nov. 18, 2002, now U.S. Pat. No. 6,799,772, which is a continuation of U.S. application Ser. No. 10/092,516 filed Mar. 8, 2002, now abandoned, which is a continuation of U.S. application Ser. No. 09/584,497 filed Jun. 1, 2000, now U.S. Pat. No. 6,378,884, the disclosures of which are expressly incorporated by reference herein in their entireties. Further, the present application claims priority under 35 U.S.C. § 119 of German Patent Application No. 299 11 652.2, filed on Jul. 5, 1999, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle steering head and in particular, to a steering head for a vehicle comprising a support tube which has rotatably supported therein a fork member to which a wheel cover and a handlebar can be secured.

2. Discussion of Background Information

Vehicle steering heads of the above-described type are in particular used in bicycles or tricycles, and in particular in tricycles or bicycles for children.

In devices of the above-described type it is desirable for safety reasons that accidents be avoided which may be caused by an excessively large handlebar deflection. It has been found that when there is an excessively large handlebar deflection (e.g., the handle bar rotates beyond a point where effective steering occurs), the vehicle may tilt to the side. Moreover, such deflections or excessive rotation may run the risk that a user impacts his body against the handlebar. Additionally, the user may get caught with his/her feet in the front wheel and may be even be injured by the pedals.

A further drawback or disadvantage of prior-art devices occurs when they are pushed with a push rod type device. In such cases, these devices have a tendency towards uncontrolled steering movements of the front wheel which cannot be mastered or effectively controlled by small children, in particular.

SUMMARY OF THE INVENTION

The present invention therefore provides a vehicle steering head of the above-mentioned type which is of a simple construction and which can operate in an easy and reliable manner. Moreover, this design avoids the drawbacks of the prior art and can in particular limit a handlebar deflection to a desired degree. The invention also has provision for locking the handlebar.

According to one aspect of the invention a latch element is secured to a fork member on a portion provided inside the support tube. A linkage element is supported in the support tube for rotation therewith. The linkage element is displaceable or moveable in a longitudinal direction of the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the latch element. Moreover, the linkage element comprises at least one locking element which is releasably connectable to the latch element.

According to another aspect of the invention a latch element is supported on the support tube. A linkage element is arranged on the fork member and connected to the tube for rotation therewith. The latch element is freely displaceable or moveable along the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the support tube. Moreover, at least one latch element is provided that is releasably connectable to the support tube.

The vehicle steering head according to the invention is characterized by a number of considerable advantages.

First of all, it is possible to install or utilize the steering head in a frame of any desired design, e.g. children's bicycles or tricycles. Ideally, the dimensions of the steering head are such that they do not interfere with the remaining structure of the frame within which it is installed. Of course, the steering head may be combined with any and all common types of frames where ever its advantageous design is desired. Accordingly, the steering head may be utilized in a variety of devices where limited deflection or rotation and/or locking are desired.

Because the invention utilizes a latch element which is arranged in the support tube, no functional parts of the steering head need be outwardly visible or accessible. Accordingly, the internal parts are less susceptible to damage, Additionally, this design is less likely to cause injury when used by children or infants.

As a result of utilizing a linkage element according to the invention, it is possible to reliably lock the fork member and thus the wheel fork and the front wheel. Such a locking provision is easily be accomplished by displacing or moving the linkage element. This design ensures a high degree of operational safety and operational reliability.

The linkage element preferably utilizes stop surfaces which cooperate with the latch element in a manner where they are brought into contact with one another. In this way, the steering angle can be limited to a particularly or desired range. This limited range of motion of the steering angle can be realized according to the invention in different ways. The invention contemplates that the available steering angle is freely selectable within a wide desired range. This is of particular advantage to vehicles for children such as tricycles, which may require a steering angle of approximately 45° to each side. Of course, other desirable steering angles can be utilized. However, by designing in the desired limited steering angle, lateral tilting of the tricycle or similar devices can be prevented or their risk significantly reduced. Additionally, the risk of injuries which may be caused by the pedals, e.g., devices which utilize pedals on the front wheel can be reduced. Finally, the risk of injury which can occur when the handlebar exceeds a controlled steering angle can be ruled out to a considerable extent.

The invention also provides for a linkage element having a locking element which is releasably connectable to the latch element. This design ensures that when a push rod is used for pushing the device, i.e., a tricycle, the front wheel thereof may be reliably locked in place during straight travel.

In an advantageous embodiment of the invention, the latch element is designed in the form of a pin which extends in a direction transverse to the fork member. The pin may extend through the fork member such that it projects at both sides of the fork member. Alternatively, the pin can project from the fork member on only one side. Moreover, the pin can be firmly connected to the fork member, e.g. by welding or other conventional attachment techniques. Additionally, it may be secured by press fitting with or without utilizing a knurled

portion. Of course, the dimensions of the pin can easily be adapted to the respective conditions of use.

It should be noted that the manufacturing costs of the steering head are reduced by the above-described construction to quite a considerable degree.

In another advantageous embodiment of the invention, the linkage element is substantially designed in the form of a hollow cylinder. Thus, the linkage element can be reliably guided in the support tube and surround the fork member Additionally, the linkage element can be designed as a single integral part or several parts which are either joined together or which cooperate together.

It is advantageous for the longitudinal displacement or movement of the linkage element to be along an axis of the support tube and the fork member. Accordingly, the support tube may comprise at least one longitudinal slot or a similar recess through which a connection element extends which is connected to the linkage element. This design also utilizes a slide which is arranged outside the support tube.

The slide facilitates the ease of handling or movement of the linkage element. In such a design, a displacement of the slide, which may additionally be provided with locking mechanism or fixing safety mechanism, effects a corresponding displacement or movement of the linkage element, The locking mechanism or fixing mechanism allows for fixing the front wheel in a single or set travel position which is preferably straight. Moreover, the invention also contemplates that the linkage element may be provided with inclined inlet surfaces or intercepting mechanisms which engage the latch element so as to initiate a locking action when the front wheel is slightly deflected angularly.

Stop surfaces on the latch element are preferably formed on at least one front attachment of the linkage element. Additionally, it is particularly advantageous when two opposite attachments or stops are in symmetry with each other and are each provided with at least one stop surface located on the linkage element. Thus, by utilizing two attachments or stops which are in symmetry with each other, this design can limit the steering angle in a symmetrical fashion to both the left and the right side.

In another advantageous embodiment of the invention, the associated stop surfaces of the attachments or stops act to limit the rotation of the fork member to a predetermined angular range at both sides. This angular range may e.g. be approximately 45° to both sides, for a total range of motion of approximately 90°.

The locking element is preferably designed in the form of at least one front recess which receives the latch element, Such an advantageous design makes it possible to grip and fix the latch element upon displacement or movement of the linkage element. Additionally, it is advantageous that the recess be retracted or set back relative to the front attachment, so that the attachments or stops can always remain in the plane of the latch element, while upon a displacement of the latch element, it is only the recess which can additionally be brought into engagement.

To implement a simple and operationally reliable structure of the steering head, it may be advantageous for the recess to be centrally arranged between the two attachments or stops.

The invention also contemplates that the fork member itself has not been changed constructionally. In other words, the invention can be adapted to work with a conventional fork member. Also, the invention makes it possible to manufacture all functional parts separately in a very simple manner. As a result, advantageous production costs can be achieved.

In a preferred design of a previously described embodiment, the linkage element is designed as part of a mudguard

which extends from below into the support tube. This design allows for significant cost savings since the mudguard is normally made from plastics and is typically already included in most vehicles of the above-described type. The linkage element can thus be mounted on the mudguard or made integrally therewith, in a particularly easy way and at low costs.

A further advantage of the this embodiment is that the latch element can be designed in the form of a bolt which arranged to be parallel with the fork member. The latch element of this design can thus be given relatively large dimensions so that the diameter of the support tube itself need not be chosen with such a large size.

It may be of particular advantage when the latch element is connected to a slide which extends into the support tube so as to be able to design the lock of the front wheel in a particularly simple manner. Furthermore, the locking element may preferably be connected to the slide. Moreover, the locking element serves to reliably maintain the locked state and to prevent any unintended unlocking. The locking element also preferably engages into a recess of a bearing which supports the fork member in the support tube. As a result, it is not necessary to mount additional parts or to take installation measures on the support tube itself.

It may also be of particular advantage for the limitation of the steering angle to be accomplished by a lower bearing which supports the fork member in the support tube. This lower bearing may have formed thereon an attachment which projects in the direction of the linkage element and which can be brought into contact with the stop surfaces formed on the linkage element and thus on the mudguard. This design has the advantageous effect that the predetermined angular range can be limited at both sides as well, e.g. approximately 45° each side.

The invention provides a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured the steering head including a latch element projecting from the fork member and disposed within the support tube, and a linkage element disposed within the support tube, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member and comprises at least one stop surface for limiting a rotation of the fork member when the latch element contacts the at least one stop surface, The linkage element may further comprise at least one locking element for locking the fork member in a single position. The at least one locking element may releasably engage the latch element when the fork member is locked. The latch element may comprise a pin. The pin may project substantially perpendicular to the axis of the fork member. The linkage element may comprise a substantially cylindrical shape. The linkage element may comprise a plurality of hollow chambers separated by connecting walls, The support tube may comprise an opening which allows a connecting element to pass therethrough. The opening may comprise a longitudinal slot. The connecting element may be secured to the linkage element, The movement of the linkage element may be limited by the movement of the connecting element within the longitudinal slot. The steering head may further comprise a slide which is secured to the connecting element, the slide being disposed adjacent an outer surface of the support tube. The at least one stop surface may be disposed on at least one stop.

The at least one stop may comprise a projection which extends from the linkage element. The at least one stop may comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The at least one stop may comprise two stops which are disposed opposite one another.

Each stop may comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The two stops may define a limited range of rotational motion of the fork member in each of a clockwise and a counter-clockwise direction. The limited range of motion in the clockwise direction may be substantially equal to the range of motion in the counter-clockwise direction. The limited range of motion in one of the clockwise and counter-clockwise direction may be approximately 45 degrees.

The linkage element may further comprise at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element. The at least one recess is set back some distance from a surface of at least one stop. The at least one recess is centrally disposed between at least two stops.

The steering head may further comprise an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tuber each of the upper and lower bearings having an opening which allows the fork member to pass therethrough.

The steering head may be disposed on a tricycle frame.

The invention also provides for a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork member, and a linkage element connected to the fork member so as to rotate therewith, the linkage element comprising at least one stop surface, wherein the at least one stop surface limits the rotation of the fork member with respect to the support tube The steering head may further comprise a slide, wherein the slide is disposed within the support tube and retains the latch element. The slide may further comprise at least one locking element for releasably securing the slide to the support tube. The linkage element may comprise a mudguard. The mudguard may be disposed between one end of the support tube and a wheel fork. The latch element may comprise a rod like member which is arranged substantially parallel to the axis of the fork member. The rod like member may comprise one of a bolt and a pin. The latch element may be connected to a slide, the slide being disposed within the support tube. The slide may be moveable substantially parallel to the axis of the fork member. A locking element may be connected to the slide.

The steering head may further comprise a bearing support disposed on at least one end of the support tube. The bearing support may be disposed on a lower end of the support tube. The steering head may further comprise a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support. The bearing support may comprise at least one stop, the at least one stop comprising at least one surface which engages the linkage element. The at least one stop may comprise a projection which engages a recess in the linkage element. The projection and the recess may cooperate to limit the rotational movement of the fork member within a desired range. The range of the rotational movement may be limited by at least two stop surfaces. The at least two stop surfaces may define a limited range of rotation in one of a clockwise and a counter-clockwise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counter-clockwise direction. The limited range of rotation between the at least two stops may be approximately 45 degrees.

The steering head may be disposed on a tricycle frame.

The invention further provides for a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The fork member comprises a fork end, a handlebar, and a latch element projecting from the fork member between the fork end and the handlebar end. The latch element is disposed within the support tube and a linkage element is slidably disposed within the support tube. The linkage element comprises at least one stop surface for engaging the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element and the at least one stop cooperate to limit the rotational movement of the fork member to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element.

The invention also relates to a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The lower bearing support comprises at least one stop surface, the fork member comprising a fork end, a handlebar, and a latch element which is slidably disposed adjacent the fork member between the fork end and the handlebar end, the latch element being disposed within the support tube and a linkage element moveably disposed adjacent the lower support bearing. The linkage element comprises at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element engages only the lower bearing support and where the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork member to a second position where the latch element releasably engages a recess in the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element, The linkage element may further comprise at least one locking element for engaging a locking recess in the lower bearing support. The at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

The invention provides for a vehicle steering head including a fork member adapted to engage a handlebar, a support tube which rotatably supports the fork member, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork member from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork member to rotate with respect to the support tube in at least two directions. The latch element may comprise a rod-like member.

The invention also provides for a vehicle steering head that includes a support tube adapted to be coupled to a vehicle frame, an upper bearing support arranged at an upper end of the support tube, a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface, a cylindrical element rotatably mounted to the support tube via the upper and lower bearing supports, the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar, a latch element movably disposed within the support tube, a slide coupled to the latch element, the latch element being movable from outside the support tube, a linkage element that is rotatable with respect to the support tube, and the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube, wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, a mechanism which limits the rotational movement of the fork member in each of two directions, and a lower bearing support mounted to the support tube, wherein the mechanism and the lower bearing support cooperate to limit the rotational movement of the fork member.

The lower bearing support may be non-rotatably fixed to the support tube. The lower bearing support may comprise at least one stop surface The lower bearing support may comprise two stop surfaces. The mechanism may comprise at least one stop surface. The mechanism may comprise two stop surfaces. The mechanism may comprise a linkage element having at least one stop surface. The linkage element may rotate with the fork member, The linkage element may be arranged on a mudguard. The fork member may be cylindrically shaped. The steering head may further comprise a handlebar connected to one end of the fork member and a wheel fork connected to another end of the fork member.

The invention also provides a vehicle steering head comprising a support tube adapted to be fixed to a frame, a cylindrical member adapted to connect a wheel fork to a handlebar, the cylindrical member being rotatable with respect to the support tube, a linkage element being movable and comprising at least two stop surfaces, wherein one of the at least two stop surfaces limits the rotation of the cylindrical member in one direction, and wherein another of the at least two stop surfaces limits the rotation of the cylindrical member in another direction.

The linkage element may rotate with the cylindrical member. The linkage element may rotate with a mudguard.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a connecting element adapted to connect a wheel fork to a handlebar, the connecting element being rotatable with respect to the support tube, a linkage element being rotatable and comprising at least two stop surfaces, a mudguard that rotates with the linkage element, one of the at least two stop surfaces limiting the rotation of the connecting element in one direction, and another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, and a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

FIG. **1** is a schematic side view of a children's tricycle with one embodiment of the vehicle steering head according to the invention;

FIG. **2** is a simplified sectional side view of the steering head according to the invention in an unlocked state;

FIG. **3** is a side view, turned or oriented by 90° (a right angle) of the arrangement shown in FIG. **2**;

FIG. **4** is a sectional side view similar to FIG. **2**, in the locked state;

FIG. **5** is a side view, similar to FIG. **3**, of the view according to FIG. **4**;

FIG. **6** is a simplified perspective illustration of the linkage element according to the invention;

FIG. **7** is a schematic side view of a children's tricycle with another embodiment of the vehicle steering head according to the invention;

FIG. **8** is a sectional side view of the vehicle steering head according to the invention, in the unlocked state;

FIG. **9** is a side view, turned or oriented by 90° of the arrangement shown in FIG. **8**;

FIG. **10** is a sectional side view similar to FIG. **8**, in the locked state;

FIG. **11** is a side view, turned or oriented by 90° which is similar to FIG. **9**, in the locked state;

FIG. **12** is a top view on the linkage element according to the invention and on the associated mudguard;

FIG. **13** is a sectional view of the arrangement according to FIG. **12** along the sectional lines XIII-XIII of FIG. **12**;

FIG. **14** is an enlarged side view showing a portion of the slide and of the locking element in the locked state;

FIG. **15** is a view analogous to FIG. **14**, in the unlocked state;

FIG. **16** is a top view on the slide; and

FIG. **17** is a top view on the lower bearing.

DETAILED DESCRIPTION OF THE INVENTION

The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

A children's tricycle is shown in FIG. **1** and comprises a front wheel **14** which is supported on a wheel fork **4**. Wheel fork **4** is fixedly connected to a fork member **3**. A handlebar (not shown) can be secured to the upper end of fork member **3**.

Fork member 3 is supported in a support tube 2. This support is accomplished by utilizing slide bearings 15 and 15' which are shown in detail in FIGS. 2 to 5. The slide bearings 15 and 15' correspond to those of the prior art in this embodiment so that a detailed description is not needed.

Support tube 2 is firmly connected to a frame 16 which has mounted thereon a seat 17. The tricycle also has a rear axle 18 with rear wheels 19. Accordingly, a support tube 2 and a fork member 3 form a steering head 1.

According to the invention, support tube 2 has arranged therein a linkage element 6 which has a substantially cylindrical configuration (see also FIG. 6) and which is received with a play or clearance (so that it can slide) within support tube 2. Linkage element 6 is also provided with a central recess through which fork member 3 extends or passes.

Support tube 2 also has formed therein a longitudinal slot 9 through which a connection element 10 extends or passes. This connection element 10 is connected to a slide 11 and linkage element 6. The connection may be via a screw 4 20 (see FIGS. 2 and 4) or other conventional connecting mechanism. In the illustrated embodiment, connection element 10 is integrally connected to or formed with slide 11 and extends in a recess 21 of linkage element 6. However, connection element 10 and slide 11 may be made as separate components which are joined or secured together by any conventional attachment technique including a screw or threaded element.

On its front upper portion, linkage element 6 comprises two symmetrical opposite attachments or stops 12. Each of these stops 12 may be provided with lateral stop surfaces 7. When viewed from the top, these attachments or stops 12 are designed in a manner of a segment of a partial circle (pie shaped or wedge shaped), so that four stop surfaces 7 are formed, with each one being arranged in symmetry with one another. Of course, stops 12 may be separately formed and attached to linkage element 6 instead of being integrally formed therewith, as is shown.

In the illustrated embodiment two locking elements 8 may be utilized in which each is formed by a recess 13. These locking elements 8 are preferably provided on linkage element 6 in retracted or set back manner with respect to stops 12. As is apparent from FIG. 6, the walls of at least one recess 13 may be made resilient to ensure a releasable locking of a bolt-like latch element 5 when linkage element 6 is pushed upwards or into engagement with bolt-like latch element 5

As is apparent from FIGS. 2 to 5, fork member 3 is provided with a bolt-like or pin-like latch element 5 which extends or projects from at least one and preferably both sides of fork member 3. Of course, latch element 5 may be integrally formed with fork member. Alternatively, latch element 5 may be a threaded or partially threaded member which threads into fork member 3. However, it is preferred that latch element 5 be a pin having a centrally disposed exterior knurl which is press fit into a fork member as is shown. In its working position, latch element 5 rotates with fork member 3 when a deflection or rotation of the handlebar takes place. The deflection of the handlebar is limited by way of latch element 5 abutting on stop surfaces 7, these stop surfaces 7 defining the limited range of motion of the handlebar.

When it is desired to lock the handlebar in a set position, latch element 5 is pressed or forced into recesses 13. This engagement occurs when locking element 8, which is disposed on linkage element 6, is pushed upwards by slide 11. Recesses 13 also utilize inclined inlet surfaces because they act as guiding lead-in surfaces which facilitate entry of pin 5 into recess 13. In the locked state, which is shown in FIGS. 4 and 5, a steering movement thus becomes impossible since the handlebar or fork member 3 is locked in a single direction.

FIGS. 2 and 3 show a downwardly displaced condition of linkage element 6 in which latch element 5 is in a position which it does not cooperate with the locking element B. As a result, in this position fork member 3 and handlebar are free to rotate until latch element 5 abuts on stop surfaces 7, this range of movement or rotation corresponding to a steering angle range.

According to a preferred aspect of the invention, linkage element 6 may be made from a plastic material. Of course, other materials are also contemplated.

Another embodiment of the vehicle steering head according to the invention is described with reference to FIGS. 7 to 16. In this regard, like parts are provided with like reference numerals.

As for the description of FIG. 7, reference can be made to the description of FIG. 1 to the extent that the same features are shown. The subsequent figures are illustrations elucidating the details which have been changed.

As in FIGS. 2 to 5, FIGS. 8 and 9 and 10 and 11, respectively, are illustrations showing the vehicle steering head on an enlarged scale. Again, like parts are here also provided with like reference numerals, so that reference can be made to the preceding explanations. Slide 11 utilizes connection element 10 and screw 20. Connection element 10 also extends through a longitudinal slot 9 Moreover, slide 11 comprises an outer grip portion 11 and an interior portion 11' which is screwed to outer grip portion 11 by a screw 20. A top view of slide 11 and 11' is shown in FIG. 16, As can be seen in this figure, a central recess 24 is provided through which fork member 3 extends or passes (with a clearance which allows slide 11' to move up and down with respect to fork member 3). Furthermore, slide 11' also has a recess (see FIGS. 9, 11 and 16) which is formed so that it can accept a bolt-like latch element 5'. Of course, this latch element 5' may be pressed into this recess, threaded into the recess, or otherwise secured to slide 11' in a suitable manner. Alternatively, latch element 5' may be integrally formed with slide 11'.

As already described in conjunction with a previous embodiment, a bearing 15 which serves as a slide bearing is used on the upper portion of steering head 1.

Lower bearing 15' in this embodiment is configured such that it has an upwardly projecting contour of a linkage element 6' which can extend into bearing 15' Of course, the bearing and the upwardly projecting contour may be made as separate components which are joined together by conventional techniques rather than integrally formed as is shown. Additionally, as becomes apparent in FIG. 12, linkage element 6' may have a recess 25 into which latch element 5' can be inserted (see also FIGS. 9 and 11).

As can further be seen from the top view of FIG. 12, linkage element 6' comprises two lateral stop surfaces 7 which are angularly spaced apart from each other. This design is such that a downwardly oriented attachment or stop 26 (see FIGS. 8 to 11) of the bearing 15', which is connected to support tube 2, forms a steering limitation of plus/minus approximately 45°. Of course, as with the previous embodiment, the range of steering limitation can be designed to any desired range.

FIG. 13 shows a lateral sectional view of mudguard 22 and of linkage element 6'. Note that these components are integrally formed as a single member which reduces manufacturing costs associated with joining two separate components.

FIGS. 14 and 15 are front views of slide 11' wherein handpiece 11 has been removed to illustrate the operation of locking element 8'. Locking element 8' is U-shaped and includes two movable or flexible lateral legs which can releasably be inserted into a recess 23 of bearing 15'. Upon insertion and locking, locking element 8' is pressed against an undercut and

thereby held in position inside recess **23**. Accordingly, when it is desired to release the locked state of fork member **3'** slide **11'** must be pushed upwards which removes the legs from recess **23**. Of course, other locking mechanisms may be utilized and this embodiment is not limited to the use of this particular locking mechanism. For example, a pin may be used which has a floating ring disposed around its circumference. Alternatively, other conventional releasable locking mechanisms may be utilized.

FIG. **17** is a top view on lower bearing **15'** on an enlarged scale. The (downwardly projecting) attachment or stop **26** can be seen here as can recess **23** which receives locking element **8'**. Moreover, recess **27** is adapted to receive and guide bolt-like latch element **5'** therein. Furthermore, a surrounding collar-like edge **28** can be seen in which **29** designates two oppositely disposed attachments or projections which serve as anti-rotation engagements. These engagements are designed to engage recesses (not shown) of support tube **2**. Of course, lower bearing may be secured to support tube **2** in any conventional manner such as by bonding, welding, or screws. Moreover, this attachment may be releasable or more permanent in nature.

It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

What is claimed:

1. A vehicle steering head for a tricycle, comprising:
- a support tube adapted to be fixed to a frame;
- a connecting member adapted to connect a wheel fork to a handlebar;
- an upper bearing support mounted to an upper end of the support tube;
- a lower bearing support mounted to a lower end of the support tube and comprising a recess;
- the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports;
- a mudguard comprising an integrally formed projection; and
- a movement limiting system limiting the rotational movement of the connecting member in each of two directions when stop surfaces of the projection engage stop surfaces of the recess.

2. The steering head of claim **1**, wherein the mudguard rotates with the connecting member.

3. The steering head of claim **1**, wherein the connecting member is cylindrically shaped.

4. The steering head of claim **1**, further comprising a handlebar connected to one end of the connecting member and a wheel fork connected to another end of the connecting member.

5. The steering head of claim **4**, wherein the mudguard is arranged between the wheel fork and the lower bearing support.

6. A vehicle steering head for a tricycle, comprising:
- a hollow support;
- a connecting member adapted to connect a wheel fork to a handlebar;
- the connecting member being rotatably mounted to the hollow support; and
- a pin arranged within the hollow support and being structured and arranged to move parallel to an axis of the connecting element,
- wherein the vehicle steering head is structured and arranged to limit rotational movement of the connecting member in each of two directions.

7. The steering head of claim **6**, further comprising an upper bearing support arranged on an upper end of the hollow support.

8. The steering head of claim **7**, further comprising a lower bearing support arranged on a lower end of the hollow support.

9. The steering head of claim **8**, wherein the connecting member is rotatably mounted to the hollow support via the upper and lower bearing supports.

10. The steering head of claim **6**, wherein the connecting member is cylindrically shaped.

11. The steering head of claim **6**, further comprising a handlebar connected to one end of the connecting member and a wheel fork connected to another end of the connecting member.

12. A tricycle steering head, comprising:
- a hollow support;
- a connecting member connecting a wheel fork to a handlebar;
- the connecting member being rotatably mounted to the hollow support; and
- a pin arranged within the hollow support and being structured and arranged to move parallel to an axis of the connecting element,
- wherein the vehicle steering head is structured and arranged to limit rotational movement of the connecting member in each of two directions.

13. The steering head of claim **12**, wherein the connecting member is rotatably mounted to upper and lower bearing supports of the hollow support.

14. The steering head of claim **12**, wherein the connecting member is cylindrically shaped.

15. A vehicle steering head for a tricycle, comprising:
- a support tube adapted to be fixed to a frame;
- a connecting member adapted to connect a wheel fork to a handlebar;
- an upper bearing support mounted to an upper end of the support tube;
- a lower bearing support mounted to a lower end of the support tube and comprising a recess;
- the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports;
- a mudguard; and
- a projection which rotates with the connecting member, is oriented upwardly, and extends into the recess of the lower bearing support,
- wherein the projection and recess limit rotational movement of the connecting member in each of two directions.

16. The steering head of claim **15**, wherein an upper portion of the projection extends into the support tube.

17. The steering head of claim **15**, wherein the recess is an arcuate recess.

18. The steering head of claim 15, wherein the mudguard is arranged between the wheel fork and the lower bearing support and the lower bearing support is non-rotatably mounted to the lower end of the support tube.

19. The steering head of claim 15, further comprising a locking system for preventing rotational movement of the connecting member.

20. A vehicle steering head for a tricycle, comprising:

a support tube adapted to be fixed to a frame;

a connecting member adapted to connect a wheel fork to a handlebar;

an upper bearing support mounted to an upper end of the support tube;

a lower bearing support mounted to a lower end of the support tube and comprising an arcuate recess;

the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports;

a projection which rotates with the connecting member, extends upwardly, and is oriented to extend into the recess of the lower bearing support,

wherein the projection and recess limit rotational movement of the connecting member in each of two directions.

21. The steering head of claim 20, wherein an upper portion of the projection extends into the support tube.

22. The steering head of claim 20, further comprising a mudguard and a locking system for preventing rotational movement of the connecting member.

23. The steering head of claim 20, further comprising a locking system for preventing rotational movement of the connecting member.

24. The steering head of claim 20, wherein the lower bearing support is non-rotatably mounted to the lower end of the support tube.

* * * * *

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(12) **United States Patent**
Kettler

(10) **Patent No.: US 6,378,884 B1**
(45) **Date of Patent: Apr. 30, 2002**

(54) **VEHICLE STEERING HEAD**

(75) Inventor: **Heinz Kettler**, Ense-Parsit (DE)

(73) Assignee: **Heinz Kettler GmbH & Co.**, Ense-Parsit (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/584,497**

(22) Filed: **Jun. 1, 2000**

(30) **Foreign Application Priority Data**

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(52) **U.S. Cl.** **280/279**; 74/495; 280/272
(58) **Field of Search** 280/279, 272, 280/271, 282, 89; 403/354, 83; 74/495

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Primary Examiner—Avraham Lerner
Assistant Examiner—Tony Winner
(74) *Attorney, Agent, or Firm*—Greenblum & Bernstein P.L.C.

(57) **ABSTRACT**

A vehicle steering head including a fork tube adapted to engage a handlebar, a support tube which rotatably supports the fork tube, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork tube from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork tube to rotate with respect to the support tube in at least two directions.

58 Claims, 9 Drawing Sheets

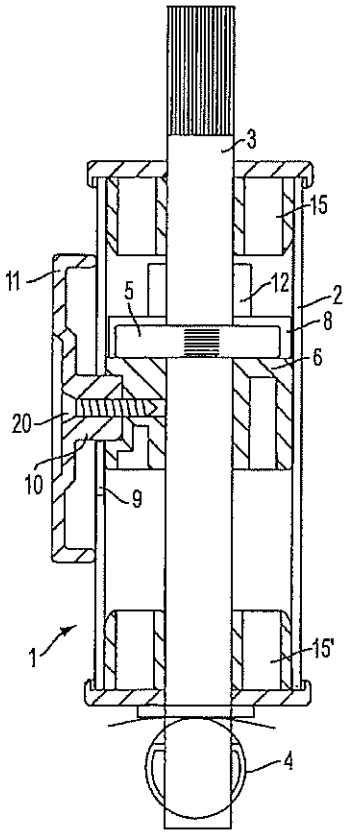


Exhibit 2

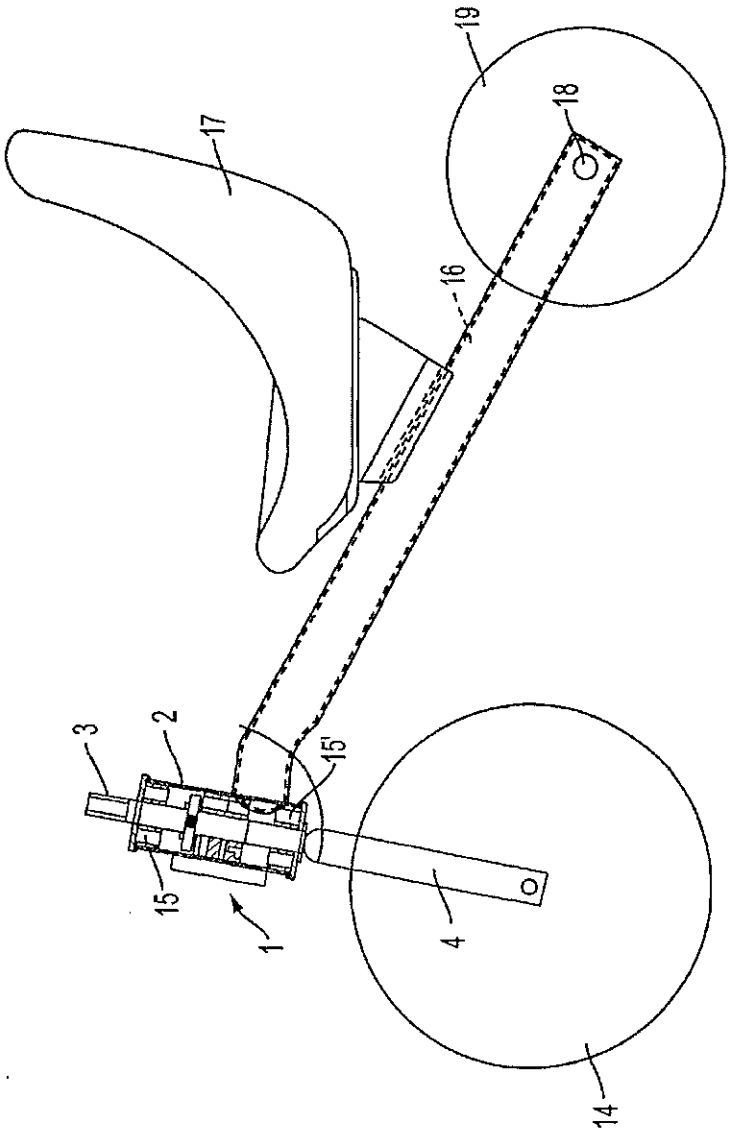


FIG. 1

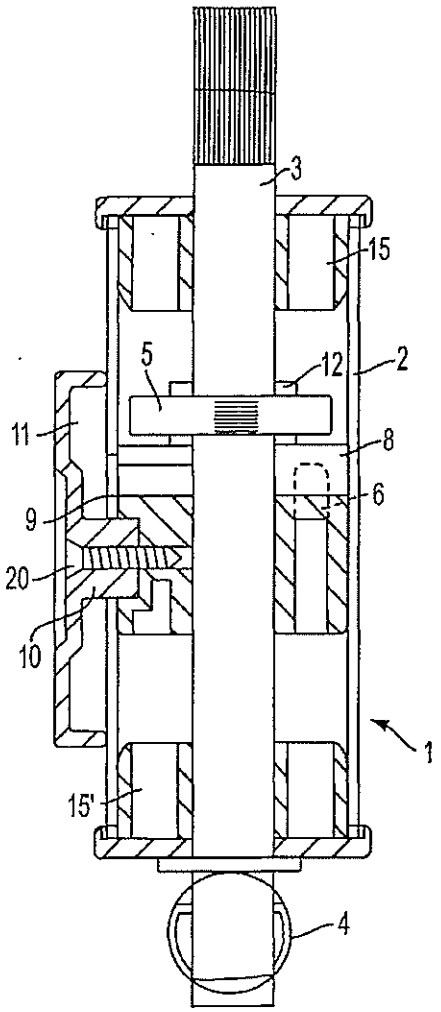


FIG. 2

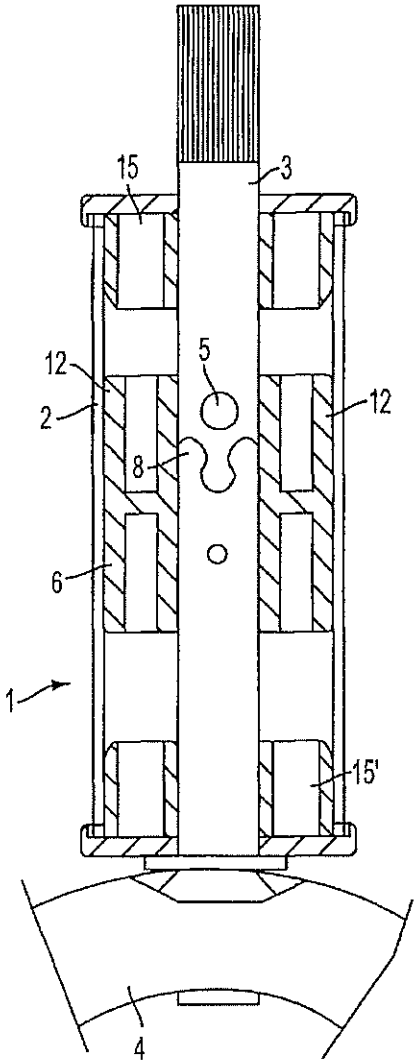


FIG. 3

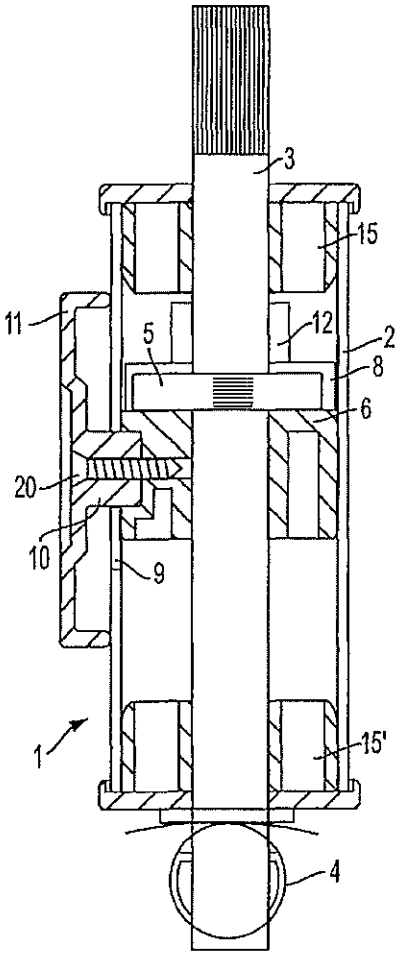


FIG. 4

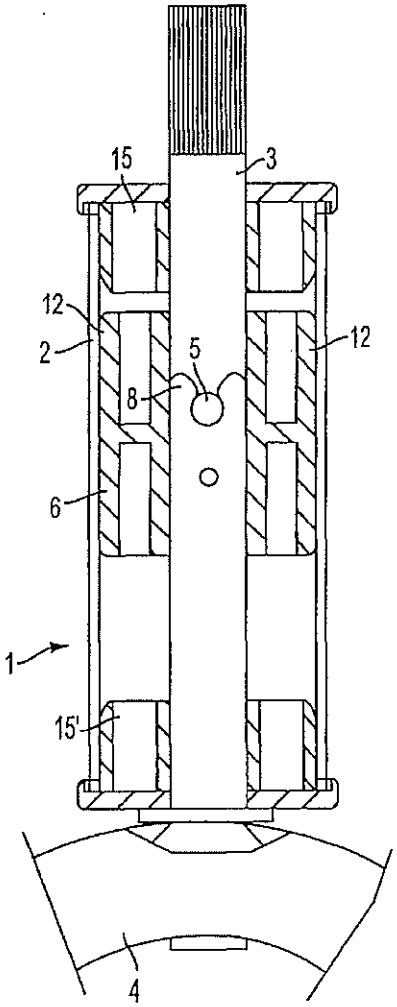


FIG. 5

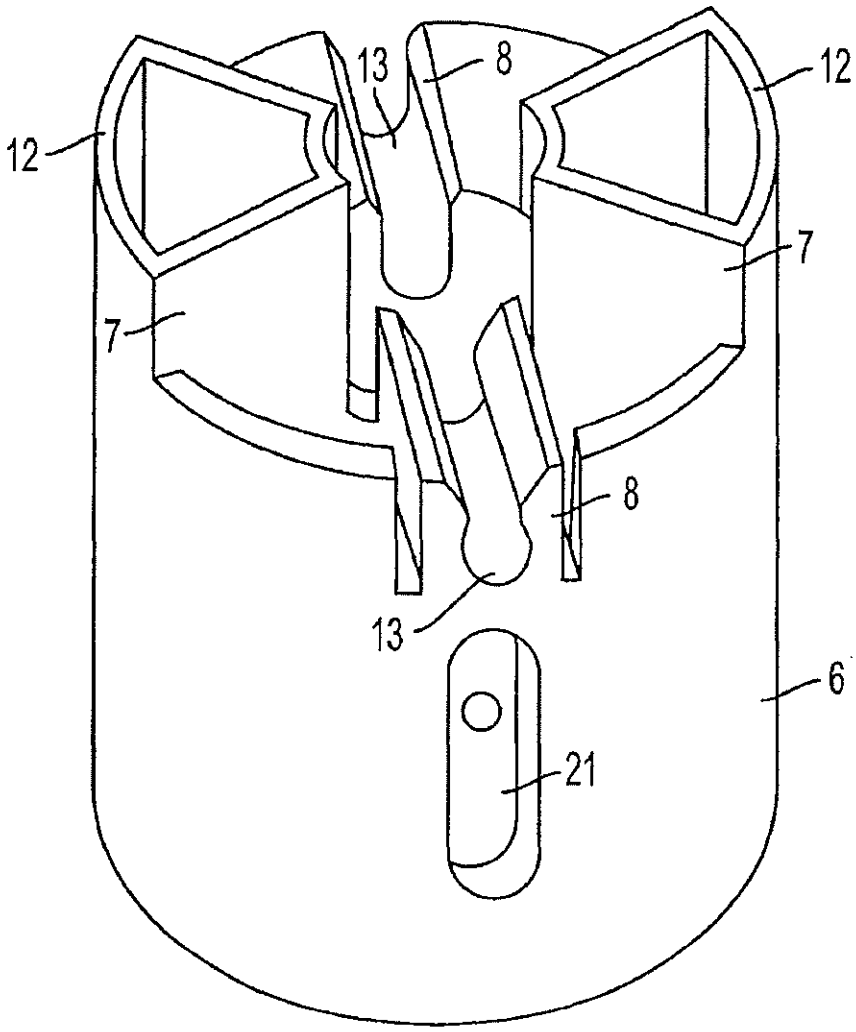


FIG. 6

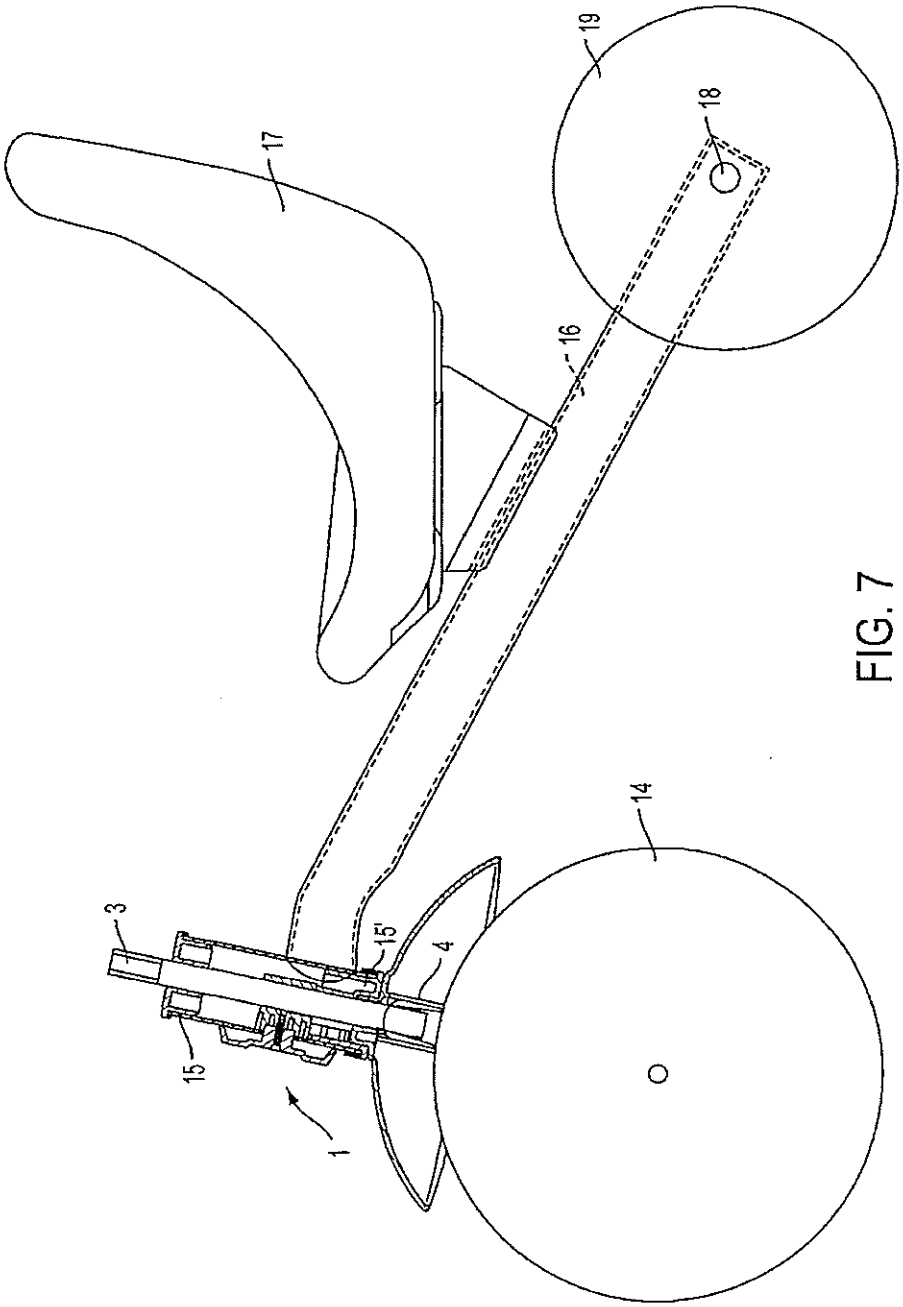


FIG. 7

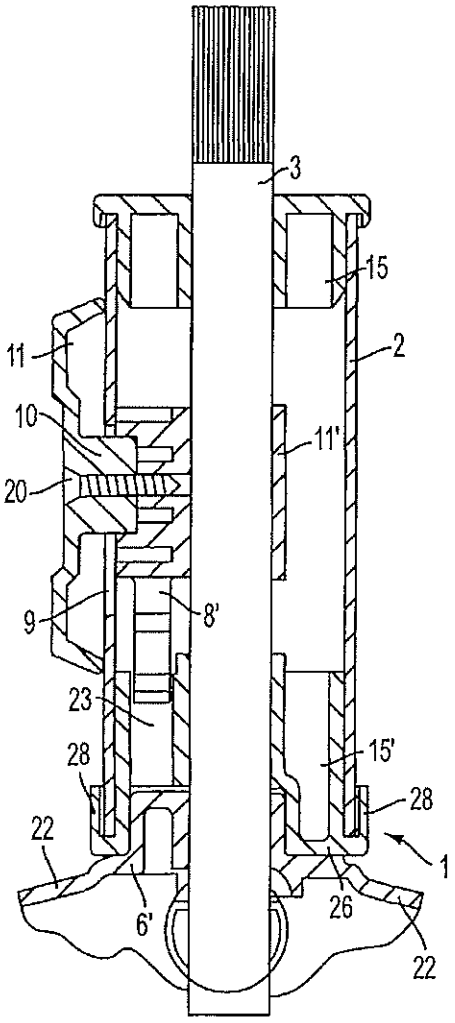
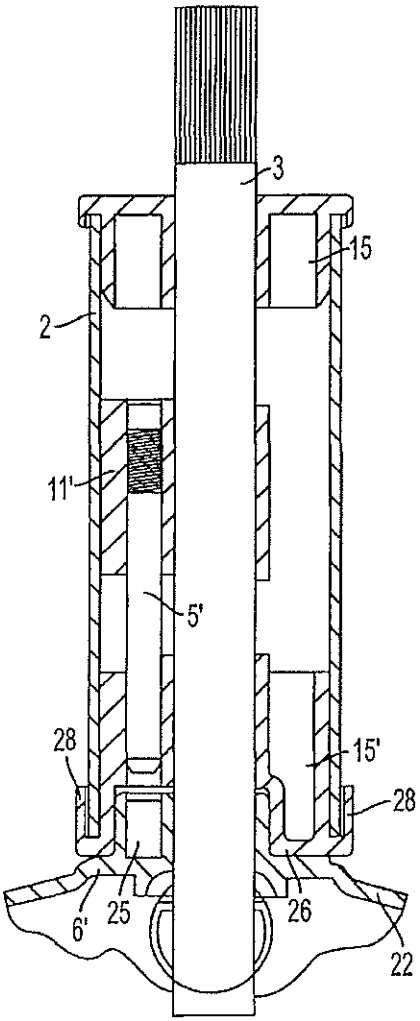

3
15
2
11
10
11'
20
9
8'
23
28
15'
28
22
1
6'
26
22

FIG. 8


3
15
2
11'
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28
15'
28
6'
25
26
22

FIG. 9

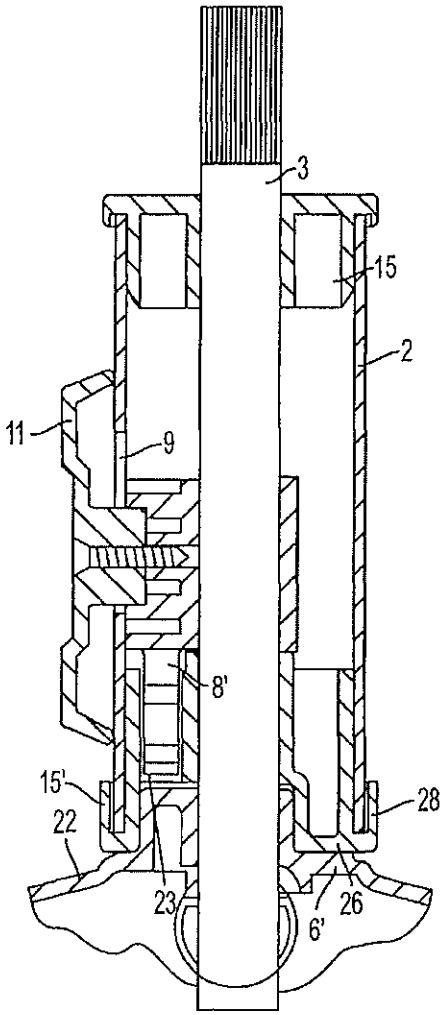


FIG. 10

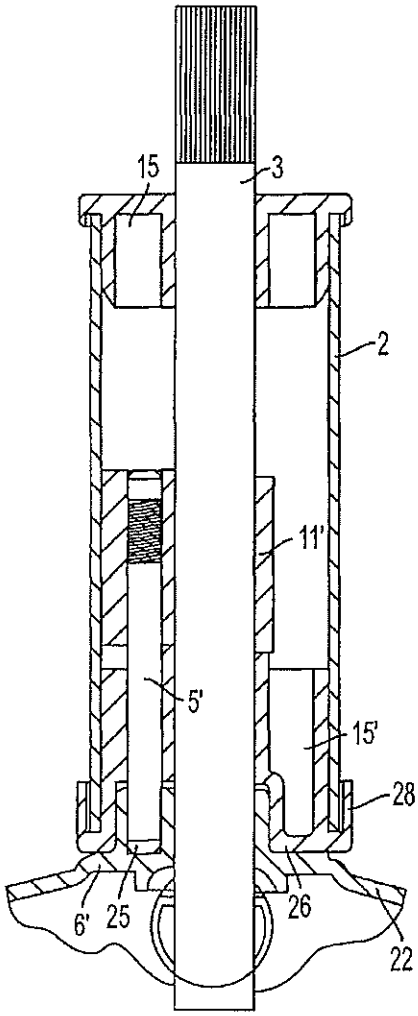


FIG. 11

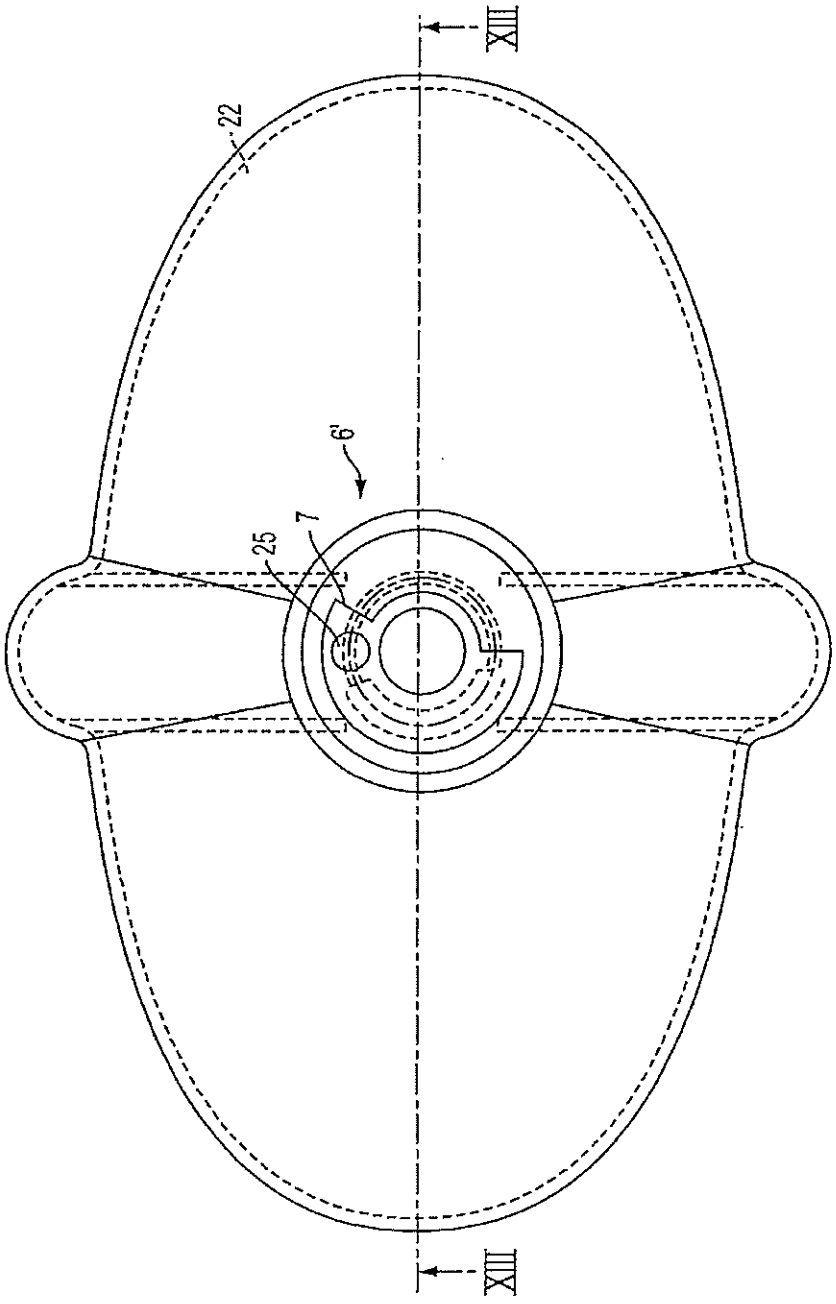


FIG. 12

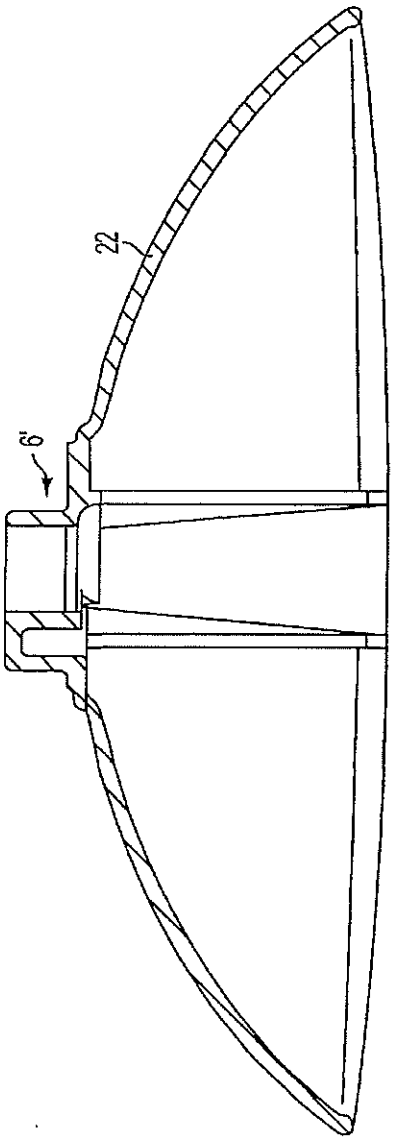


FIG. 13

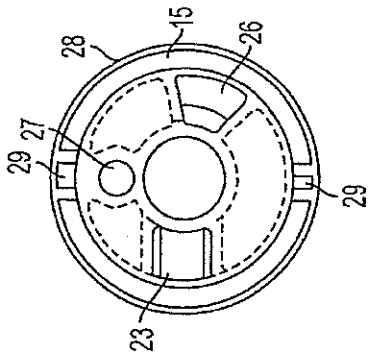


FIG. 17

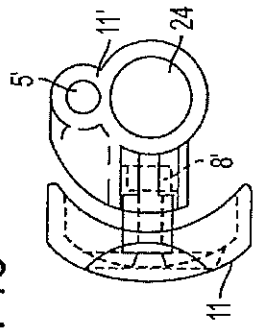


FIG. 16

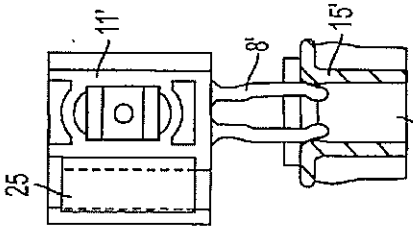


FIG. 15

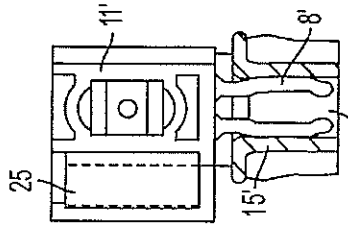


FIG. 14

VEHICLE STEERING HEAD

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims priority under 35 U.S.C. §119 of German Patent Application No. 299 11 652.2, filed on Jul. 5, 1999, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle steering head and in particular, to a steering head for a vehicle comprising a support tube which has rotatably supported therein a fork tube to which a wheel cover and a handlebar can be secured.

2. Discussion of Background Information

Vehicle steering heads of the above-described type are in particular used in bicycles or tricycles, and in particular in tricycles or bicycles for children.

In devices of the above-described type it is desirable for safety reasons that accidents be avoided which may be caused by an excessively large handlebar deflection. It has been found that when there is an excessively large handlebar deflection (e.g., the handle bar rotates beyond a point where effective steering occurs), the vehicle may tilt to the side. Moreover, such deflections or excessive rotation may run the risk that a user impacts his body against the handlebar. Additionally, the user may get caught with his/her feet in the front wheel and may be even be injured by the pedals.

A further drawback or disadvantage of prior-art devices occurs when they are pushed with a push rod type device. In such cases, these devices have a tendency towards uncontrolled steering movements of the front wheel which cannot be mastered or effectively controlled by small children, in particular.

SUMMARY OF THE INVENTION

The present invention therefore provides a vehicle steering head of the above-mentioned type which is of a simple construction and which can operate in an easy and reliable manner. Moreover, this design avoids the drawbacks of the prior art and can in particular limit a handlebar deflection to a desired degree. The invention also has provision for locking the handlebar.

According to one aspect of the invention a latch element is secured to a fork tube on a portion provided inside the support tube. A linkage element is supported in the support tube for rotation therewith. The linkage element is displaceable or moveable in a longitudinal direction of the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork tube and can be brought into contact with the latch element. Moreover, the linkage element comprises at least one locking element which is releasably connectable to the latch element.

According to another aspect of the invention a latch element is supported on the support tube. A linkage element is arranged on the fork tube and connected to the tube for rotation therewith. The latch element is freely displaceable or moveable along the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork tube and can be brought into contact with the support tube. Moreover, at least one latch element is provided that is releasably connectable to the support tube.

The vehicle steering head according to the invention is characterized by a number of considerable advantages.

First of all, it is possible to install or utilize the steering head in a frame of any desired design, e.g. children's bicycles or tricycles. Ideally, the dimensions of the steering head are such that they do not interfere with the remaining structure of the frame within which it is installed. Of course, the steering head may be combined with any and all common types of frames where ever its advantageous design is desired. Accordingly, the steering head may be utilized in a variety of devices where limited deflection or rotation and/or locking are desired.

Because the invention utilizes a latch element which is arranged in the support tube, no functional parts of the steering head need be outwardly visible or accessible. Accordingly, the internal parts are less susceptible to damage. Additionally, this design is less likely to cause injury when used by children or infants.

As a result of utilizing a linkage element according to the invention, it is possible to reliably lock the fork tube and thus the wheel fork and the front wheel. Such a locking provision is easily be accomplished by displacing or moving the linkage element. This design ensures a high degree of operational safety and operational reliability.

The linkage element preferably utilizes stop surfaces which cooperate with the latch element in a manner where they are brought into contact with one another. In this way, the steering angle can be limited to a particularly or desired range. This limited range of motion of the steering angle can be realized according to the invention in different ways. The invention contemplates that the available steering angle is freely selectable within a wide desired range. This is of particular advantage to vehicles for children such as tricycles, which may require a steering angle of approximately 45° to each side. Of course, other desirable steering angles cab be utilized. However, by designing in the desired limited steering angle, lateral tilting of the tricycle or similar devices can be prevented or its risk significantly reduced. Additionally, the risk of injuries which may be caused by the pedals, e.g., devices which utilize pedals on the front wheel can be reduced. Finally, the risk of injury which can occur when the handlebar exceeds a controlled steering angle can be ruled out to a considerable extent.

The invention also provides for a linkage element having a locking element which is releasably connectable to the latch element. This design ensures that when a push rod is used for pushing the device, i.e., a tricycle, the front wheel thereof may be reliably locked in place during straight travel.

In an advantageous embodiment of the invention, the latch element is designed in the form of a pin which extends in a direction transverse to the fork tube. The pin may extend through the fork tube such that it projects at both sides of the fork tube. Alternatively, the pin can project from the fork tube on only one side. Moreover, the pin can be firmly connected to the fork tube, e.g. by welding or other conventional attachment techniques. Additionally, it may be secured by press fitting with or without utilizing a knurled portion. Of course, the dimensions of the pin can easily be adapted to the respective conditions of use.

It should be noted that the manufacturing costs of the steering head are reduced by the above-described construction to quite a considerable degree.

In another advantageous embodiment of the invention, the linkage element is substantially designed in the form of a hollow cylinder. Thus, the linkage element can be reliably guided in the support tube and surround the fork tube. Additionally, the linkage element can be designed as a single

integral part or several parts which are either joined together or which cooperate together.

It is advantageous for the longitudinal displacement or movement of the linkage element to be along an axis of the support tube and the fork tube. Accordingly, the support tube may comprise at least one longitudinal slot or a similar recess through which a connection element extends which is connected to the linkage element. This design also utilizes a slide which is arranged outside the support tube.

The slide facilitates the ease of handling or movement of the linkage element. In such a design, a displacement of the slide, which may additionally be provided with locking mechanism or fixing safety mechanism, effects a corresponding displacement or movement of the linkage element. The locking mechanism or fixing mechanism allows for fixing the front wheel in a single or set travel position which is preferably straight. Moreover, the invention also contemplates that the linkage element may be provided with inclined inlet surfaces or intercepting mechanisms which engage the latch element so as to initiate a locking action when the front wheel is slightly deflected angularly.

Stop surfaces on the latch element are preferably formed on at least one front attachment of the linkage element. Additionally, it is particularly advantageous when two opposite attachments or stops are in symmetry with each other and are each provided with at least one stop surface located on the linkage element. Thus, by utilizing two attachments or stops which are in symmetry with each other, this design can limit the steering angle in a symmetrical fashion to both the left and the right side.

In another advantageous embodiment of the invention, the associated stop surfaces of the attachments or stops act to limit the rotation of the fork tube to a predetermined angular range at both sides. This angular range may e.g. be approximately 45° to both sides, for a total range of motion of approximately 90°.

The locking element is preferably designed in the form of at least one front recess which receives the latch element. Such an advantageous design makes it possible to grip and fix the latch element upon displacement or movement of the linkage element. Additionally, it is advantageous that the recess is retracted or set back relative to the front attachment, so that the attachments or stops can always remain in the plane of the latch element, while upon a displacement of the latch element, it is only the recess which can additionally be brought into engagement.

To implement a simple and operationally reliable structure of the steering head, it may be of advantage that the recess be centrally arranged between the two attachments or stops.

The invention also contemplates that the fork tube itself has not been changed constructionally. In other words, the invention can be adapted to work with a conventional fork tube. Also, the invention makes it possible to manufacture all functional parts separately in a very simple manner. As a result, advantageous production costs can be achieved.

In a preferred design of a previously described embodiment, the linkage element is designed as part of a mudguard which extends from below into the support tube. This design allows for significant cost savings since the mudguard is normally made from plastics and is typically already included in most vehicles of the above-described type. The linkage element can thus be mounted on the mudguard or made integrally therewith, in a particularly easy way and at low costs.

A further advantage of the this embodiment is that the latch element can be designed in the form of a bolt which

arranged to be parallel with the fork tube. The latch element of this design can thus be given relatively large dimensions so that the diameter of the support tube itself need not be chosen with such a large size.

It may be of particular advantage when the latch element is connected to a slide which extends into the support tube so as to be able to design the lock of the front wheel in a particularly simple manner. Furthermore, the locking element may preferably be connected to the slide. Moreover, the locking element serves to reliably maintain the locked state and to prevent any unintended unlocking. The locking element also preferably engages into a recess of a bearing which supports the fork tube in the support tube. As a result, it is not necessary to mount additional parts or to take installation measures on the support tube itself.

It may also be of particular advantage for the limitation of the steering angle to be accomplished by a lower bearing which supports the fork tube in the support tube. This lower bearing may have formed thereon an attachment which projects in the direction of the linkage element and which can be brought into contact with the stop surfaces formed on the linkage element and thus on the mudguard. This design has the advantageous effect that the predetermined angular range can be limited at both sides as well, e.g. approximately 45° each side.

The invention provides of a vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head including a latch element projecting from the fork tube and disposed within the support tube, and a linkage element disposed within the support tube, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube and comprises at least one stop surface for limiting a rotation of the fork tube when the latch element contacts the at least one stop surface. The linkage element may further comprise at least one locking element for locking the fork tube in a single position. The at least one locking element may releasably engage the latch element when the fork tube is locked. The latch element may comprises a pin. The pin may project substantially perpendicular to the axis of the fork tube. The linkage element may comprise a substantially cylindrical shape. The linkage element may comprise a plurality of hollow chambers separated by connecting walls. The support tube may comprise an opening which allows a connecting element to pass therethrough. The opening may comprise a longitudinal slot. The connecting element may be secured to the linkage element. The movement of the linkage element may be limited by the movement of the connecting element within the longitudinal slot. The steering head may further comprise a slide which is secured the connecting element, the slide being disposed adjacent an outer surface of the support tube. The at least one stop surface may be disposed on at least one stop.

The at least one stop may comprise a projection which extends from the linkage element. The at least one stop may comprise wedge-shaped hollow projection having two angled lateral stop surfaces. The at least one stop may comprise two stops which are disposed opposite one another. Each stop may comprise wedge-shaped hollow projection having two angled lateral stop surfaces. The two stops may define a limited range of rotational motion of the fork tube in each of a clockwise and a counter-clockwise direction. The limited range of motion in the clockwise direction may be substantially equal to the range of motion in the counter-clockwise direction. The limited range of motion in one of the clockwise and counter-clockwise direction may be approximately 45 degrees.

The linkage element may further comprise at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element. The at least one recess is set back some distance from a surface of at least one stop. The at least one recess is centrally disposed between at least two stops.

The steering head may further comprise an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tube, each of the upper and lower bearings having an opening which allows the fork tube to pass therethrough.

The steering head may be disposed on a tricycle frame.

The invention also provides for a vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head including a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube, and a linkage element connected to the fork tube so as to rotate therewith, the linkage element comprising at least one stop surface, wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube. The steering head may further comprise a slide, wherein the slide is disposed within the support tube and retains the latch element. The slide may further comprise at least one locking element for releasably securing the slide to the support tube. The linkage element may comprise a mudguard. The mudguard may be disposed between one end of the support tube and a wheel fork. The latch element may comprise a rod like member which is arranged substantially parallel to the axis of the fork tube. The rod like member may comprise one of a bolt and a pin. The latch element may be connected to a slide, the slide being disposed within the support tube. The slide may be moveable substantially parallel to the axis of the fork tube. A locking element may be connected to the slide.

The steering head may further comprise a bearing support disposed on at least one end of the support tube. The bearing support may be disposed on a lower end of the support tube. The steering head may further comprise a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support. The bearing support may comprise at least one stop, the at least one stop comprising at least one surface which engages the linkage element. The at least one stop may comprise a projection which engages a recess in the linkage element. The projection and the recess may cooperate to limit the rotational movement of the fork tube within a desired range. The range of the rotational movement may be limited by at least two stop surfaces. The at least two stop surfaces may define a limited range of rotation in one of a clockwise and a counter-clockwise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counter-clockwise direction. The limited range of rotation between the at least two stops may be approximately 45 degrees.

The steering head may be disposed on a tricycle frame.

The invention further provides for a vehicle steering head including a support tube and fork tube which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube, a lower bearing support disposed at a lower end of the support tube, the fork tube comprising a fork end, a handlebar, and a latch element projecting from the fork tube between the fork end and the handlebar end, the latch element being disposed within the support tube, a linkage element slidable disposed within the support tube, the linkage element comprising at least one stop surface for engaging the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube from a first position where the latch element and the at least one stop cooperate to limit the rotational movement of the fork tube to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork tube is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element.

The invention also relates to a vehicle steering head including a support tube and fork tube which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube, a lower bearing support disposed at a lower end of the support tube, the lower bearing support comprising at least one stop surface, the fork tube comprising a fork end, a handlebar, and a latch element which is slidably disposed adjacent the fork tube between the fork end and the handlebar end, the latch element being disposed within the support tube, a linkage element moveably disposed adjacent the lower support bearing, the linkage element comprising at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube from a first position where the latch element engages only the lower bearing support and where the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork tube to a second position where the latch element releasably engages a recess in the linkage element whereby the fork tube is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element. The linkage element may further comprise at least one locking element for engaging a locking recess in the lower bearing support. The at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

The invention provides for a vehicle steering head including a fork tube adapted to engage a handlebar, a support tube which rotatably supports the fork tube, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork tube from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork tube to rotate with respect to the support tube in at least two directions. The latch element may comprise a rod-like member.

The invention also provides for a vehicle steering head that includes a support tube adapted to be coupled to a vehicle frame, an upper bearing support arranged at an upper end of the support tube, a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface, a cylindrical element rotatably mounted to the support tube via the upper and

lower bearing supports, the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar, a latch element movably disposed within the support tube, a slide coupled to the latch element, the latch element being movable from outside the support tube, a linkage element that is rotatable with respect to the support tube, and the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube, wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of exemplary embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

FIG. 1 is a schematic side view of a children's tricycle with one embodiment of the vehicle steering head according to the invention;

FIG. 2 is a simplified sectional side view of the steering head according to the invention in an unlocked state;

FIG. 3 is a side view, turned or oriented by 90° (a right angle) of the arrangement shown in FIG. 2;

FIG. 4 is a sectional side view similar to FIG. 2, in the locked state;

FIG. 5 is a side view, similar to FIG. 3, of the view according to FIG. 4;

FIG. 6 is a simplified perspective illustration of the linkage element according to the invention;

FIG. 7 is a schematic side view of a children's tricycle with another embodiment of the vehicle steering head according to the invention;

FIG. 8 is a sectional side view of the vehicle steering head according to the invention, in the unlocked state;

FIG. 9 is a side view, turned or oriented by 90° of the arrangement shown in FIG. 8;

FIG. 10 is a sectional side view similar to FIG. 8, in the locked state;

FIG. 11 is a side view, turned or oriented by 90° which is similar to FIG. 9, in the locked state;

FIG. 12 is a top view on the linkage element according to the invention and on the associated mudguard;

FIG. 13 is a sectional view of the arrangement according to FIG. 12 along the sectional lines XIII—XIII of FIG. 12;

FIG. 14 is an enlarged side view showing a portion of the slide and of the locking element in the locked state;

FIG. 15 is a view analogous to FIG. 14, in the unlocked state;

FIG. 16 is a top view on the slide; and

FIG. 17 is a top view on the lower bearing.

DETAILED DESCRIPTION OF THE INVENTION

The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

A children's tricycle is shown in FIG. 1 and comprises a front wheel 14 which is supported on a wheel fork 4. Wheel fork 4 is fixedly connected to a fork tube 3. A handlebar (not shown) can be secured to the upper end of fork tube 3.

Fork tube 3 is supported in a support tube 2. This support is accomplished by utilizing slide bearings 15 and 15' which are shown in detail in FIGS. 2 to 5. The slide bearings 15 and 15' correspond to those of the prior art in this embodiment so that a detailed description is here not needed.

Support tube 2 is firmly connected to a frame 16 which has mounted thereon a seat 17. The tricycle also has a rear axle 18 with rear wheels 19. Accordingly, it is support tube 2 and fork tube 3 which form a steering head 1.

According to the invention, support tube 2 has arranged therein a linkage element 6 which has a substantially cylindrical configuration (see also FIG. 6) and which is received with a play or clearance (so that it can slide) within support tube 2. Linkage element 6 is also provided with a central recess through which fork tube 3 extends or passes.

Support tube 2 also has formed therein a longitudinal slot 9 through which a connection element 10 extends or passes. This connection element 10 is connected to a slide 11 and linkage element 6. The connection may be via a screw 20 (see FIGS. 2 and 4) or other conventional connecting mechanism. In the illustrated embodiment, connection element 10 is integrally connected to or formed with slide 11 and extends in a recess 21 of linkage element 6. However, connection element 10 and slide 11 may be made as separate components which are joined or secured together by any conventional attachment technique including a screw or threaded element.

On its front upper portion, linkage element 6 comprises two symmetrical opposite attachments or stops 12. Each of these stops 12 may be provided with lateral stop surfaces 7. When viewed from the top, these attachments or stops 12 are designed in a manner of a segment of a partial circle (pie shaped or wedge shaped), so that four stop surfaces 7 are formed, with each one being arranged in symmetry with one another. Of course, stops 12 may be separately formed and attached to linkage element 6 instead of being integrally formed therewith, as is shown.

In the illustrated embodiment two locking elements 8 may be utilized in which each is formed by a recess 13. These locking elements 8 are preferably provided on linkage element 6 in retracted or set back manner with respect to stops 12. As becomes apparent from FIG. 6, the walls of at least one recess 13 may be made resilient to ensure a releasable locking of a bolt-like latch element 5 when linkage element 6 is pushed upwards or into engagement with bolt-like latch element 5.

As becomes apparent from FIGS. 2 to 5, fork tube 3 is provided with a bolt-like or pin-like latch element 5 which extends or projects from at least one and preferably both sides of fork tube 3. Of course, latch element 5 may be integrally formed with fork tube. Alternatively, latch element 5 may be a threaded or partially threaded member which threads into fork tube 3. However, it is preferred that latch element 5 is a pin having a centrally disposed exterior knurl which is press fit into fork tube as is shown. In its working position, latch element 5 rotates with fork tube 3

when a deflection or rotation of the handlebar takes place. The deflection of the handlebar is limited by way of latch element 5 abutting on stop surfaces 7, these stop surfaces 7 defining the limited range of motion of the handlebar.

When it is desired to lock the handlebar in a set position, latch element 5 is pressed or forced into recesses 13. This engagement occurs when locking element 8, which is disposed on linkage element 6, is pushed upwards by slide 11. Recesses 13 also utilize inclined inlet surfaces because they act as guiding lead-in surfaces which facilitate entry of pin 5 into recess 13. In the locked state, which is shown in FIGS. 4 and 5, a steering movement thus becomes impossible since the handlebar or fork tube 3 is locked in a single direction. FIGS. 2 and 3 show a downwardly displaced condition of linkage element 6 in which latch element 5 is in a position which it does not cooperate with the locking element 8. As a result, in this position fork tube 3 and handlebar are free to rotate until latch element 5 abuts on stop surfaces 7, this range of movement or rotation corresponding to a steering angle range.

According to a preferred aspect of the invention, linkage element 6 may be made from a plastic material. Of course, other materials are also contemplated.

Another embodiment of the vehicle steering head according to the invention is described with reference to FIGS. 7 to 16. In this regard, like parts are provided with like reference numerals.

As for the description of FIG. 7, reference can be made to the description of FIG. 1 to the extent that the same features are shown. The subsequent figures are illustrations elucidating the details which have been changed.

As in FIGS. 2 to 5, FIGS. 8 and 9 and 10 and 11, respectively, are illustrations showing the vehicle steering head on an enlarged scale. Again, like parts are here also provided with like reference numerals, so that reference can be made to the preceding explanations. Slide 11 utilizes connection element 10 and screw 20. Connection element 10 also extends through a longitudinal slot 9. Moreover, slide 11 comprises an outer grip portion 11 and an interior portion 11' which is screwed to outer grip portion 11 by a screw 20. A top view of slide 11 and 11' is shown in FIG. 16. As can be seen in this figure, a central recess 24 is provided through which fork tube 3 extends or passes (with a clearance which allows slide 11' to move up and down with respect to fork tube 3). Furthermore, slide 11' also has a recess (see FIGS. 9, 11 and 16) which is formed so that it can accept a bolt-like latch element 5'. Of course, this latch element 5' may be pressed into this recess, threaded into the recess, or otherwise secured to slide 11' in a suitable manner. Alternatively, latch element 5' may be integrally formed with slide 11'.

As already described in conjunction with a previous embodiment, a bearing 15 which serves as a slide bearing is used on the upper portion of steering head 1.

Lower bearing 15' in this embodiment is configured such that it has an upwardly projecting contour of a linkage element 6' which can extend into bearing 15'. Of course, the bearing and the upwardly projecting contour may be made as separate components which are joined together by conventional techniques rather than integrally formed as is shown. Additionally, as becomes apparent in FIG. 12, linkage element 6' may have a recess 25 into which latch element 5' can be inserted (see also FIGS. 9 and 11).

As can further be seen from the top view of FIG. 12, linkage element 6' comprises two lateral stop surfaces 7 which are angularly spaced apart from each other. This design is such that a downwardly oriented attachment or stop 26 (see FIGS. 8 to 11) of the bearing 15', which is connected to support tube 2, forms a steering limitation of plus/minus approximately 45°. Of course, as with the previous embodiment, the range of steering limitation can be designed to any desired range.

FIG. 13 shows a lateral sectional view of mudguard 22 and of linkage element 6'. Note that these components are integrally formed as a single member which reduces manufacturing costs associated with joining two separate components.

FIGS. 14 and 15 are front views of slide 11' wherein handpiece 11 has been removed to illustrate the operation of locking element 8'. Locking element 8' comprises a U-shaped and includes two movable or flexible lateral legs which can releasably be inserted into a recess 23 of bearing 15'. Upon insertion and locking, locking element 8' is pressed against an undercut and thereby held in position inside recess 23. Accordingly, when it is desired to release the locked state of fork tube 3, slide 11' must be pushed upwards which removes the legs from recess 23. Of course, other locking mechanisms may be utilized and this embodiment is not limited to the use of this particular locking mechanism. For example, a pin may be used which has a floating ring disposed around its circumference. Alternatively, other conventional releasable locking mechanisms may be utilized.

FIG. 17 is a top view on lower bearing 15' on an enlarged scale. The (downwardly projecting) attachment or stop 26 can here be seen as well as recess 23 which receives locking element 8'. Moreover, recess 27 is adapted to receive and guide bolt-like latch element 5' therein. Furthermore, a surrounding collar-like edge 28 can be seen in which 29 designates two oppositely disposed attachments or projections which serve as anti-rotation engagements. These engagements are designed to engage recesses (not shown) of support tube 2. Of course, lower bearing may be secured to support tube 2 in any conventional manner such as by bonding, welding, or screws. Moreover, this attachment may be releasable or more permanent in nature.

It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

What is claimed:

1. A vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element projecting from the fork tube and disposed within the support tube; and

a linkage element disposed within the support tube,

wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube

and comprises at least one stop surface for limiting a rotation of the fork tube when the latch element contacts the at least one stop surface.

2. The steering head of claim 1, wherein the linkage element further comprises at least one locking element for locking the fork tube in a single position.

3. The steering head of claim 2, wherein the at least one locking element releasably engages the latch element when the fork tube is locked.

4. The steering head of claim 1, wherein the latch element comprises a pin.

5. The steering head of claim 4, wherein the pin projects substantially perpendicular to the axis of the fork tube.

6. The steering head of claim 1, wherein the linkage element comprises a substantially cylindrical shape.

7. The steering head of claim 6, wherein the linkage element comprises a plurality of hollow chambers separated by connecting walls.

8. The steering head of claim 1, wherein the support tube comprises an opening which allows a connecting element to pass therethrough.

9. The steering head of claim 8, wherein the opening comprises a longitudinal slot.

10. The steering head of claim 9, wherein the connecting element is secured to the linkage element.

11. The steering head of claim 10, wherein the movement of the linkage element is limited by the movement of the connecting element within the longitudinal slot.

12. The steering head of claim 10, further comprising a slide which is secured the connecting element, the slide being disposed adjacent an outer surface of the support tube.

13. The steering head of claim 1, wherein the at least one stop surface is disposed on at least one stop.

14. The steering head of claim 13, wherein the at least one stop comprises a projection which extends from the linkage element.

15. The steering head of claim 14, wherein the at least one stop comprises wedge-shaped hollow projection having two angled lateral stop surfaces.

16. The steering head of claim 13, wherein the at least one stop comprises two stops which are disposed opposite one another.

17. The steering head of claim 16, wherein each stop comprises wedge-shaped hollow projection having two angled lateral stop surfaces.

18. The steering head of claim 16, wherein the two stops define a limited range of rotational motion of the fork tube in each of a clockwise and a counter-clockwise direction.

19. The steering head of claim 18, wherein the limited range of motion in the clockwise direction is substantially equal to the range of motion in the counter-clockwise direction.

20. The steering head of claim 18, wherein the limited range of motion in one of the clockwise and counter-clockwise direction is approximately 45 degrees.

21. The steering head of claim 1, wherein the linkage element further comprises at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element.

22. The steering head of claim 21, wherein the at least one recess is set back some distance from a surface of at least one stop.

23. The steering head of claim 21, wherein the at least one recess is centrally disposed between at least two stops.

24. The steering head of claim 1, further comprising an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tube, each of the upper and lower bearings having an opening which allows the fork tube to pass therethrough.

25. The steering head of claim 1, wherein the steering head is disposed on a tricycle frame.

26. A vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element that is rotatable with the fork tube, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

wherein the latch element is connected to a slide, the slide being disposed within the support tube.

27. The steering head of claim 26, wherein the slide is moveable substantially parallel to the axis of the fork tube.

28. The steering head of claim 26, further comprising a locking element connected to the slide.

29. The steering head of claim 26, wherein the steering head is disposed on a tricycle frame. mudguard.

30. A vehicle steering head including a support tube which rotatable supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element that is rotatable with the fork tube, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

a slide that is disposed within the support tube and retains the latch element.

31. The steering head of claim 30, wherein the slide further comprises at least one locking element for releasable securing the slide to the support tube.

32. A vehicle steering head including a support tube which rotatable supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element that is rotatable with the fork tube, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

wherein the linkage element comprises a mudguard.

33. The steering head of claim 32, wherein the mudguard is disposed between one end of the support tube and a wheel fork.

34. A vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element connected to the fork tube so as to rotate therewith, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

wherein the latch element comprises a rod like member which is arranged substantially parallel to the axis of the fork tube.

35. The steering head of claim 34, wherein the rod like member comprises one of a bolt and a pin.

36. A vehicle steering head including a support tube which rotatably supports therein a fork tube to which a wheel fork and a handlebar can be secured, the steering head comprising:

a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork tube; and

a linkage element that is rotatable with the fork tube, the linkage element comprising at least one stop surface;

wherein the at least one stop surface limits the rotation of the fork tube with respect to the support tube, and

a bearing support disposed on at least one end of the support tube.

37. The steering head of claim 36, wherein the bearing support is disposed on a lower end of the support tube.

38. The steering head of claim 36, further comprising a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support.

39. The steering head of claim 36, wherein the bearing support comprises at least one stop, the at least one stop comprising at least one surface which engages the linkage element.

40. The steering head of claim 38, wherein the at least one stop comprises a projection which engages a recess in the linkage element.

41. The steering head of claim 39, wherein the projection and the recess cooperate to limit the rotational movement of the fork tube within a desired range.

42. The steering head of claim 40, wherein the range of the rotational movement is limited by at least two stop surfaces.

43. The steering head of claim 41, wherein the at least two stop surfaces define a limited range of rotation in one of a clockwise and a counter-clockwise direction.

44. The steering head of claim 42, wherein the at least two stop surfaces define a limited range of rotation in each of a clockwise and a counter-clockwise direction.

45. The steering head of claim 42, wherein the limited range of rotation between the at least two stops is approximately 45 degrees.

46. A vehicle steering head including a support tube and fork tube which is rotatably mounted with respect to the support tube, the steering head comprising:

an upper bearing support disposed at an upper end of the support tube;

a lower bearing support disposed at a lower end of the support tube;

the fork tube comprising a fork end and a handlebar engaging end;

a latch element projecting from the fork tube between the fork end and the handlebar engaging end, the latch element being disposed within the support tube; and

a linkage element slidable disposed within the support tube, the linkage element comprising at least one stop surface for engaging the latch element;

wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork tube from a first position, wherein the latch element and the at least one stop cooperate to limit the rotational movement of the fork tube, to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork tube is prevented from rotating in any direction.

47. The steering head of claim 46, wherein the linkage element is moveable from outside the support tube via a slide.

48. The steering head of claim 47, wherein the slide is connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube.

49. The steering head of claim 48, wherein the longitudinal slot limits the movement of the linkage element.

50. A vehicle steering head including a support tube and fork tube which is rotatably mounted with respect to the support tube, the steering head comprising:

an upper bearing support disposed at an upper end of the support tube;

a lower bearing support disposed at a lower end of the support tube, the lower bearing support comprising at least one stop surface;

the fork tube comprising a fork end and a handlebar engaging end;

a latch element slidably disposed adjacent the fork tube between the fork end and the handlebar engaging end, the latch element being disposed within the support tube; and

a linkage element moveably disposed adjacent the lower support bearing, the linkage element comprising at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element,

wherein the latch element is moveable in a direction which is substantially parallel to an axis of the fork tube from a first position where the latch element engages only the lower bearing support, wherein the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork tube, to a second position where the latch element releasably engages a recess in the linkage element whereby the fork tube is prevented from rotating in any direction.

51. The steering head of claim 50, wherein the latch element is moveable from outside the support tube via a slide.

52. The steering head of claim 51, wherein the slide is connected to the latch element via a connection element, the connection element passing through a longitudinal slot in the support tube.

53. The steering head of claim 52, wherein the longitudinal slot limits the movement of one of the latch element or the slide.

54. The steering head of claim 52, further comprising a least one locking element for engaging a locking recess in the lower bearing support.

55. The steering head of claim 54, wherein the at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

56. A vehicle steering head comprising:

a fork tube adapted to engage a handlebar;

a support tube which rotatably supports the fork tube;

a latch element disposed within the support tube;

a slide which is moveable with respect to the support tube; and

a linkage element;

wherein the slide is moveable from at least one position wherein the linkage element prevents the fork tube from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork tube to rotate with respect to the support rube in at least two directions, and

wherein the slide is adapted to move the latch element from outside the support tube.

57. The steering head of claim 56, wherein the latch element comprises a rod-like member.

58. A vehicle steering head comprising:

a support tube adapted to be coupled to a vehicle frame;

an upper bearing support arranged at an upper end of the support tube;

a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface;

a cylindrical element rotatably mounted to the support tube via the upper and lower bearing supports;

the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar;

a latch element movably disposed within the support tube;

a slide coupled to the latch element;

the latch element being movable from outside the support tube;

a linkage element that is rotatable with respect to the support tube; and

the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube,

wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,378,884 B1
DATED : April 30, 2002
INVENTOR(S) : H. Kettler

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

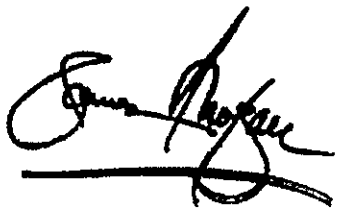
Column 12,
Line 23, delete "mudguard".
Lines 25 and 41, replace "rotatable" with -- rotatably --.

Column 13,
Line 30, the claim dependency should be changed from "38" to -- 39 --.
Line 33, the claim dependency should be changed from "39" to -- 40 --.
Line 36, the claim dependency should be changed from "40" to -- 41 --.
Line 39, the claim dependency should be changed from "41" to -- 42 --.
Line 61, replace "slidable" with -- slidably --.

Column 14,
Line 10, insert -- slot -- between the words "longitudinal" and "in".
Line 14, replace "rube" with -- tube --.
Line 57, the claim dependency should be changed from "52" to -- 50 --.

Signed and Sealed this

Twenty-fifth Day of February, 2003



JAMES E. ROGAN
Director of the United States Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE
Certificate

Patent No. 6,378,884 B1 Patented: April 30, 2002

On petition requesting issuance of a certificate for correction of inventorship pursuant to 35 U.S.C. 256, it has been found that the above identified patent, through error and without any deceptive intent, improperly sets forth the inventorship.

Accordingly, it is hereby certified that the correct inventorship of this patent is: Heinz Kettler, Ense-Parsit (DE); Joachim Kettler, Ense-Parsit, (DE); and Reinhard Rocholl, Werl, (DE).

Signed and Sealed this Third Day of April 2007.

ANDRES KASHNIKOW
Supervisory Patent Examiner
Art Unit 3993

(12) **EX PARTE REEXAMINATION CERTIFICATE** (6008th)
United States Patent
Kettler et al.

(10) **Number: US 6,378,884 C1**
(45) **Certificate Issued: Nov. 13, 2007**

(54) **VEHICLE STEERING HEAD**

(75) Inventors: **Heinz Kettler**, Ense-Parsit (DE); **Joachim Kettler**, Ense-Parsit (DE); **Reinhard Rocholl**, Werl (DE)

(73) Assignee: **Heinz Kettler GmbH & Co. KG**, Ense-Parsit (DE)

Reexamination Request:
No. 90/007,243, Oct. 8, 2004

Reexamination Certificate for:

Patent No.:	**6,378,884**
Issued:	**Apr. 30, 2002**
Appl. No.:	**09/584,497**
Filed:	**Jun. 1, 2000**

Certificate of Correction issued Feb. 25, 2003.

Certificate of Correction issued Apr. 3, 2007.

(30) **Foreign Application Priority Data**

Jul. 5, 1999 (DE) ..... 299 11 652 U

(51) **Int. Cl.**
B62K 5/02 (2006.01)

(52) **U.S. Cl.** 280/279; 280/272; 74/495
(58) **Field of Classification Search** ..... None
See application file for complete search history.

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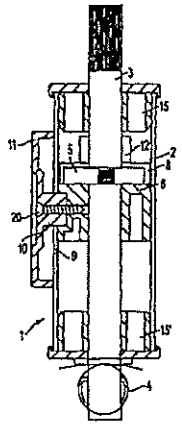
(Continued)

Primary Examiner—David O. Reip

(57) **ABSTRACT**

A vehicle steering head including a fork tube adapted to engage a handlebar, a support tube which rotatably supports the fork tube, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork tube from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork tube to rotate with respect to the support tube in at least two directions.



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Figs. 1, 2A and 2B purporting to show the Push, Pedal & Ride Trike in a fully assembled state and a partially disassembled state.

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Black and while picture allegedly showing a mold having p. No. RF12208.

Black and white picture allegedly showing mold parts having p. No. RF12209.

Sheet table in Italian having a stamp entitled "N. CITTON & C, s.a.s.".

Cover page of Europeo (in color) having p. RF12230 and dated Feb. 1, 1991.

Four sheets with p. Nos. RF12244–A, –B, –C and –D (in color) showing various pictures of trikes and a scooter on what appears to be notebook pages.

Four sheets with p. Nos. RF12245–A, –B, –C and –D (in color) showing various pictures of trikes and a bike on what appears to be notebook pages.

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Three sheets labeled "ACKNOWLEDGMENT" which Radio Flyer alleges to be evidence that the Radio Flyer model No. 77 was sold during 1998.

A sheet entitled "Restricted Turning Prior Art" which Radio Flyer alleges to be evidence that the Radio Flyer model No. 77 was released Feb. 19, 1998.

A sheet entitled "Product Name: Roll N Ride" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Grow–With–Me–Trike" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Baby Too" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Tough Trikes" and "Product Name: Push'n Pedal Trike" which Radio Flyer alleges to be evidence that the products shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "HBC Model 29875 CS 04G" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Smoby Pilot Alu Plus Juguetes Pico S.A." which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

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Two sheets entitled "Charton Baby Driver 2 39150 St. Laurent France" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Processed Plastics West Coast Choppers" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Processed Plastic Item 17800–2" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Fischer Price Kawasaki (US Patent 6,651,528)" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Mattel Hot Wheels" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Tek–Net Toys Int'l Inc. USA 020821 Emergency 911" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Fischer Price L&S Ride on Harley" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Friendly Toys Item #7112 Fold–Up Trike" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

EX PARTE REEXAMINATION CERTIFICATE ISSUED UNDER 35 U.S.C. 307

THE PATENT IS HEREBY AMENDED AS INDICATED BELOW.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

The patentability of claims 26–45 and 50–58 is confirmed.

Claims 1–25 and 46–49 are cancelled.

* * * * *

US006799772B2

(12) **United States Patent**
Kettler et al.

(10) **Patent No.: US 6,799,772 B2**
(45) **Date of Patent: *Oct. 5, 2004**

(54) **VEHICLE STEERING HEAD**

(75) Inventors: **Heinz Kettler**, Ense-Parsit (DE); **Joachim Kettler**, Werl (DE); **Reinhard Rocholl**, Werl (DE)

(73) Assignee: **Heinz Kettler GmbH & Co.**, Ense-Parsit (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/298,002**

(22) Filed: **Nov. 18, 2002**

(65) **Prior Publication Data**

US 2003/0132597 A1 Jul. 17, 2003

Related U.S. Application Data

(63) Continuation of application No. 10/092,516, filed on Mar. 8, 2002, now abandoned, which is a continuation of application No. 09/584,497, filed on Jun. 1, 2000, now Pat. No. 6,378,884.

(30) **Foreign Application Priority Data**

Jul. 5, 1999 (DE) ..... 299 11 652 U

(51) **Int. Cl.**[7] **B62K 5/02**
(52) **U.S. Cl.** **280/279**; 280/272; 74/495
(58) **Field of Search** 280/279, 272, 280/271, 282, 89; 403/354, 83; 74/495

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Primary Examiner—Lesley D. Morris
Assistant Examiner—Tony Winner
(74) *Attorney, Agent, or Firm*—Greenblum & Bernstein, P.L.C.

(57) **ABSTRACT**

Vehicle steering head including a connecting element adapted to engage a handlebar. A support tube rotatably supports the connecting element. A fork member adapted to connect a wheel fork to a handlebar. The fork member is rotatable with respect to the support tube. A mechanism limits the rotational movement of the fork member in each of two directions. A lower bearing support is mounted to the support tube. The mechanism and the lower bearing support cooperate to limit the rotational movement of the fork member.

69 Claims, 9 Drawing Sheets

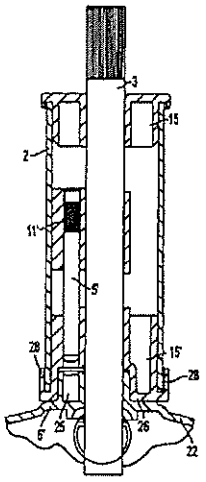


Exhibit 3

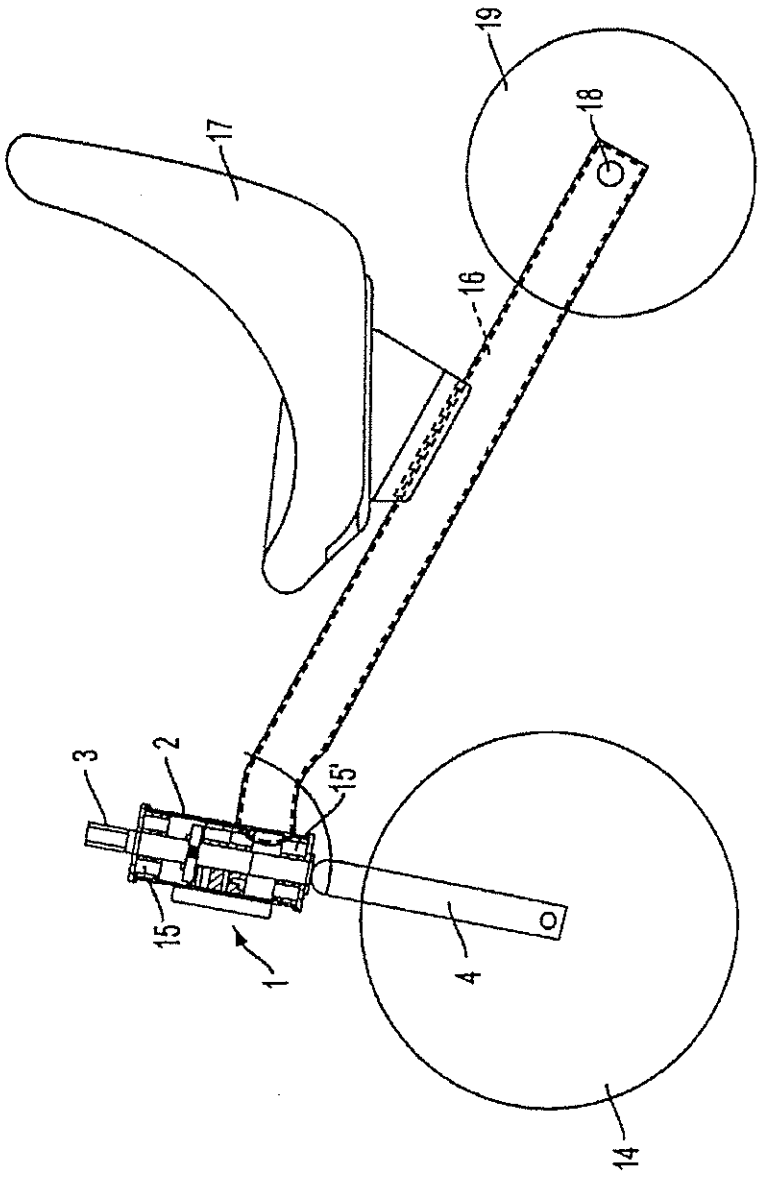


FIG. 1

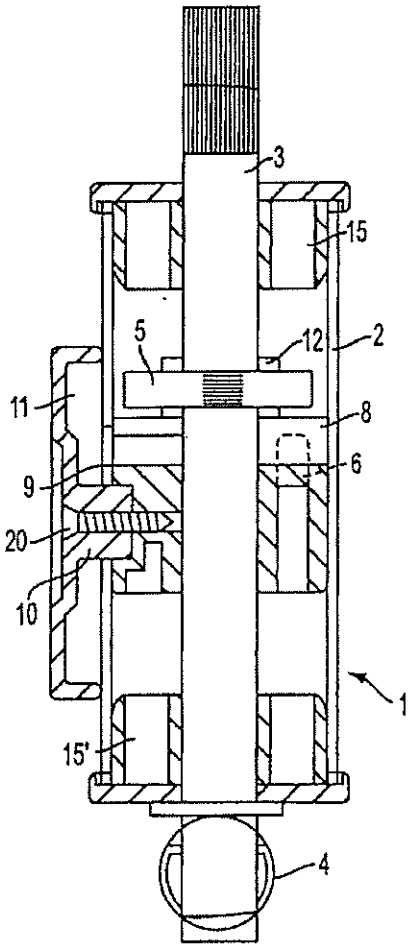


FIG. 2

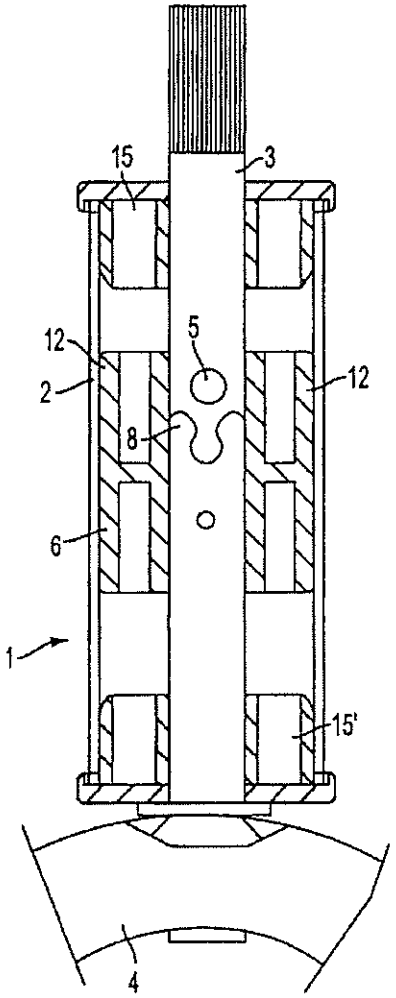


FIG. 3

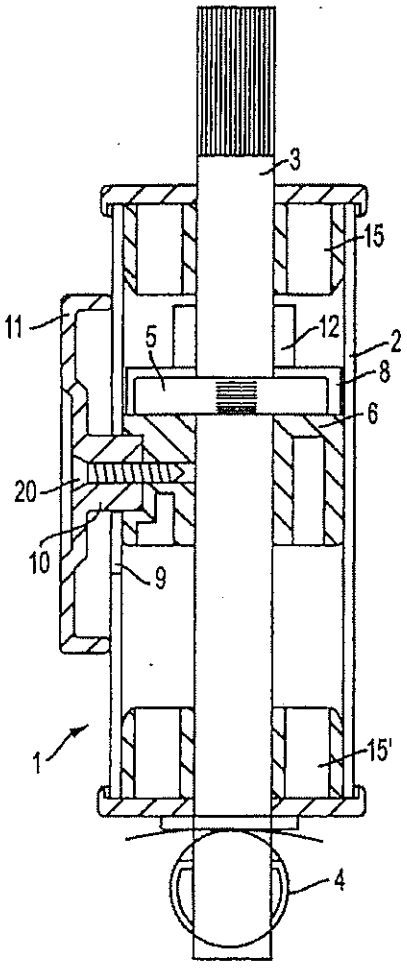


FIG. 4

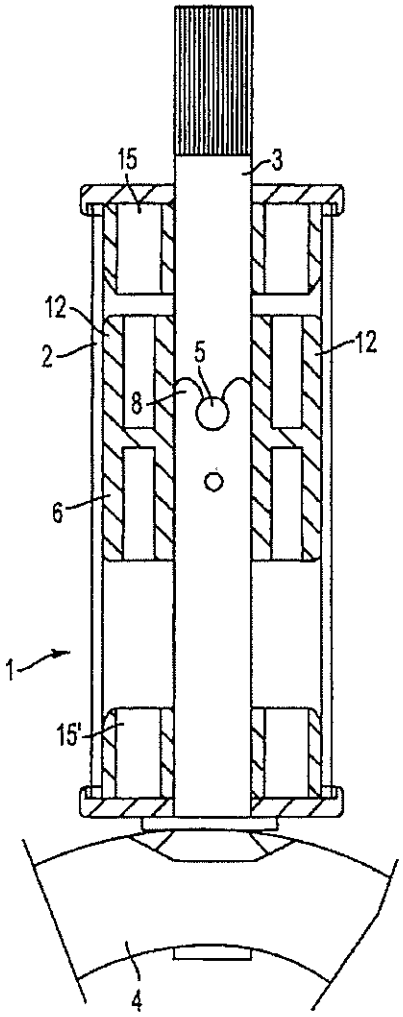


FIG. 5

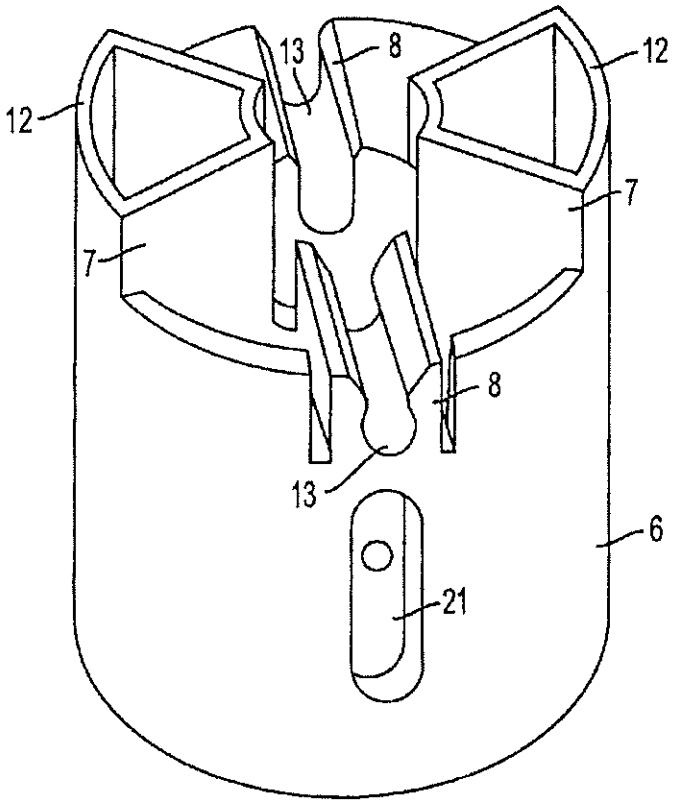


FIG. 6

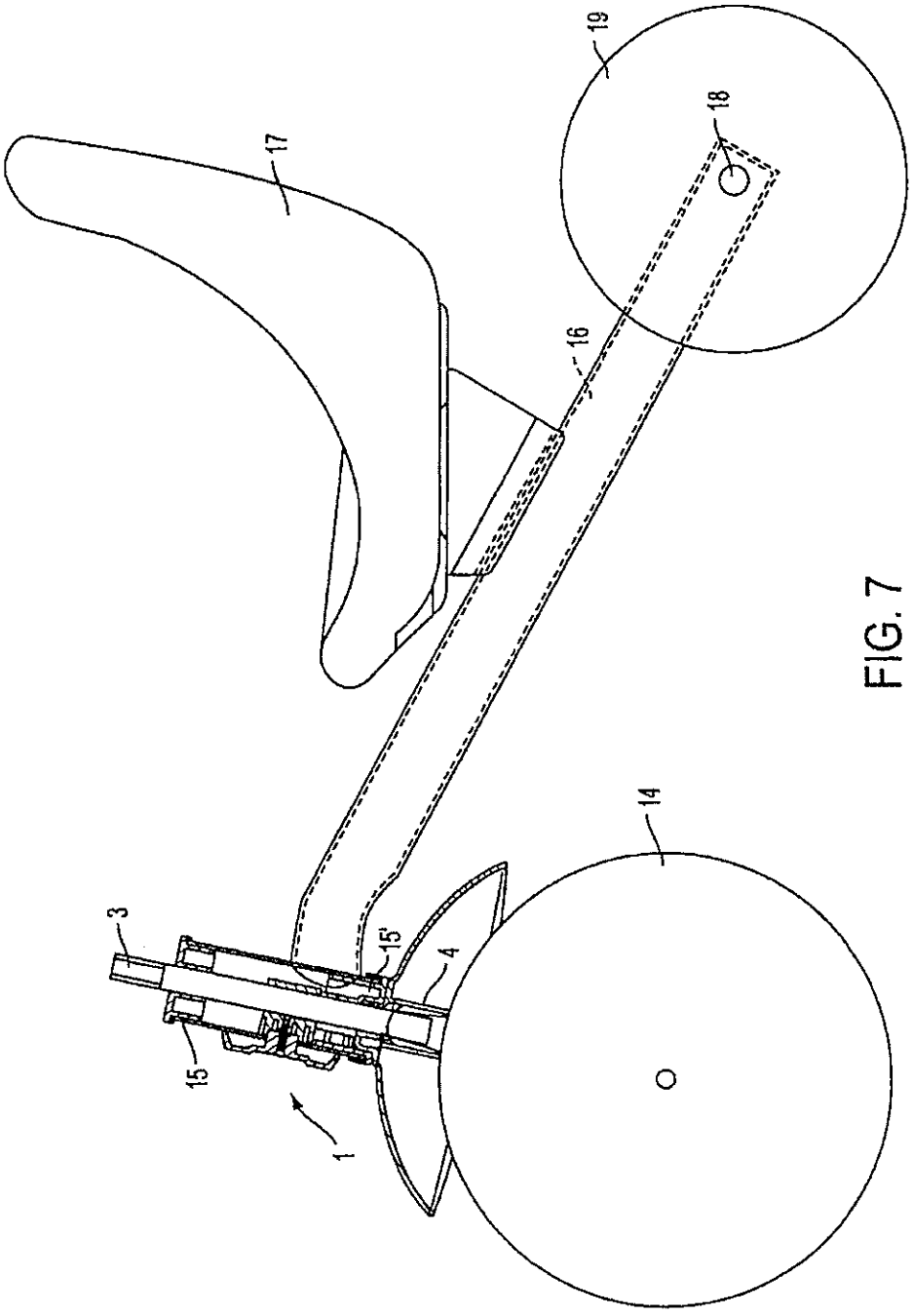
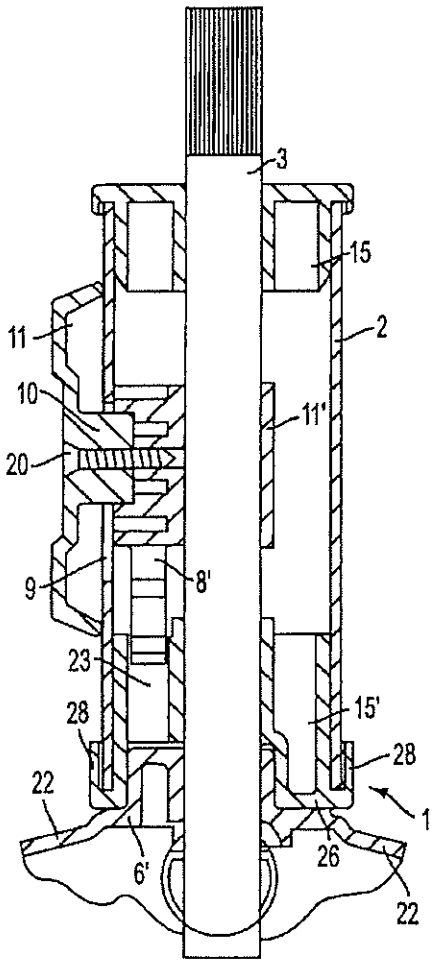


FIG. 7


3
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11'
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8'
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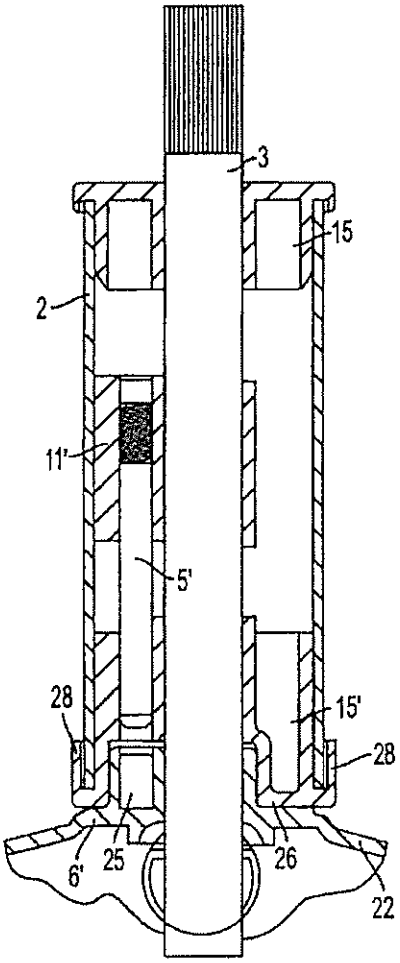
22
1
6'
26
22

FIG. 8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6'
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26
22

FIG. 9

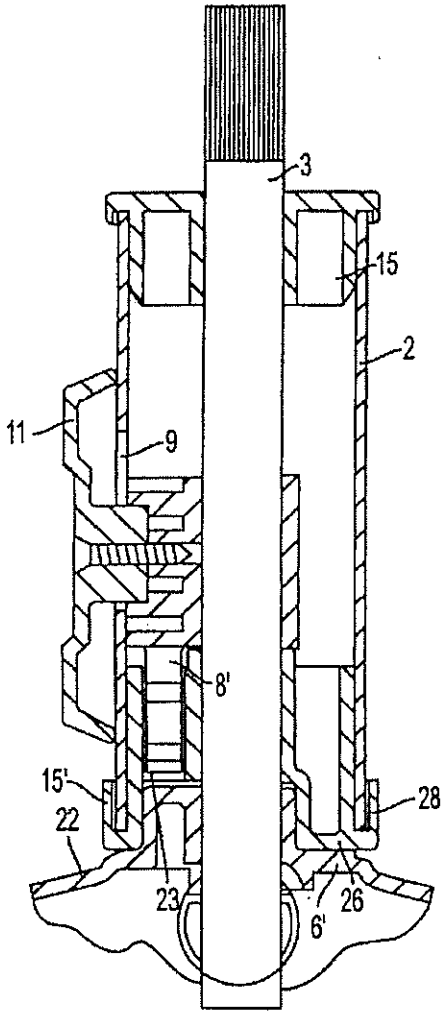

FIG. 10

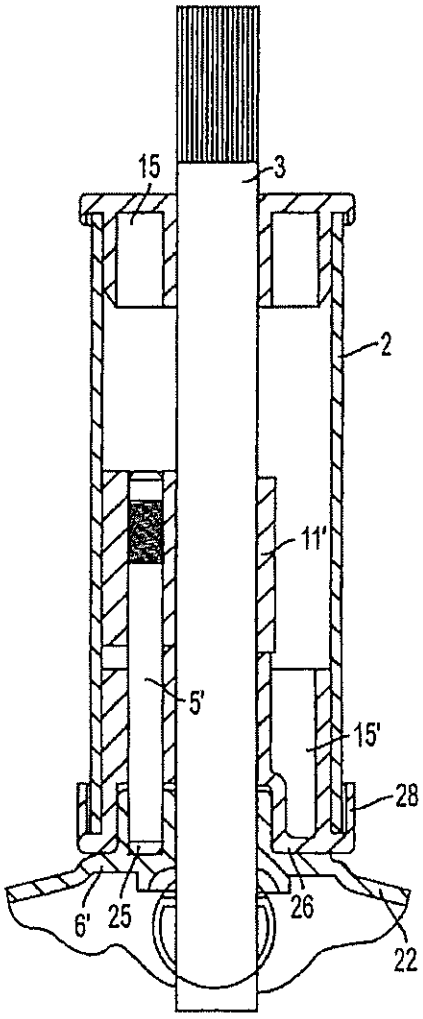

FIG. 11

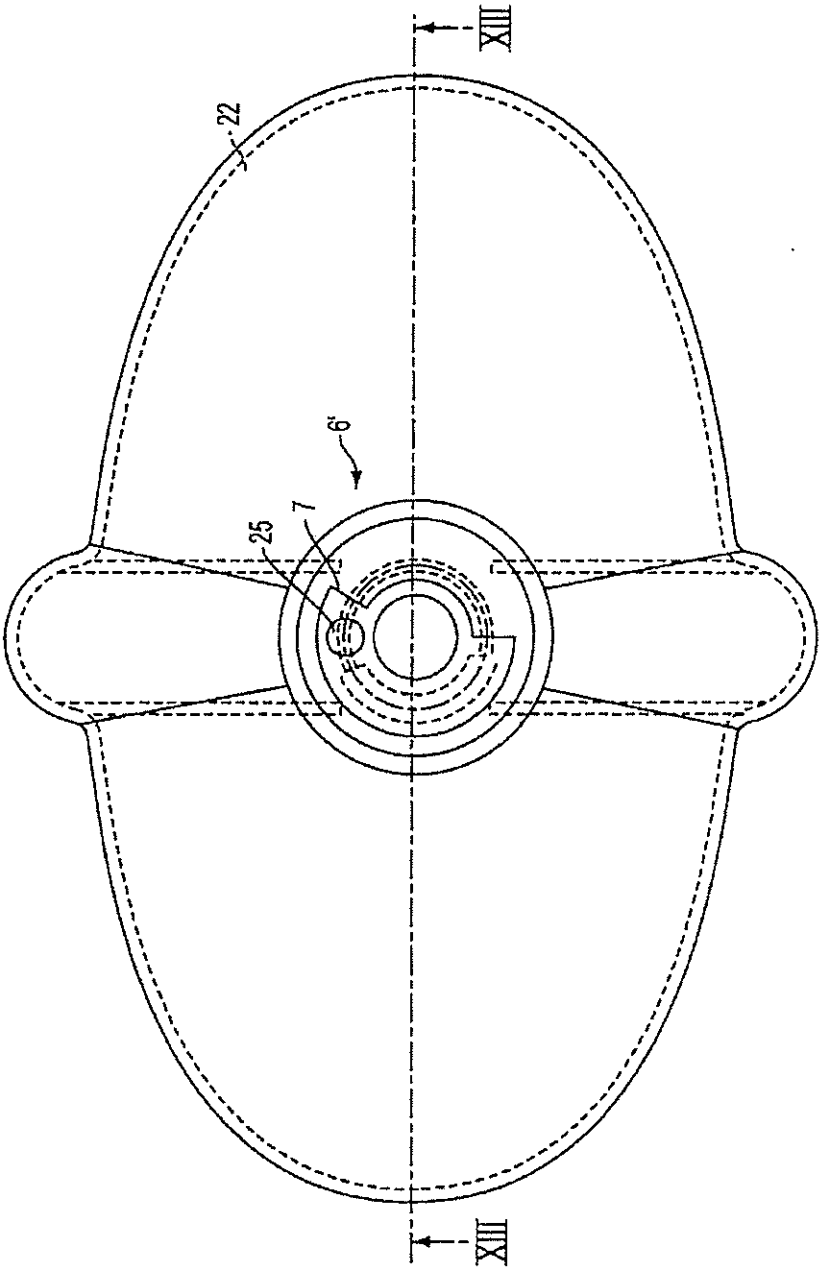

FIG. 12

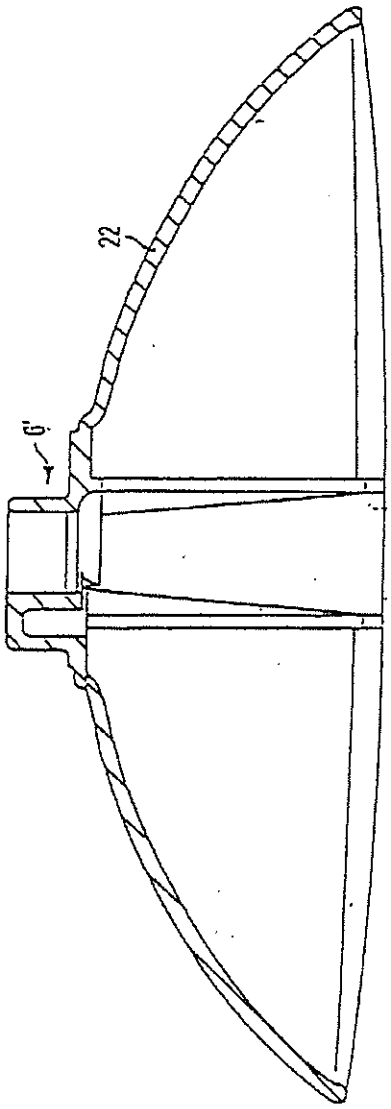

FIG. 13

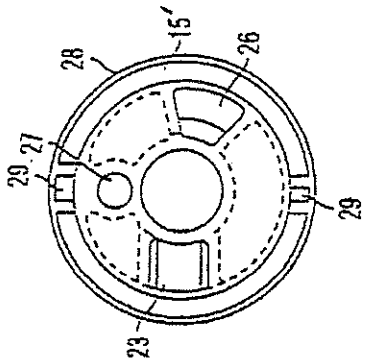

FIG. 17

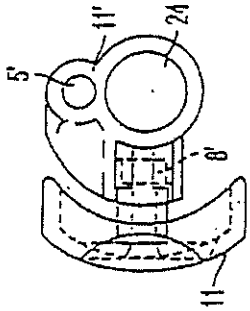

FIG. 16

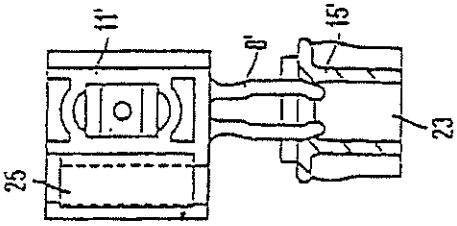

FIG. 15

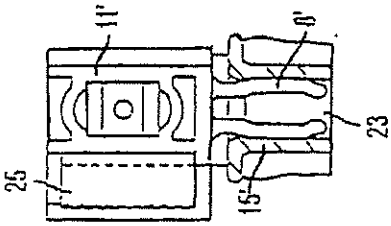

FIG. 14

VEHICLE STEERING HEAD

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of U.S. application Ser. No. 10/092,516 filed Mar. 8, 2002 now abandoned, which is a continuation of U.S. application Ser. No. 09/584,497 filed Jun. 1, 2000, now U.S. Pat. No. 6,378,884, the disclosures of which are expressly incorporated by reference herein in their entireties. Further, the present application claims priority under 35 U.S.C. § 119 of German Patent Application No. 299 11 652.2, filed on Jul. 5, 1999, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle steering head and in particular, to a steering head for a vehicle comprising a support tube which has rotatably supported therein a fork member to which a wheel cover and a handlebar can be secured.

2. Discussion of Background Information

Vehicle steering heads of the above-described type are in particular used in bicycles or tricycles, and in particular in tricycles or bicycles for children.

In devices of the above-described type it is desirable for safety reasons that accidents be avoided which may be caused by an excessively large handlebar deflection. It has been found that when there is an excessively large handlebar deflection (e.g., the handle bar rotates beyond a point where effective steering occurs), the vehicle may tilt to the side. Moreover, such deflections or excessive rotation may run the risk that a user impacts his body against the handlebar. Additionally, the user may get caught with his/her feet in the front wheel and may be even be injured by the pedals.

A further drawback or disadvantage of prior-art devices occurs when they are pushed with a push rod type device. In such cases, these devices have a tendency towards uncontrolled steering movements of the front wheel which cannot be mastered or effectively controlled by small children, in particular.

SUMMARY OF THE INVENTION

The present invention therefore provides a vehicle steering head of the above-mentioned type which is of a simple construction and which can operate in an easy and reliable manner. Moreover, this design avoids the drawbacks of the prior art and can in particular limit a handlebar deflection to a desired degree. The invention also has provision for locking the handlebar.

According to one aspect of the invention a latch element is secured to a fork member on a portion provided inside the support tube. A linkage element is supported in the support tube for rotation therewith. The linkage element is displaceable or moveable in a longitudinal direction of the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the latch element. Moreover, the linkage element comprises at least one locking element which is releasably connectable to the latch element.

According to another aspect of the invention a latch element is supported on the support tube. A linkage element is arranged on the fork member and connected to the tube for rotation therewith. The latch element is freely displaceable or moveable along the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the support tube. Moreover, at least one latch element is provided that is releasably connectable to the support tube.

The vehicle steering head according to the invention is characterized by a number of considerable advantages.

First of all, it is possible to install or utilize the steering head in a frame of any desired design, e.g. children's bicycles or tricycles. Ideally, the dimensions of the steering head are such that they do not interfere with the remaining structure of the frame within which it is installed. Of course, the steering head may be combined with any and all common types of frames where ever its advantageous design is desired. Accordingly, the steering head may be utilized in a variety of devices where limited deflection or rotation and/or locking are desired.

Because the invention utilizes a latch element which is arranged in the support tube, no functional parts of the steering head need be outwardly visible or accessible. Accordingly, the internal parts are less susceptible to damage. Additionally, this design is less likely to cause injury when used by children or infants.

As a result of utilizing a linkage element according to the invention, it is possible to reliably lock the fork member and thus the wheel fork and the front wheel. Such a locking provision is easily be accomplished by displacing or moving the linkage element. This design ensures a high degree of operational safety and operational reliability.

The linkage element preferably utilizes stop surfaces which cooperate with the latch element in a manner where they are brought into contact with one another. In this way, the steering angle can be limited to a particularly or desired range. This limited range of motion of the steering angle can be realized according to the invention in different ways. The invention contemplates that the available steering angle is freely selectable within a wide desired range. This is of particular advantage to vehicles for children such as tricycles, which may require a steering angle of approximately 45° to each side. Of course, other desirable steering angles can be utilized. However, by designing in the desired limited steering angle, lateral tilting of the tricycle or similar devices can be prevented or their risk significantly reduced. Additionally, the risk of injuries which may be caused by the pedals, e.g., devices which utilize pedals on the front wheel can be reduced. Finally, the risk of injury which can occur when the handlebar exceeds a controlled steering angle can be ruled out to a considerable extent.

The invention also provides for a linkage element having a locking element which is releasably connectable to the latch element. This design ensures that when a push rod is used for pushing the device, i.e., a tricycle, the front wheel thereof may be reliably locked in place during straight travel.

In an advantageous embodiment of the invention, the latch element is designed in the form of a pin which extends in a direction transverse to the fork member. The pin may extend through the fork member such that it projects at both sides of the fork member. Alternatively, the pin can project from the fork member on only one side. Moreover, the pin can be firmly connected to the fork member, e.g. by welding or other conventional attachment techniques. Additionally, it may be secured by press fitting with or without utilizing a knurled portion. Of course, the dimensions of the pin can easily be adapted to the respective conditions of use.

It should be noted that the manufacturing costs of the steering head are reduced by the above-described construction to quite a considerable degree.

In another advantageous embodiment of the invention, the linkage element is substantially designed in the form of a hollow cylinder. Thus, the linkage element can be reliably guided in the support tube and surround the fork member. Additionally, the linkage element can be designed as a single integral part or several parts which are either joined together or which cooperate together.

It is advantageous for the longitudinal displacement or movement of the linkage element to be along an axis of the support tube and the fork member. Accordingly, the support tube may comprise at least one longitudinal slot or a similar recess through which a connection element extends which is connected to the linkage element. This design also utilizes a slide which is arranged outside the support tube.

The slide facilitates the ease of handling or movement of the linkage element. In such a design, a displacement of the slide, which may additionally be provided with locking mechanism or fixing safety mechanism, effects a corresponding displacement or movement of the linkage element. The locking mechanism or fixing mechanism allows for fixing the front wheel in a single or set travel position which is preferably straight. Moreover, the invention also contemplates that the linkage element may be provided with inclined inlet surfaces or intercepting mechanisms which engage the latch element so as to initiate a locking action when the front wheel is slightly deflected angularly.

Stop surfaces on the latch element are preferably formed on at least one front attachment of the linkage element. Additionally, it is particularly advantageous when two opposite attachments or stops are in symmetry with each other and are each provided with at least one stop surface located on the linkage element. Thus, by utilizing two attachments or stops which are in symmetry with each other, this design can limit the steering angle in a symmetrical fashion to both the left and the right side.

In another advantageous embodiment of the invention, the associated stop surfaces of the attachments or stops act to limit the rotation of the fork member to a predetermined angular range at both sides. This angular range may e.g. be approximately 45° to both sides, for a total range of motion of approximately 90°.

The locking element is preferably designed in the form of at least one front recess which receives the latch element. Such an advantageous design makes it possible to grip and fix the latch element upon displacement or movement of the linkage element. Additionally, it is advantageous that the recess be retracted or set back relative to the front attachment, so that the attachments or stops can always remain in the plane of the latch element, while upon a displacement of the latch element, it is only the recess which can additionally be brought into engagement.

To implement a simple and operationally reliable structure of the steering head, it may be advantageous for the recess to be centrally arranged between the two attachments or stops.

The invention also contemplates that the fork member itself has not been changed constructionally. In other words, the invention can be adapted to work with a conventional fork member. Also, the invention makes it possible to manufacture all functional parts separately in a very simple manner. As a result, advantageous production costs can be achieved.

In a preferred design of a previously described embodiment, the linkage element is designed as part of a

mudguard which extends from below into the support tube. This design allows for significant cost savings since the mudguard is normally made from plastics and is typically already included in most vehicles of the above-described type. The linkage element can thus be mounted on the mudguard or made integrally therewith, in a particularly easy way and at low costs.

A further advantage of the this embodiment is that the latch element can be designed in the form of a bolt which arranged to be parallel with the fork member. The latch element of this design can thus be given relatively large dimensions so that the diameter of the support tube itself need not be chosen with such a large size.

It may be of particular advantage when the latch element is connected to a slide which extends into the support tube so as to be able to design the lock of the front wheel in a particularly simple manner. Furthermore, the locking element may preferably be connected to the slide. Moreover, the locking element serves to reliably maintain the locked state and to prevent any unintended unlocking. The locking element also preferably engages into a recess of a bearing which supports the fork member in the support tube. As a result, it is not necessary to mount additional parts or to take installation measures on the support tube itself.

It may also be of particular advantage for the limitation of the steering angle to be accomplished by a lower bearing which supports the fork member in the support tube. This lower bearing may have formed thereon an attachment which projects in the direction of the linkage element and which can be brought into contact with the stop surfaces formed on the linkage element and thus on the mudguard. This design has the advantageous effect that the predetermined angular range can be limited at both sides as well, e.g. approximately 45° each side.

The invention provides a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element projecting from the fork member and disposed within the support tube, and a linkage element disposed within the support tube, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member and comprises at least one stop surface for limiting a rotation of the fork member when the latch element contacts the at least one stop surface. The linkage element may further comprise at least one locking element for locking the fork member in a single position. The at least one locking element may releasably engage the latch element when the fork member is locked. The latch element may comprise a pin. The pin may project substantially perpendicular to the axis of the fork member. The linkage element may comprise a substantially cylindrical shape. The linkage element may comprise a plurality of hollow chambers separated by connecting walls. The support tube may comprise an opening which allows a connecting element to pass therethrough. The opening may comprise a longitudinal slot. The connecting element may be secured to the linkage element. The movement of the linkage element may be limited by the movement of the connecting element within the longitudinal slot. The steering head may further comprise a slide which is secured to the connecting element, the slide being disposed adjacent an outer surface of the support tube. The at least one stop surface may be disposed on at least one stop.

The at least one stop may comprise a projection which extends from the linkage element. The at least one stop may comprise a wedge-shaped hollow projection having two

angled lateral stop surfaces. The at least one stop may comprise two stops which are disposed opposite one another. Each stop may comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The two stops may define a limited range of rotational motion of the fork member in each of a clockwise and a counter-clockwise direction. The limited range of motion in the clockwise direction may be substantially equal to the range of motion in the counter-clockwise direction. The limited range of motion in one of the clockwise and counter-clockwise direction may be approximately 45 degrees.

The linkage element may further comprise at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element. The at least one recess is set back some distance from a surface of at least one stop. The at least one recess is centrally disposed between at least two stops.

The steering head may further comprise an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tube, each of the upper and lower bearings having an opening which allows the fork member to pass therethrough.

The steering head may be disposed on a tricycle frame.

The invention also provides for a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork member, and a linkage element connected to the fork member so as to rotate therewith, the linkage element comprising at least one stop surface, wherein the at least one stop surface limits the rotation of the fork member with respect to the support tube. The steering head may further comprise a slide, wherein the slide is disposed within the support tube and retains the latch element. The slide may further comprise at least one locking element for releasably securing the slide to the support tube. The linkage element may comprise a mudguard. The mudguard may be disposed between one end of the support tube and a wheel fork. The latch element may comprise a rod like member which is arranged substantially parallel to the axis of the fork member. The rod like member may comprise one of a bolt and a pin. The latch element may be connected to a slide, the slide being disposed within the support tube. The slide may be moveable substantially parallel to the axis of the fork member. A locking element may be connected to the slide.

The steering head may further comprise a bearing support disposed on at least one end of the support tube. The bearing support may be disposed on a lower end of the support tube. The steering head may further comprise a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support. The bearing support may comprise at least one stop, the at least one stop comprising at least one surface which engages the linkage element. The at least one stop may comprise a projection which engages a recess in the linkage element. The projection and the recess may cooperate to limit the rotational movement of the fork member within a desired range. The range of the rotational movement may be limited by at least two stop surfaces. The at least two stop surfaces may define a limited range of rotation in one of a clockwise and a counter-clockwise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counter-clockwise direction. The limited range of rotation between the at least two stops may be approximately 45 degrees.

The steering head may be disposed on a tricycle frame.

The invention further provides for a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The fork member comprises a fork end, a handlebar, and a latch element projecting from the fork member between the fork end and the handlebar end. The latch element is disposed within the support tube and a linkage element is slidably disposed within the support tube. The linkage element comprises at least one stop surface for engaging the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element and the at least one stop cooperate to limit the rotational movement of the fork member to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element.

The invention also relates to a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The lower bearing support comprises at least one stop surface, the fork member comprising a fork end, a handlebar, and a latch element which is slidably disposed adjacent the fork member between the fork end and the handlebar end, the latch element being disposed within the support tube and a linkage element moveably disposed adjacent the lower support bearing. The linkage element comprises at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element engages only the lower bearing support and where the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork member to a second position where the latch element releasably engages a recess in the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element. The linkage element may further comprise at least one locking element for engaging a locking recess in the lower bearing support. The at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

The invention provides for a vehicle steering head including a fork member adapted to engage a handlebar, a support tube which rotatably supports the fork member, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage

element prevents the fork member from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork member to rotate with respect to the support tube in at least two directions. The latch element may comprise a rod-like member.

The invention also provides for a vehicle steering head that includes a support tube adapted to be coupled to a vehicle frame, an upper bearing support arranged at an upper end of the support tube, a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface, a cylindrical element rotatably mounted to the support tube via the upper and lower bearing supports, the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar, a latch element movably disposed within the support tube, a slide coupled to the latch element, the latch element being movable from outside the support tube, a linkage element that is rotatable with respect to the support tube, and the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube, wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, a mechanism which limits the rotational movement of the fork member in each of two directions, and a lower bearing support mounted to the support tube, wherein the mechanism and the lower bearing support cooperate to limit the rotational movement of the fork member.

The lower bearing support may be non-rotatably fixed to the support tube. The lower bearing support may comprise at least one stop surface. The lower bearing support may comprise two stop surfaces. The mechanism may comprise at least one stop surface. The mechanism may comprise two stop surfaces. The mechanism may comprise a linkage element having at least one stop surface. The linkage element may rotate with the fork member. The linkage element may be arranged on a mudguard. The fork member may be cylindrically shaped. The steering head may further comprise a handlebar connected to one end of the fork member and a wheel fork connected to another end of the fork member.

The invention also provides a vehicle steering head comprising a support tube adapted to be fixed to a frame, a cylindrical member adapted to connect a wheel fork to a handlebar, the cylindrical member being rotatable with respect to the support tube, a linkage element being movable and comprising at least two stop surfaces, wherein one of the at least two stop surfaces limits the rotation of the cylindrical member in one direction, and wherein another of the at least two stop surfaces limits the rotation of the cylindrical member in another direction.

The linkage element may rotate with the cylindrical member. The linkage element may rotate with a mudguard.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a connecting element adapted to connect a wheel fork to a handlebar, the connecting element being rotatable with respect to the support tube, a linkage element being rotatable and comprising at least two stop surfaces, a mudguard that rotates with the linkage element, one of the at least two stop surfaces limiting the rotation of the connecting element in one direction, and another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, and a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

FIG. **1** is a schematic side view of a children's tricycle with one embodiment of the vehicle steering head according to the invention;

FIG. **2** is a simplified sectional side view of the steering head according to the invention in an unlocked state;

FIG. **3** is a side view, turned or oriented by 90° (a night angle) of the arrangement shown in FIG. **2**;

FIG. **4** is a sectional side view similar to FIG. **2**, in the locked state;

FIG. **5** is a side view, similar to FIG. **3**, of the view according to FIG. **4**;

FIG. **6** is a simplified perspective illustration of the linkage element according to the invention;

FIG. **7** is a schematic side view of a children's tricycle with another embodiment of the vehicle steering head according to the invention;

FIG. **8** is a sectional side view of the vehicle steering head according to the invention, in the unlocked state;

FIG. **9** is a side view, turned or oriented by 90° of the arrangement shown in FIG. **8**;

FIG. **10** is a sectional side view similar to FIG. **8**, in the locked state;

FIG. **11** is a side view, turned or oriented by 90° which is similar to FIG. **9**, in the locked state;

FIG. **12** is a top view on the linkage element according to the invention and on the associated mudguard;

FIG. **13** is a sectional view of the arrangement according to FIG. **12** along the sectional lines XIII—XIII of FIG. **12**;

FIG. **14** is an enlarged side view showing a portion of the slide and of the locking element in the locked state;

FIG. **15** is a view analogous to FIG. **14**, in the unlocked state;

FIG. **16** is a top view on the slide; and

FIG. **17** is a top view on the lower bearing.

DETAILED DESCRIPTION OF THE INVENTION

The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is

made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

A children's tricycle is shown in FIG. 1 and comprises a front wheel 14 which is supported on a wheel fork 4. Wheel fork 4 is fixedly connected to a fork member 3. A handlebar (not shown) can be secured to the upper end of fork member 3.

Fork member 3 is supported in a support tube 2. This support is accomplished by utilizing slide bearings 15 and 15' which are shown in detail in FIGS. 2 to 5. The slide bearings 15 and 15' correspond to those of the prior art in this embodiment so that a detailed description is not needed.

Support tube 2 is firmly connected to a frame 16 which has mounted thereon a seat 17. The tricycle also has a rear axle 18 with rear wheels 19. Accordingly, a support tube 2 and a fork member 3 form a steering head 1.

According to the invention, support tube 2 has arranged therein a linkage element 6 which has a substantially cylindrical configuration (see also FIG. 6) and which is received with a play or clearance (so that it can slide) within support tube 2. Linkage element 6 is also provided with a central recess through which fork member 3 extends or passes.

Support tube 2 also has formed therein a longitudinal slot 9 through which a connection element 10 extends or passes. This connection element 10 is connected to a slide 11 and linkage element 6. The connection may be via a screw 20 (see FIGS. 2 and 4) or other conventional connecting mechanism. In the illustrated embodiment, connection element 10 is integrally connected to or formed with slide 11 and extends in a recess 21 of linkage element 6. However, connection element 10 and slide 11 may be made as separate components which are joined or secured together by any conventional attachment technique including a screw or threaded element.

On its front upper portion, linkage element 6 comprises two symmetrical opposite attachments or stops 12. Each of these stops 12 may be provided with lateral stop surfaces 7. When viewed from the top, these attachments or stops 12 are designed in a manner of a segment of a partial circle (pie shaped or wedge shaped), so that four stop surfaces 7 are formed, with each one being arranged in symmetry with one another. Of course, stops 12 may be separately formed and attached to linkage element 6 instead of being integrally formed therewith, as is shown.

In the illustrated embodiment two locking elements 8 may be utilized in which each is formed by a recess 13. These locking elements 8 are preferably provided on linkage element 6 in retracted or set back manner with respect to stops 12. As is apparent from FIG. 6, the walls of at least one recess 13 may be made resilient to ensure a releasable locking of a bolt-like latch element 5 when linkage element 6 is pushed upwards or into engagement with bolt-like latch element 5.

As is apparent from FIGS. 2 to 5, fork member 3 is provided with a bolt-like or pin-like latch element 5 which extends or projects from at least one and preferably both sides of fork member 3. Of course, latch element 5 may be integrally formed with fork member. Alternatively, latch element 5 may be a threaded or partially threaded member which threads into fork member 3. However, it is preferred that latch element 5 be a pin having a centrally disposed exterior knurl which is press fit into a fork member as is shown. In its working position, latch element 5 rotates with fork member 3 when a deflection or rotation of the handlebar takes place. The deflection of the handlebar is limited by way of latch element 5 abutting on stop surfaces 7, these stop surfaces 7 defining the limited range of motion of the handlebar.

When it is desired to lock the handlebar in a set position, latch element 5 is pressed or forced into recesses 13. This engagement occurs when locking element 8, which is disposed on linkage element 6, is pushed upwards by slide 11. Recesses 13 also utilize inclined inlet surfaces because they act as guiding lead-in surfaces which facilitate entry of pin 5 into recess 13. In the locked state, which is shown in FIGS. 4 and 5, a steering movement thus becomes impossible since the handlebar or fork member 3 is locked in a single direction. FIGS. 2 and 3 show a downwardly displaced condition of linkage element 6 in which latch element 5 is in a position which it does not cooperate with the locking element 8. As a result, in this position fork member 3 and handlebar are free to rotate until latch element 5 abuts on stop surfaces 7, this range of movement or rotation corresponding to a steering angle range.

According to a preferred aspect of the invention, linkage element 6 may be made from a plastic material. Of course, other materials are also contemplated.

Another embodiment of the vehicle steering head according to the invention is described with reference to FIGS. 7 to 16. In this regard, like parts are provided with like reference numerals.

As for the description of FIG. 7, reference can be made to the description of FIG. 1 to the extent that the same features are shown. The subsequent figures are illustrations elucidating the details which have been changed.

As in FIGS. 2 to 5, FIGS. 8 and 9 and 10 and 11, respectively, are illustrations showing the vehicle steering head on an enlarged scale. Again, like parts are here also provided with like reference numerals, so that reference can be made to the preceding explanations. Slide 11 utilizes connection element 10 and screw 20. Connection element 10 also extends through a longitudinal slot 9. Moreover, slide 11 comprises an outer grip portion 11 and an interior portion 11' which is screwed to outer grip portion 11 by a screw 20. A top view of slide 11 and 11' is shown in FIG. 16. As can be seen in this figure, a central recess 24 is provided through which fork member 3 extends or passes (with a clearance which allows slide 11' to move up and down with respect to fork member 3). Furthermore, slide 11' also has a recess (see FIGS. 9, 11 and 16) which is formed so that it can accept a bolt-like latch element 5'. Of course, this latch element 5' may be pressed into this recess, threaded into the recess, or otherwise secured to slide 11' in a suitable manner. Alternatively, latch element 5' may be integrally formed with slide 11'.

As already described in conjunction with a previous embodiment, a bearing 15 which serves as a slide bearing is used on the upper portion of steering head 1.

Lower bearing 15' in this embodiment is configured such that it has an upwardly projecting contour of a linkage element 6' which can extend into bearing 15'. Of course, the bearing and the upwardly projecting contour may be made as separate components which are joined together by conventional techniques rather than integrally formed as is shown. Additionally, as becomes apparent in FIG. 12, linkage element 6' may have a recess 25 into which latch element 5' can be inserted (see also FIGS. 9 and 11).

As can further be seen from the top view of FIG. 12, linkage element 6' comprises two lateral stop surfaces 7

which are angularly spaced apart from each other. This design is such that a downwardly oriented attachment or stop **26** (see FIGS. **8** to **11**) of the bearing **15'**, which is connected to support tube **2**, forms a steering limitation of plus/minus approximately 45°. Of course, as with the previous embodiment, the range of steering limitation can be designed to any desired range.

FIG. **13** shows a lateral sectional view of mudguard **22** and of linkage element **6'**. Note that these components are integrally formed as a single member which reduces manufacturing costs associated with joining two separate components.

FIGS. **14** and **15** are front views of slide **11'** wherein handpiece **11** has been removed to illustrate the operation of locking element **8'**. Locking element **8'** is U-shaped and includes two movable or flexible lateral legs which can releasably be inserted into a recess **23** of bearing **15'**. Upon insertion and locking, locking element **8'** is pressed against an undercut and thereby held in position inside recess **23**. Accordingly, when it is desired to release the locked state of fork member **3**, slide **11'** must be pushed upwards which removes the legs from recess **23**. Of course, other locking mechanisms may be utilized and this embodiment is not limited to the use of this particular locking mechanism. For example, a pin may be used which has a floating ring disposed around its circumference. Alternatively, other conventional releasable locking mechanisms may be utilized.

FIG. **17** is a top view on lower bearing **15'** on an enlarged scale. The (downwardly projecting) attachment or stop **26** can be seen here as can recess **23** which receives locking element **8'**. Moreover, recess **27** is adapted to receive and guide bolt-like latch element **5'** therein. Furthermore, a surrounding collar-like edge **28** can be seen in which **29** designates two oppositely disposed attachments or projections which serve as anti-rotation engagements. These engagements are designed to engage recesses (not shown) of support tube **2**. Of course, lower bearing may be secured to support tube **2** in any conventional manner such as by bonding, welding, or screws. Moreover, this attachment may be releasable or more permanent in nature.

It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

What is claimed:

1. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatable with respect to the support tube;

a latch element movably disposed within the support tube; and

a linkage element being movable and comprising at least one stop surface,

wherein the at least one stop surface limits the rotation of the fork member with respect to the support tube, and

wherein the latch element moves in a direction parallel to an axis of the fork member.

2. The steering head of claim **1**, wherein the latch element is connected to a slide, the slide being disposed within the support tube.

3. The steering head of claim **2**, wherein the slide is moveable substantially parallel to the axis of the fork member.

4. The steering head of claim **1**, further comprising a locking element connected to one of a slide and the linkage element.

5. The steering head of claim **1**, wherein the linkage element rotates with the fork member.

6. The steering head of claim **1**, wherein the fork member is cylindrical.

7. The steering head of claim **1**, further comprising a handlebar connected to one end of the fork member and a wheel fork connected to another end of the fork member.

8. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a cylindrical member adapted to connect a wheel fork to a handlebar;

the cylindrical member being rotatable with respect to the support tube;

a latch element movably disposed within the support tube; and

a linkage element being movable and comprising at least two stop surfaces,

wherein one of the at least two stop surfaces limits the rotation of the cylindrical member in one direction,

wherein another of the at least two stop surfaces limits the rotation of the cylindrical member in another direction,

wherein the latch element is connected to a slide, the slide being disposed within the support tube, and

wherein the slide is moveable substantially parallel to the axis of the cylindrical member.

9. The steering head of claim **8**, further comprising a locking element connected to one of a slide and the linkage element.

10. The steering head of claim **8**, wherein the latch element moves in a direction parallel to an axis of the cylindrical member.

11. The steering head of claim **8**, wherein the linkage element rotates with the cylindrical member.

12. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a linkage element being movable and comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a latch element that is movable parallel to an axis of the connecting element between at least a first position and at least a second position,

wherein, when the latch element is in the first position, the connecting element is rotatable, and wherein, when the latch element is in the second position, the connecting element is prevented from rotating.

13. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mechanism is coupled to the mudguard.

14. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mechanism and the mudguard comprise a one-piece structure.

15. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a device that engages the mechanism to prevent movement thereof,

wherein the device that engages the mechanism comprises a pin, and

wherein the pin is movable.

16. The vehicle steering head of claim 15, wherein the pin can move parallel to an axis of the connecting element.

17. The vehicle steering head of claim 16, wherein the pin engages an opening in the mechanism in a locking position.

18. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mudguard comprises the mechanism.

19. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mudguard;

a first stop surface limiting the rotation of the connecting element in one direction;

a second stop surface limiting the rotation of the connecting element in another direction; and

a device that engages the mudguard to prevent movement thereof,

wherein the device that engages the mudguard comprises a pin, and

wherein the pin is movably mounted.

20. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mudguard;

a first stop surface limiting the rotation of the connecting element in one direction;

a second stop surface limiting the rotation of the connecting element in another direction; and

a device that engages the mudguard to prevent movement thereof,

wherein the device that engages the mudguard comprises a pin, and

wherein the pin can move parallel to an axis of the connecting element.

21. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mudguard;

a first stop surface limiting the rotation of the connecting element in one direction;

a second stop surface limiting the rotation of the connecting element in another direction; and

a device that engages the mudguard to prevent movement thereof,

wherein the device that engages the mudguard comprises a pin, and

wherein the pin engages an opening in the mudguard.

22. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mudguard;

a first stop surface limiting the rotation of the connecting element in one direction;

a second stop surface limiting the rotation of the connecting element in another direction; and

a device that engages an opening that moves when the mudguard moves, wherein, when the device engages the opening, the mudguard is prevented from moving.

23. The vehicle steering head of claim 22, wherein the device that engages the opening comprises a pin.

24. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatable with respect to the support tube; and

a system which limits the rotational movement of the fork member in each of two directions,

wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member, and

wherein the one part which is non-rotatably mounted to the support tube comprises a lower bearing support.

25. The vehicle steering head of claim 24, wherein the other part which rotates with the fork member comprises a mechanism that has two stop surfaces.

26. The vehicle steering head of claim 25, wherein the mechanism that has two stop surfaces comprises a mudguard.

27. The vehicle steering head of claim 25, wherein the mechanism that has two stop surfaces is coupled to a mudguard.

28. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatable with respect to the support tube; and

a system which limits the rotational movement of the fork member in each of two directions,

wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member, and

a device that engages an opening that moves when the fork member moves, wherein, when the device engages the opening, the fork member is prevented from moving.

29. The vehicle steering head of claim 28, wherein the device that engages the opening comprises a pin.

30. The vehicle steering head of claim 29, wherein the pin can move in a direction that is parallel to an axis of the support tube.

31. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatably mounted to the support tube;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being movably mounted; and

the opening being arranged on a surface that can rotate in each of two directions,

wherein, when the pin engages the opening, the fork member is prevented from rotating, and

wherein, when the pin does not engage the opening, the fork member is free to rotate in each of two directions.

32. The vehicle steering head of claim 31, wherein the pin can move in a direction that is parallel to an axis of the support tube.

33. The vehicle steering head of claim 31, further comprising a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

34. The vehicle steering head of claim 33, wherein the one part which is non-rotatably mounted to the support tube comprises two stop surfaces and wherein the other part which rotates with the fork member comprises two stop surfaces.

35. The vehicle steering head of claim 34, wherein the fork member can rotate approximately 45 degrees to each side.

36. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatably mounted to the support tube;

a locking system comprising an opening and a locking device;

the locking device comprising a button portion and an engaging portion;

the locking device being movably mounted and being capable of moving in a direction that is parallel to an axis of the support tube;

the opening being arranged on a surface that can rotate in each of two directions and being capable of receiving the engaging portion of the locking device,

wherein, when the engaging portion engages the opening, the fork member is prevented from rotating, and

wherein, when the engaging portion does not engage the opening, the fork member is free to rotate in each of two directions.

37. The vehicle steering head of claim 36, further comprising a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

38. The vehicle steering head of claim 36, wherein the one part which is non-rotatably mounted to the support tube comprises two stop surfaces and wherein the other part which rotates with the fork member comprises two stop surfaces.

39. A vehicle steering head for one of a bicycle or a tricycle having a frame, said steering head comprising:

a support tube adapted to be fixed to the frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that limits rotational movement of the connecting element;

the mechanism comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mechanism is coupled to a mudguard, and

wherein the mechanism and the mudguard comprise a one-piece structure.

40. A vehicle steering head for one of a bicycle or a tricycle having a frame, said steering head comprising:

a support tube adapted to be fixed to the frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that limits rotational movement of the connecting element;

the mechanism comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a device that engages the mechanism to prevent movement thereof,

wherein the device that engages the mechanism comprises a pin, and

wherein the pin is movable parallel to an axis of the connecting element.

41. The vehicle steering head of claim **40**, wherein the pin engages an opening in the mechanism in a locking position.

42. A vehicle steering head for one of a bicycle or a tricycle having a frame, said steering head comprising:

a support tube adapted to be fixed to the frame;

a fork member adapted to connect a wheel fork to a handlebar;

the fork member being rotatably mounted to the support tube;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being movably mounted; and

the opening being arranged on a surface that can rotate in each of two directions,

wherein, when the pin engages the opening, the fork member is prevented from rotating, and

wherein, when the pin does not engage the opening, the fork member is free to rotate in each of two directions.

43. The vehicle steering head of claim **42**, wherein the pin is moveable in a direction that is parallel to an axis of the support tube.

44. The vehicle steering head of claim **42**, further comprising a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

45. The vehicle steering head of claim **44**, wherein the one part which is non-rotatably mounted to the support tube comprises two stop surfaces and wherein the other part which rotates with the fork member comprises two stop surfaces.

46. The vehicle steering head of claim **45**, wherein the fork member can rotate approximately 45 degrees to each side.

47. A vehicle steering head for a bicycle or a tricycle having a frame, comprising:

a support tube fixed to the frame;

an upper bearing support non-movably mounted to the support tube;

a lower bearing support non-movably mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess formed in the lower bearing support and a protrusion that rotates when the connecting element rotates;

the protrusion comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a locking system that prevents rotational movement of the connecting element.

48. The vehicle steering head of claim **47**, wherein the locking system comprises an engaging member that can be moved between a first position that allows the connecting element to rotate in each of two directions to a second position wherein the connecting element is prevented from rotational movement in each of the two directions.

49. The vehicle steering head of claim **47**, wherein the locking system comprises a movable engaging member that can move parallel to an axis of the connecting element to prevent rotational movement of the connecting element.

50. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support non-movably mounted to the support tube;

a lower bearing support non-movably mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which movably engages with the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

the projecting portion being movable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion extends into the recess and rotates with the connecting element about an axis that runs through the connecting element.

51. The vehicle steering head of claim **50**, further comprising a locking system that prevents rotational movement of the connecting element.

52. The vehicle steering head of claim **51**, wherein the locking system comprises a locking member that moves parallel to an axis of the support tube and an opening which rotates with the connecting element, wherein when the locking member engages the opening the connecting element is prevented from rotating, and wherein when the locking member disengages from the opening the connecting element is allowed to rotate.

53. The vehicle steering head of claim **51**, wherein the locking system comprises a movable locking member and a recess which rotates with the connecting element, wherein when the locking member engages the recess the connecting element is prevented from rotating, and wherein when the locking member disengages from the recess the connecting element is allowed to rotate.

54. A vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that is rotatable and comprises at least two stop surfaces;

a mudguard;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a device that engages an opening in the mechanism to prevent movement of the mechanism.

55. The vehicle steering head of claim **54**, wherein the device that engages the mechanism comprises a pin.

56. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to an upper end of the support tube;

a lower bearing support mounted to a lower end of the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which movably engages with the recess;

the recess comprising two stop surfaces and being arranged on the lower bearing support;

the projecting portion being rotatable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion extends into the recess and rotates with the connecting element about an axis that runs through the connecting element.

57. The vehicle steering head of claim **56**, wherein the projecting portion is arranged on a mudguard.

58. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to an upper end of the support tube;

a lower bearing support mounted to a lower end of the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which movably engages with the recess;

the recess comprising two stop surfaces and being arranged on the lower bearing support;

the projecting portion being arranged on a mudguard and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion extends into the recess and rotates with the connecting element about an axis that runs through the connecting element, and

wherein the projecting portion and the mudguard comprise a one-piece member.

59. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which moves within the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion rotates with the connecting element about an axis that runs through the connecting element.

60. The vehicle steering head of claim 59, further comprising a locking system that prevents rotational movement of the connecting element.

61. The vehicle steering head of claim 60, wherein the locking system comprises a locking member that moves parallel to the axis and an opening adapted to receive the locking member, and wherein the locking member is movable between a first position that allows the connecting element to rotate in each of two directions to a second position wherein the connecting element is prevented from rotational movement in each of the two directions, whereby, in the first position, the locking member does not extend into the opening, and whereby, in the second position, the locking member extends into the opening.

62. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which moves within the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

the projecting portion being movable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion rotates with the connecting element about an axis that runs through the connecting element.

63. The vehicle steering head of claim 62, wherein the projecting portion is arranged on a mudguard.

64. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which moves within the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

the projecting portion being arranged on a mudguard;

the projecting portion being movable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion rotates with the connecting element about an axis that runs through the connecting element, and

wherein the projecting portion and the mudguard comprise a one-piece member.

65. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard;

a movement limiting system that limits rotational movement of the connecting element;

the movement limiting system comprising a recess and a projecting portion which moves within the recess;

the recess having two stop surfaces and being arranged on the lower bearing support;

the projecting portion being movable with the connecting element and being configured to engage each of the two stop surfaces;

one of the two stop surfaces limiting the rotation of the connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

another of the two stop surfaces limiting the rotation of the connecting element in another direction when the projecting portion engages another of the two stop surfaces,

wherein the projecting portion rotates with the connecting element about an axis that runs through the connecting element.

66. A vehicle steering head for a bicycle or a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element having one end connected to a wheel fork and another end adapted to be connected to a handlebar;

the connecting element being rotatably mounted to the support tube via the upper and lower bearing supports;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being movably mounted within the support tube; and

the opening being arranged on a surface that can rotate with the connecting element in each of two directions,

wherein, when the pin engages the opening, the connecting element is prevented from rotating, and

wherein, when the pin does not engage the opening, the connecting element is free to rotate in each of two directions.

67. The vehicle steering head of claim 66, further comprising a mudguard.

68. The vehicle steering head of claim 66, wherein the pin moves parallel to an axis of the connecting element.

69. The vehicle steering head of claim 66, wherein the pin moves parallel to an axis of the connecting element and is configured to pass through the lower bearing support and into the opening.

* * * * *

US007156408B2

(12) **United States Patent**
Kettler et al.

(10) **Patent No.: US 7,156,408 B2**
(45) **Date of Patent: Jan. 2, 2007**

(54) **VEHICLE STEERING HEAD**

(75) Inventors: **Heinz Kettler**, Ense-Parsit (DE); **Joachim Kettler**, Werl (DE); **Reinhard Rocholl**, Werl (DE)

(73) Assignee: **Heinz Kettler GmbH & Co. KG.**, Ense-Parsit (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/671,668**

(22) Filed: **Sep. 29, 2003**

(65) **Prior Publication Data**

US 2004/0090038 A1 May 13, 2004

Related U.S. Application Data

(63) Continuation of application No. 10/298,002, filed on Nov. 18, 2002, now Pat. No. 6,799,772, which is a continuation of application No. 10/092,516, filed on Mar. 8, 2002, now abandoned, which is a continuation of application No. 09/584,497, filed on Jun. 1, 2000, now Pat. No. 6,378,884.

(30) **Foreign Application Priority Data**

Jul. 5, 1999 (DE) ..... 299 11 652 U

(51) **Int. Cl.**
B62K 5/02 (2006.01)

(52) **U.S. Cl.** **280/279**; 280/272; 74/495

(58) **Field of Classification Search** 280/279, 280/272, 271, 282, 89; 403/354, 83; 74/495
See application file for complete search history.

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Primary Examiner—Tony Winner
(74) *Attorney, Agent, or Firm*—Greenblum & Bernstein, P.L.C.

(57) **ABSTRACT**

Vehicle steering head including a connecting element adapted to engage a handlebar. A support tube rotatably supports the connecting element. A connecting member is adapted to connect a wheel fork to a handlebar. The connecting member is rotatable with respect to the support tube. A mechanism limits the rotational movement of the connecting member in each of two directions. A lower bearing support is mounted to the support tube. The mechanism and the lower bearing support cooperate to limit the rotational movement of the connecting member.

71 Claims, 9 Drawing Sheets

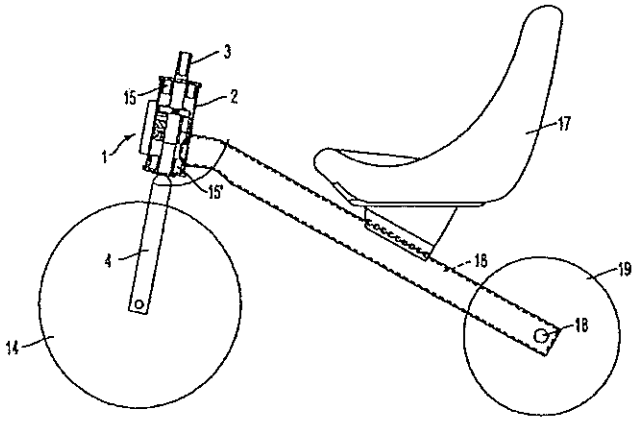

Exhibit 4

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Three sheets labeled "ACKNOWLEDGMENT" which Radio Flyer alleges to be evidence that the Radio Flyer model No. 77 was sold during 1998.

A sheet entitled "Restricted Turning Prior Art" which Radio Flyer alleges to be evidence that the Radio Flyer model No. 77 was released Feb. 19, 1998.

A sheet entitled "Product Name: Roll N Ride" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Grow-With-Me-Trike" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Baby Too" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

A sheet entitled "Product Name: Tough Trikes" and "Product Name: Push'n Pedal Trike" which Radio Flyer alleges to be evidence that the products shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "HBC Model 29875 CS 04G" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Smoby Pilot Alu Plus Jugueles Pico S.A." which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Fisher Price Rock, Roll and Ride XL" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Charton Baby Driver 2 39150 St. Laurent France" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Processed Plastics West Coast Choppers" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Processed Plastic Item 17800-2" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799.772.

Two sheets entitled "Fischer Price Kawasaki (US Patent 6,651,528)" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Mattel Hot Wheels" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Tek-Net Toys Int'l Inc. USA 020821 Emergency 911" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Fischer Price L&S Ride on Harley" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

Two sheets entitled "Friendly Toys Item #7112 Fold-Up Trike" which Radio Flyer alleges to be evidence that the product shown in the photographs utilizes features recited in certain claims of US patent 6,799,772.

English Language Abstract of GB 815,456.

English Language Abstract of DE 32 42 863.

English Language Abstract of DE 39 14 050.

English Language Translation of Swiss No. 290478.

Document showing Radio Flyer model #77 entitled "Restricted Turning Prior Art" asserted by Radio Flyer to be prior art against the instant application in Civil Action No. 204-CV-614. During litigation, Radio Flyer presented to Applicant two Radio Flyer model #77 trikes and asserted that these trikes were prior art. One trike had an adhesive label with the following text "P.D. Jun. 1999" and another trike had an adhesive label with the text "P.D. Jul. 1998".

Applicant has no knowledge with regard to the meaning of "P.D.". Additionally, during litigation, Applicant ordered three Radio Flyer model #77 trikes on ebay rom three different individuals. One trike had an adhesive label with the following text "P.D. Jan. 1999", another trike had an adhesive label with the text "P.D. Jul. 1999", and another trike had an adhesive label with the text "P.D. Oct. 1999". Applicant has no knowledge with regard to whether or when any of these five trikes was sold or offered for sale in the U.S.

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Radio Flyer 1998 catalog (in color) pp. RF01389-RF01396.
Hand made drawing page No. RF12204 on ITALTRIKE letterhead. The drawing has a handwritten date of Jan. 21, 1987.
Hand made drawing page No. RF12206 on ITALTRIKE letterhead. The drawing has a handwritten date of Jan. 21, 1987.
Black and while picture allegedly showing a mold having page No. RF12208.
Black and white picture allegedly showing mold parts having page No. RF12209.
Sheet table in Italian having a stamp entitled "N. CITTON & C, s.a.s.".
Cover page of Europeo (in color) having page RF12230 and dated Feb. 1, 1991.
Four sheets with page Nos. RF12244-A, -B, -C and -D (in color) showing various pictures of trikes and a scooter on what appears to be notebook pages.
Four sheets with page Nos. RF12245-A, -B, -C and -D (in color) showing various pictures of trikes and a bike on what appears to be notebook pages.

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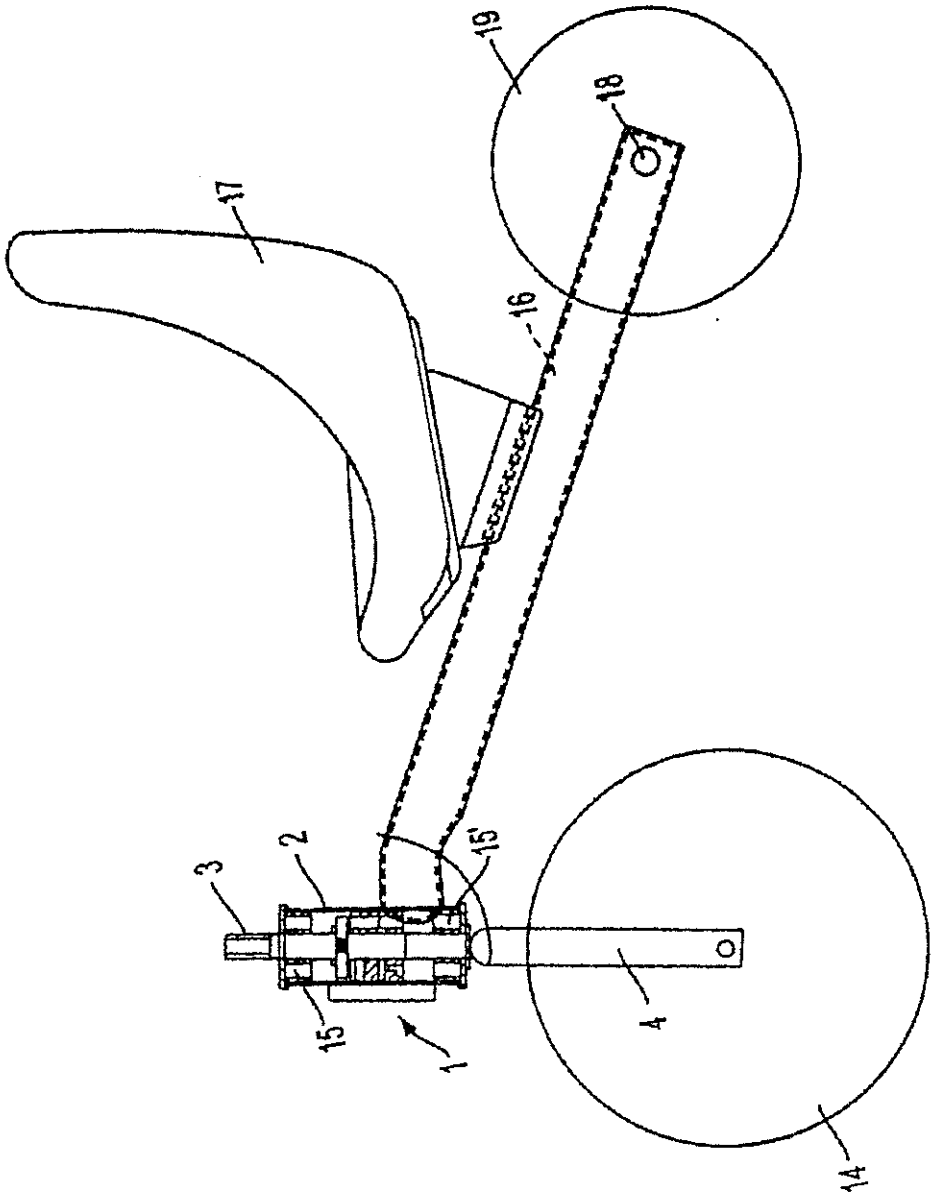


FIG. 1

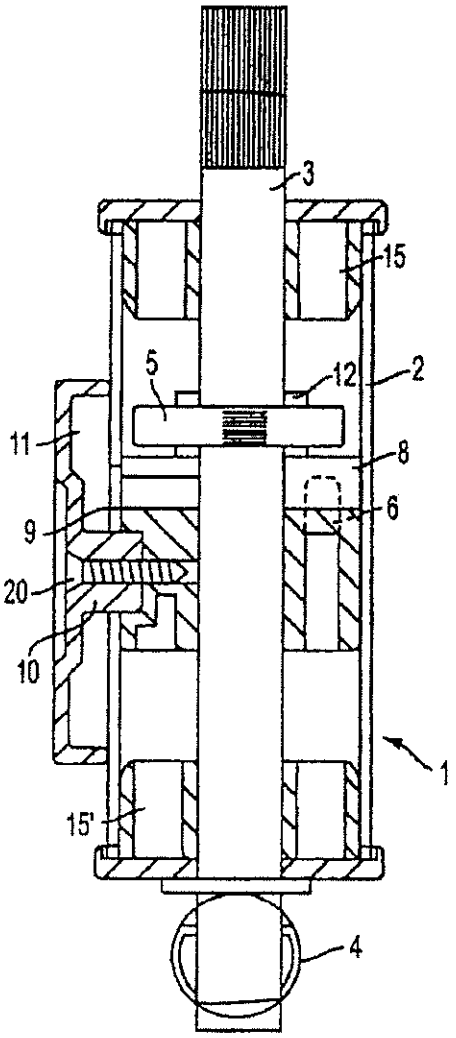


FIG. 2

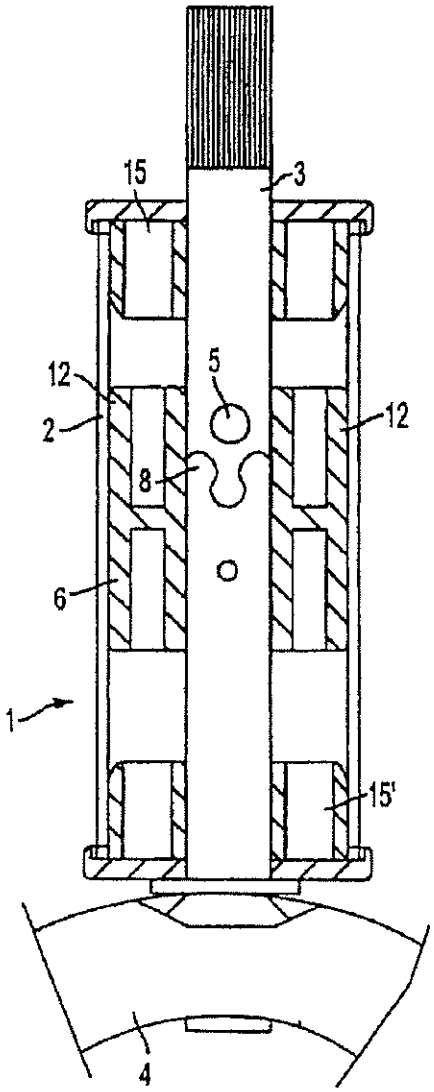


FIG. 3

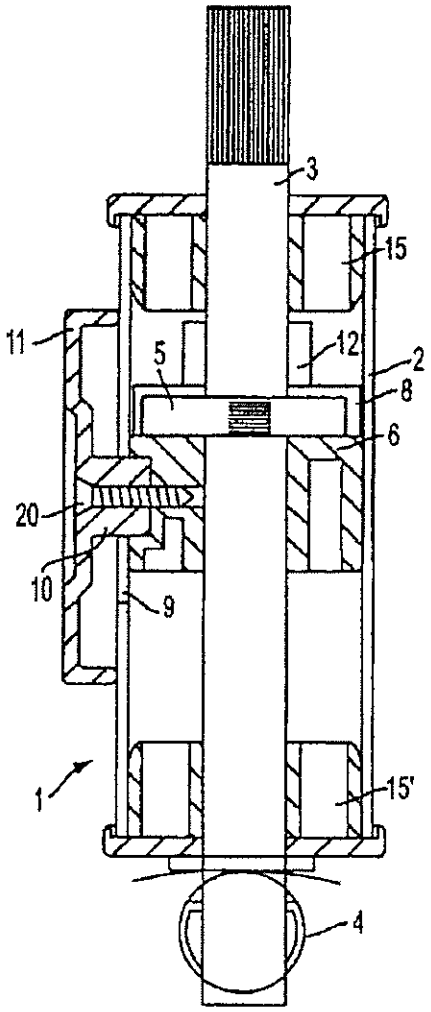


FIG. 4

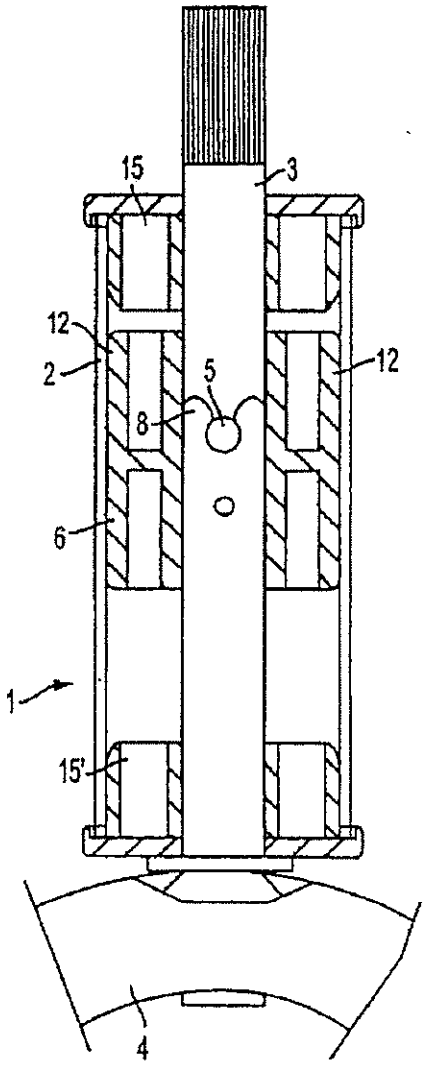


FIG. 5

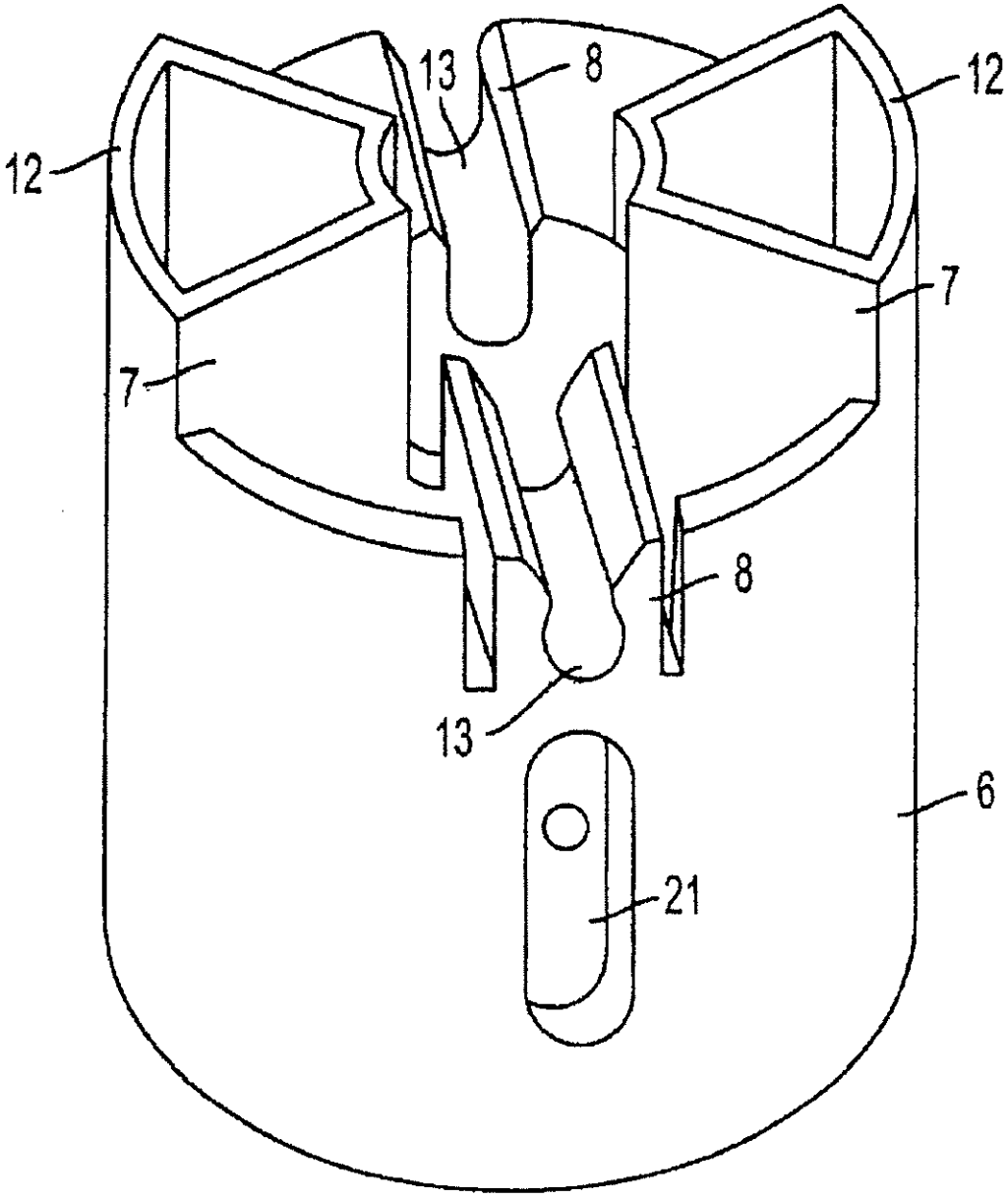


FIG. 6

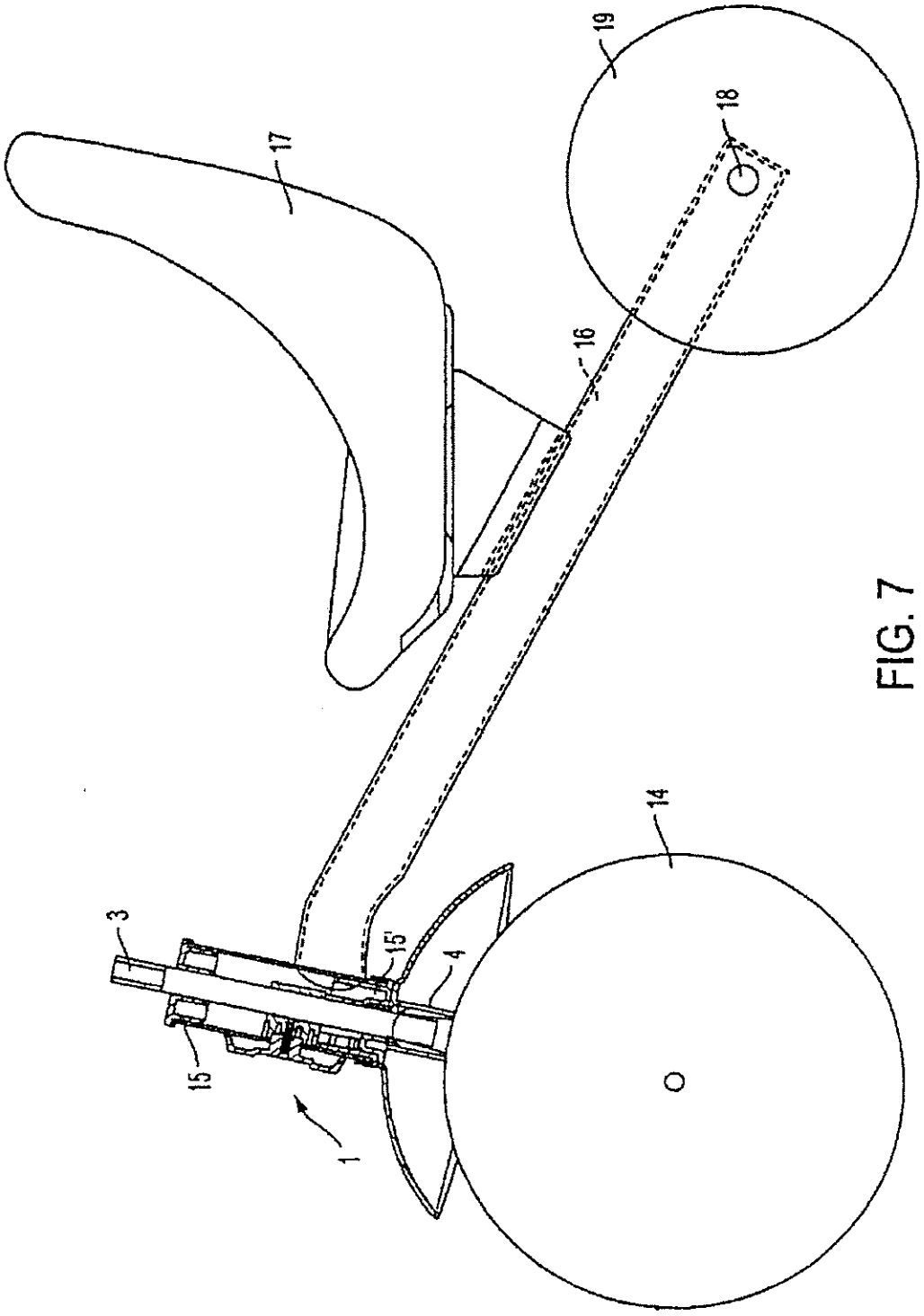
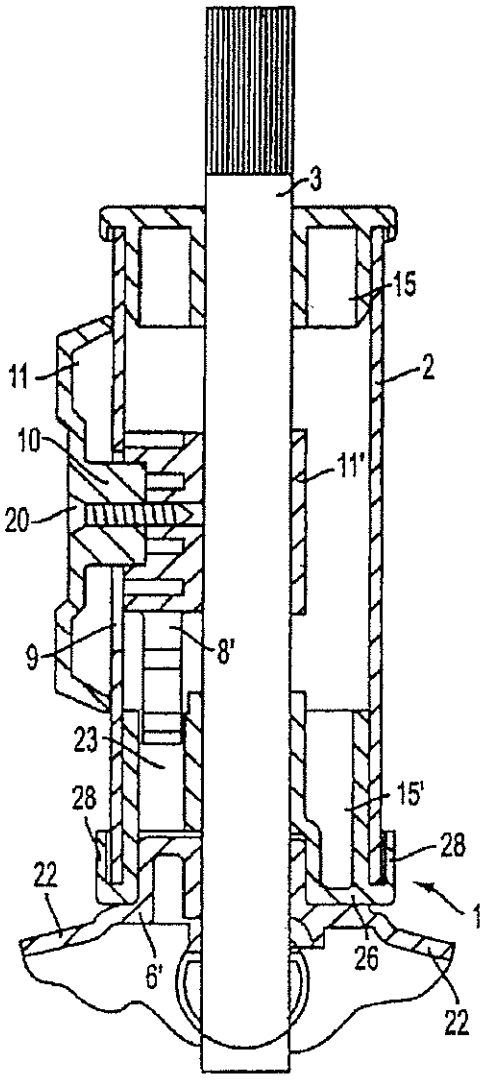


FIG. 7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11'
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8'
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1
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FIG. 8

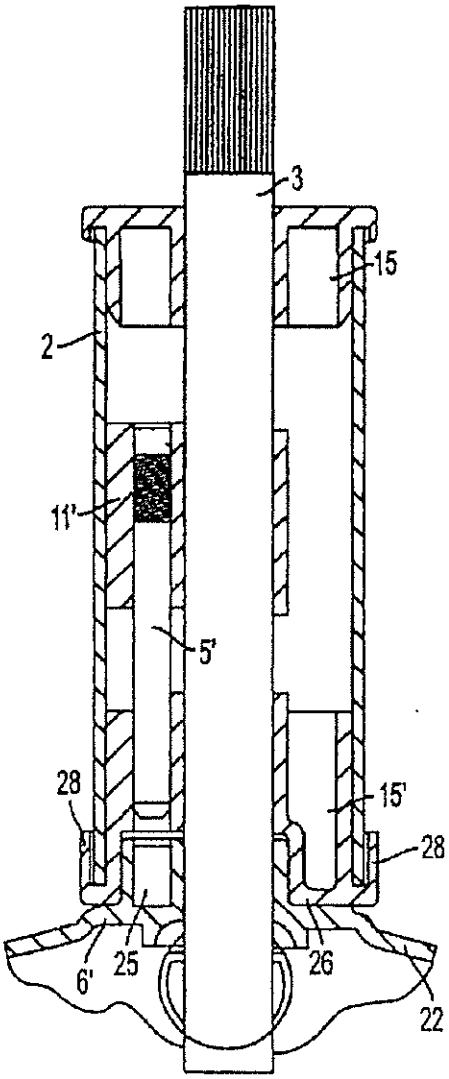
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FIG. 9

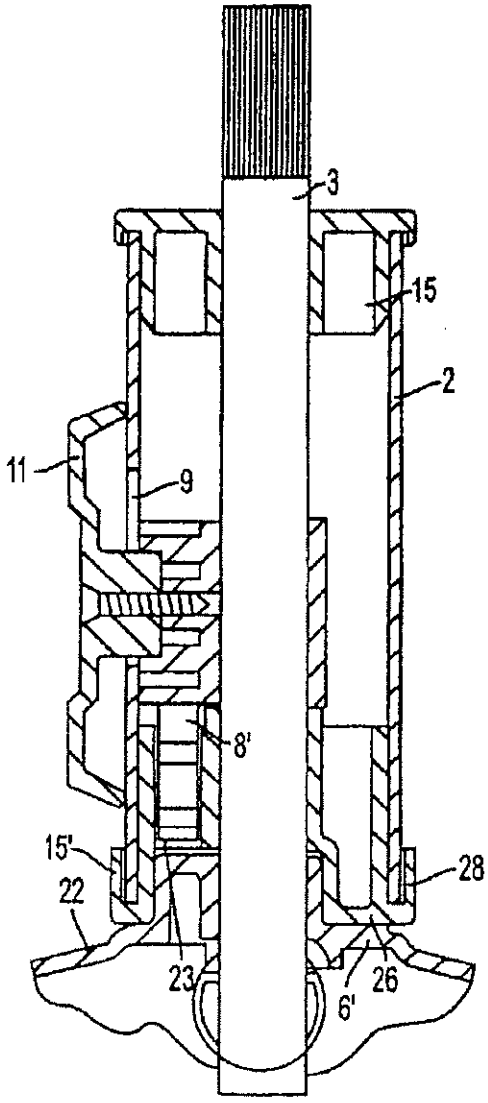

FIG. 10

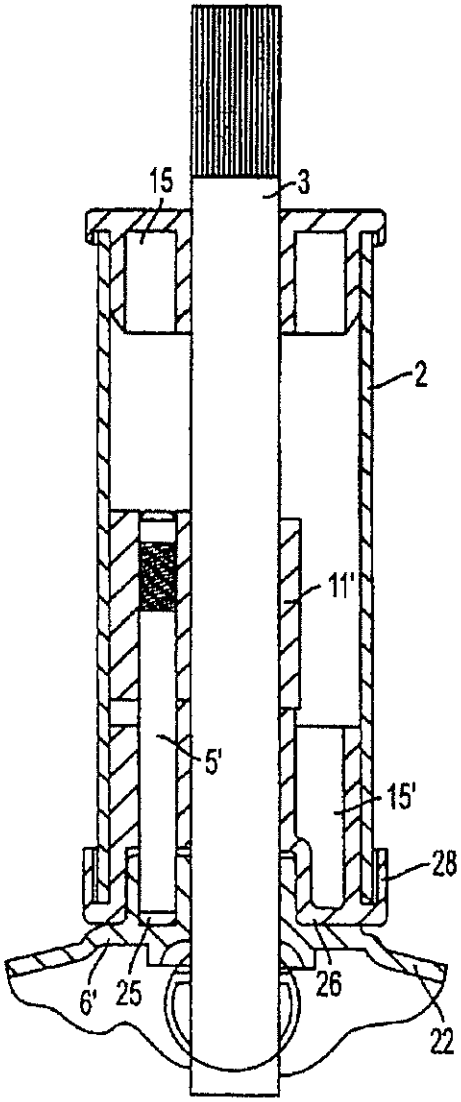

FIG. 11

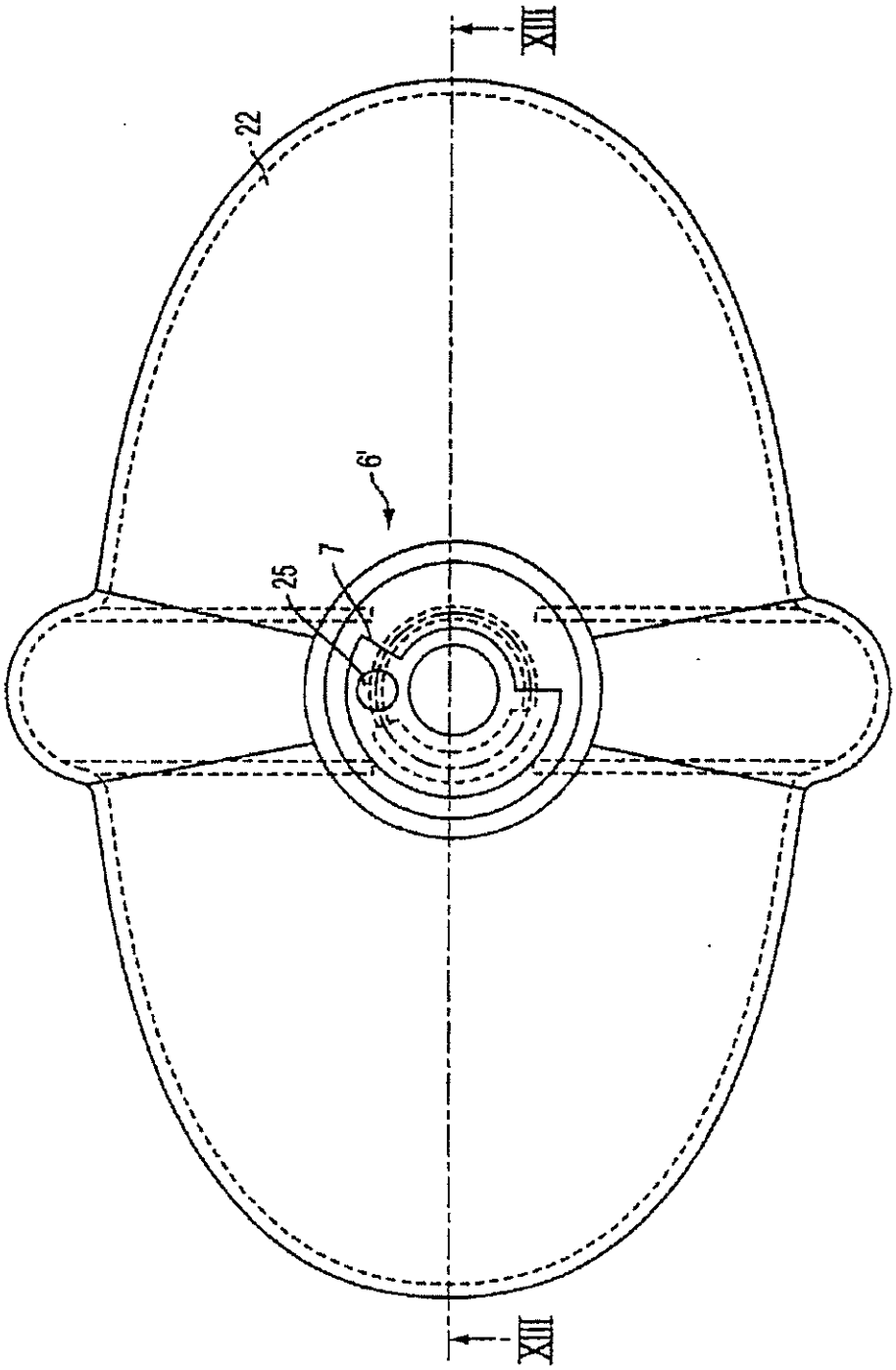

FIG. 12

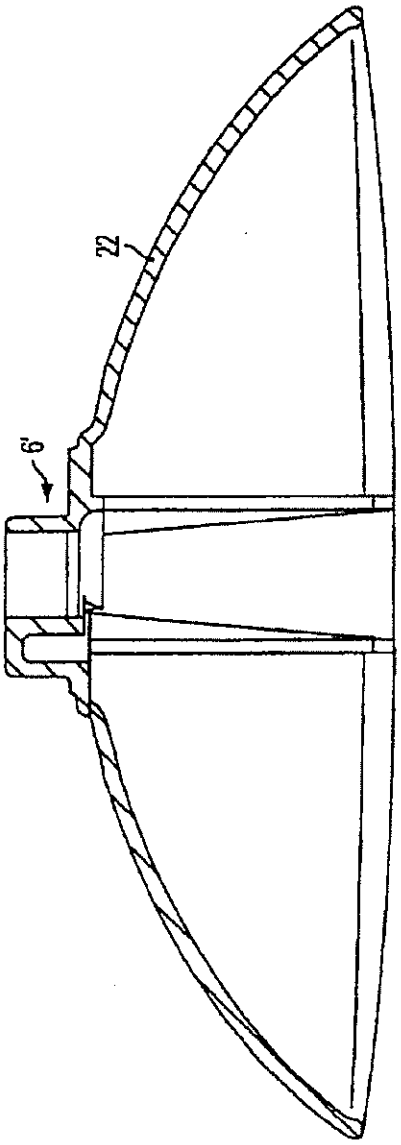

FIG. 13

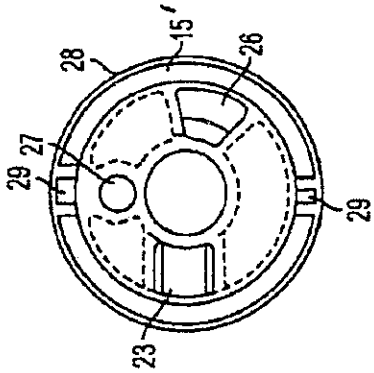

FIG. 17

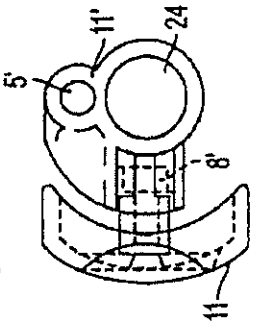

FIG. 16

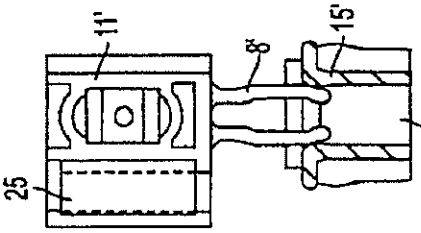

FIG. 15

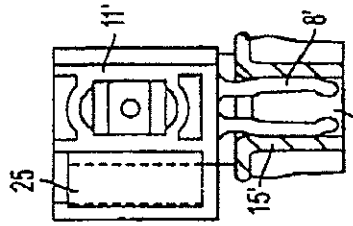

FIG. 14

VEHICLE STEERING HEAD

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of U.S. application Ser. No. 10/298,002 which was filed Nov. 18, 2002 now U.S. Pat. No. 6,799,772, which is a continuation of U.S. application Ser. No. 10/092,516 filed Mar. 8, 2002 now abandoned which is a continuation of U.S. application Ser. No. 09/584,497 filed Jun. 1, 2000, now U.S. Pat. No. 6,378,884, the disclosures of which are expressly incorporated by reference herein in their entireties. Further, the present application claims priority under 35 U.S.C. § 119 of German Patent Application No. 299 11 652.2, filed on Jul. 5, 1999, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle steering head and in particular, to a steering head for a vehicle comprising a support tube which has rotatably supported therein a fork member to which a wheel cover and a handlebar can be secured.

2. Discussion of Background Information

Vehicle steering heads of the above-described type are in particular used in bicycles or tricycles, and in particular in tricycles or bicycles for children.

In devices of the above-described type it is desirable for safety reasons that accidents be avoided which may be caused by an excessively large handlebar deflection. It has been found that when there is an excessively large handlebar deflection (e.g., the handle bar rotates beyond a point where effective steering occurs), the vehicle may tilt to the side. Moreover, such deflections or excessive rotation may run the risk that a user impacts his body against the handlebar. Additionally, the user may get caught with his/her feet in the front wheel and may be even be injured by the pedals.

A further drawback or disadvantage of prior-art devices occurs when they are pushed with a push rod type device. In such cases, these devices have a tendency towards uncontrolled steering movements of the front wheel which cannot be mastered or effectively controlled by small children, in particular.

SUMMARY OF THE INVENTION

The present invention therefore provides a vehicle steering head of the above-mentioned type which is of a simple construction and which can operate in an easy and reliable manner. Moreover, this design avoids the drawbacks of the prior art and can in particular limit a handlebar deflection to a desired degree. The invention also has provision for locking the handlebar.

According to one aspect of the invention a latch element is secured to a fork member on a portion provided inside the support tube. A linkage element is supported in the support tube for rotation therewith. The linkage element is displaceable or moveable in a longitudinal direction of the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the latch element. Moreover, the linkage element comprises at least one locking element which is releasably connectable to the latch element.

According to another aspect of the invention a latch element is supported on the support tube. A linkage element is arranged on the fork member and connected to the tube for rotation therewith. The latch element is freely displaceable or moveable along the support tube. The linkage element comprises at least one stop surface which limits a rotation of the fork member and can be brought into contact with the support tube. Moreover, at least one latch element is provided that is releasably connectable to the support tube.

The vehicle steering head according to the invention is characterized by a number of considerable advantages.

First of all, it is possible to install or utilize the steering head in a frame of any desired design, e.g. children's bicycles or tricycles. Ideally, the dimensions of the steering head are such that they do not interfere with the remaining structure of the frame within which it is installed. Of course, the steering head may be combined with any and all common types of frames where ever its advantageous design is desired. Accordingly, the steering head may be utilized in a variety of devices where limited deflection or rotation and/or locking are desired.

Because the invention utilizes a latch element which is arranged in the support tube, no functional parts of the steering head need be outwardly visible or accessible. Accordingly, the internal parts are less susceptible to damage. Additionally, this design is less likely to cause injury when used by children or infants.

As a result of utilizing a linkage element according to the invention, it is possible to reliably lock the fork member and thus the wheel fork and the front wheel. Such a locking provision is easily be accomplished by displacing or moving the linkage element. This design ensures a high degree of operational safety and operational reliability.

The linkage element preferably utilizes stop surfaces which cooperate with the latch element in a manner where they are brought into contact with one another. In this way, the steering angle can be limited to a particularly or desired range. This limited range of motion of the steering angle can be realized according to the invention in different ways. The invention contemplates that the available steering angle is freely selectable within a wide desired range. This is of particular advantage to vehicles for children such as tricycles, which may require a steering angle of approximately 45° to each side. Of course, other desirable steering angles can be utilized. However, by designing in the desired limited steering angle, lateral tilting of the tricycle or similar devices can be prevented or their risk significantly reduced. Additionally, the risk of injuries which may be caused by the pedals, e.g., devices which utilize pedals on the front wheel can be reduced. Finally, the risk of injury which can occur when the handlebar exceeds a controlled steering angle can be ruled out to a considerable extent.

The invention also provides for a linkage element having a locking element which is releasably connectable to the latch element. This design ensures that when a push rod is used for pushing the device, i.e., a tricycle, the front wheel thereof may be reliably locked in place during straight travel.

In an advantageous embodiment of the invention, the latch element is designed in the form of a pin which extends in a direction transverse to the fork member. The pin may extend through the fork member such that it projects at both sides of the fork member. Alternatively, the pin can project from the fork member on only one side. Moreover, the pin can be firmly connected to the fork member, e.g. by welding or other conventional attachment techniques. Additionally, it may be secured by press fitting with or without utilizing a

knurled portion. Of course, the dimensions of the pin can easily be adapted to the respective conditions of use.

It should be noted that the manufacturing costs of the steering head are reduced by the above-described construction to quite a considerable degree.

In another advantageous embodiment of the invention, the linkage element is substantially designed in the form of a hollow cylinder. Thus, the linkage element can be reliably guided in the support tube and surround the fork member. Additionally, the linkage element can be designed as a single integral part or several parts which are either joined together or which cooperate together.

It is advantageous for the longitudinal displacement or movement of the linkage element to be along an axis of the support tube and the fork member. Accordingly, the support tube may comprise at least one longitudinal slot or a similar recess through which a connection element extends which is connected to the linkage element. This design also utilizes a slide which is arranged outside the support tube.

The slide facilitates the ease of handling or movement of the linkage element. In such a design, a displacement of the slide, which may additionally be provided with locking mechanism or fixing safety mechanism, effects a corresponding displacement or movement of the linkage element. The locking mechanism or fixing mechanism allows for fixing the front wheel in a single or set travel position which is preferably straight. Moreover, the invention also contemplates that the linkage element may be provided with inclined inlet surfaces or intercepting mechanisms which engage the latch element so as to initiate a locking action when the front wheel is slightly deflected angularly.

Stop surfaces on the latch element are preferably formed on at least one front attachment of the linkage element. Additionally, it is particularly advantageous when two opposite attachments or stops are in symmetry with each other and are each provided with at least one stop surface located on the linkage element. Thus, by utilizing two attachments or stops which are in symmetry with each other, this design can limit the steering angle in a symmetrical fashion to both the left and the right side.

In another advantageous embodiment of the invention, the associated stop surfaces of the attachments or stops act to limit the rotation of the fork member to a predetermined angular range at both sides. This angular range may e.g. be approximately 45° to both sides, for a total range of motion of approximately 90°.

The locking element is preferably designed in the form of at least one front recess which receives the latch element. Such an advantageous design makes it possible to grip and fix the latch element upon displacement or movement of the linkage element. Additionally, it is advantageous that the recess be retracted or set back relative to the front attachment, so that the attachments or stops can always remain in the plane of the latch element, while upon a displacement of the latch element, it is only the recess which can additionally be brought into engagement.

To implement a simple and operationally reliable structure of the steering head, it may be advantageous for the recess to be centrally arranged between the two attachments or stops.

The invention also contemplates that the fork member itself has not been changed constructionally. In other words, the invention can be adapted to work with a conventional fork member. Also, the invention makes it possible to manufacture all functional parts separately in a very simple manner. As a result, advantageous on costs can be achieved.

In a preferred design of a previously described embodiment, the linkage element is designed as part of a mudguard which extends from below into the support tube. This design allows for significant cost savings since the mudguard is normally made from plastics and is typically already included in most vehicles of the above described type. The linkage element can thus be mounted on the mudguard or made integrally therewith, in a particularly easy way and at low costs.

A further advantage of the this embodiment is that the latch element can be designed in the form of a bolt which arranged to be parallel with the fork member. The latch element of this design can thus be given relatively large dimensions so that the diameter of the support tube itself need not be chosen with such a large size.

It may be of particular advantage when the latch element is connected to a slide which extends into the support tube so as to be able to design the lock of the front wheel in a particularly simple manner. Furthermore, the locking element may preferably be connected to the slide. Moreover, the locking element serves to reliably maintain the locked state and to prevent any unintended unlocking. The locking element also preferably engages into a recess of a bearing which supports the fork member in the support tube. As a result, it is not necessary to mount additional parts or to take installation measures on the support tube itself.

It may also be of particular advantage for the limitation of the steering angle to be accomplished by a lower bearing which supports the fork member in the support tube. This lower bearing may have formed thereon an attachment which projects in the direction of the linkage element and which can be brought into contact with the stop surfaces formed on the linkage element and thus on the mudguard. This design has the advantageous effect that the predetermined angular range can be limited at both sides as well, e.g. approximately 45° each side.

The invention provides a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element projecting from the fork member and disposed within the support tube, and a linkage element disposed within the support tube, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member and comprises at least one stop surface for limiting a rotation of the fork member when the latch element contacts the at least one stop surface. The linkage element may further comprise at least one locking element for locking the fork member in a single position. The at least one locking element may releasably engage the latch element when the fork member is locked. The latch element may comprise a pin. The pin may project substantially perpendicular to the axis of the fork member. The linkage element may comprise a substantially cylindrical shape. The linkage element may comprise a plurality of hollow chambers separated by connecting walls. The support tube may comprise an opening which allows a connecting element to pass therethrough. The opening may comprise a longitudinal slot. The connecting element may be secured to the linkage element. The movement of the linkage element may be limited by the movement of the connecting element within the longitudinal slot. The steering head may further comprise a slide which is secured to the connecting element, the slide being disposed adjacent an outer surface of the support tube. The at least one stop surface may be disposed on at least one stop.

The at least one stop may comprise a projection which extends from the linkage element. The at least one stop may

comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The at least one stop may comprise two stops which are disposed opposite one another. Each stop may comprise a wedge-shaped hollow projection having two angled lateral stop surfaces. The two stops may define a limited range of rotational motion of the fork member in each of a clockwise and a counter-clockwise direction. The limited range of motion in the clockwise direction may be substantially equal to the range of motion in the counter-clockwise direction. The limited range of motion in one of the clockwise and counter-clockwise direction may be approximately 45 degrees.

The linkage element may further comprise at least one locking element, the at least one locking element comprising at least one recess which is adapted to receive the latch element. The at least one recess is set back some distance from a surface of at least one stop. The at least one recess is centrally disposed between at least two stops.

The steering head may further comprise an upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tube, each of the upper and lower bearings having an opening which allows the fork member to pass therethrough.

The steering head may be disposed on a tricycle frame.

The invention also provides for a vehicle steering head including a support tube which rotatably supports therein a fork member to which a wheel fork and a handlebar can be secured, the steering head including a latch element disposed within the support tube, the latch element being moveable in a direction which is substantially parallel to an axis of the fork member, and a linkage element connected to the fork member so as to rotate therewith, the linkage element comprising at least one stop surface, wherein the at least one stop surface limits the rotation of the fork member with respect to the support tube. The steering head may further comprise a slide, wherein the slide is disposed within the support tube and retains the latch element. The slide may further comprise at least one locking element for releasably securing the slide to the support tube. The linkage element may comprise a mudguard. The mudguard may be disposed between one end of the support tube and a wheel fork. The latch element may comprise a rod like member which is arranged substantially parallel to the axis of the fork member. The rod like member may comprise one of a bolt and a pin. The latch element may be connected to a slide, the slide being disposed within the support tube. The slide may be moveable substantially parallel to the axis of the fork member. A locking element may be connected to the slide.

The steering head may further comprise a bearing support disposed on at least one end of the support tube. The bearing support may be disposed on a lower end of the support tube. The steering head may further comprise a locking element disposed within the support tube, the locking element being insertable into a recess of the bearing support. The bearing support may comprise at least one stop, the at least one stop comprising at least one surface which engages the linkage element. The at least one stop may comprise a projection which engages a recess in the linkage element. The projection and the recess may cooperate to limit the rotational movement of the fork member within a desired range. The range of the rotational movement may be limited by at least two stop surfaces. The at least two stop surfaces may define a limited range of rotation in one of a clockwise and a counter-clockwise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counter-clockwise direction. The limited range of rotation between the at least two stops may be approximately 45 degrees.

The steering head may be disposed on a tricycle frame.

The invention further provides for a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The fork member comprises a fork end, a handlebar, and a latch element projecting from the fork member between the fork end and the handlebar end. The latch element is disposed within the support tube and a linkage element is slidably disposed within the support tube. The linkage element comprises at least one stop surface for engaging the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element and the at least one stop cooperate to limit the rotational movement of the fork member to a second position where the latch element releasably engages a locking element disposed on the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element.

The invention also relates to a vehicle steering head including a support tube and fork member which is rotatably mounted with respect to the support tube, the steering head including an upper bearing support disposed at an upper end of the support tube and a lower bearing support disposed at a lower end of the support tube. The lower bearing support comprises at least one stop surface, the fork member comprising a fork end, a handlebar, and a latch element which is slidably disposed adjacent the fork member between the fork end and the handlebar end, the latch element being disposed within the support tube and a linkage element moveably disposed adjacent the lower support bearing. The linkage element comprises at least one stop surface for engaging the at least one stop surface of the lower bearing support and comprising a recess for receiving the latch element, wherein the linkage element is moveable in a direction which is substantially parallel to an axis of the fork member from a first position where the latch element engages only the lower bearing support and where the at least one stop of the lower bearing support cooperates with the at least one stop of the linkage element to limit the rotational movement of the fork member to a second position where the latch element releasably engages a recess in the linkage element whereby the fork member is prevented from rotating in any direction. The linkage element may be moveable from outside the support tube via a slide. The slide may be connected to the linkage element via a connection element, the connection element passing through a longitudinal in the support tube. The longitudinal slot may limit the movement of the linkage element. The linkage element may further comprise at least one locking element for engaging a locking recess in the lower bearing support. The at least one locking element engages the locking recess of the lower bearing support when the latch element engages the recess in the linkage element.

The invention provides for a vehicle steering head including a fork member adapted to engage a handlebar, a support tube which rotatably supports the fork member, a latch

element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position wherein linkage element prevents the fork member from rotating with respect to the support tube to at least another position wherein the linkage element allows the fork member to rotate with respect to the support tube in at least two directions. The latch element may comprise a rod-like member.

The invention also provides for a vehicle steering head that includes a support tube adapted to be coupled to a vehicle frame, an upper bearing support arranged at an upper end of the support tube, a lower bearing support arranged at a lower end of the support tube, the lower bearing support comprising at least one stop surface, a cylindrical element rotatably mounted to the support tube via the upper and lower bearing supports, the cylindrical element having one end that is adapted to be connected to a wheel fork and another end that is adapted to be connected to a handlebar, a latch element movably disposed within the support tube, a slide coupled to the latch element, the latch element being movable from outside the support tube, a linkage element that is rotatable with respect to the support tube, and the linkage element cooperating with the lower bearing support to limit a rotational movement of the linkage element with respect to the support tube, wherein the latch element and the linkage element are releasably engagable with each other to prevent rotational movement of the cylindrical element.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, a mechanism which limits the rotational movement of the fork member in each of two directions, and a lower bearing support mounted to the support tube, wherein the mechanism and the lower bearing support cooperate to limit the rotational movement of the fork member.

The lower bearing support may be non-rotatably fixed to the support tube. The lower bearing support may comprise at least one stop surface. The lower bearing support may comprise two stop surfaces. The mechanism may comprise at least one stop surface. The mechanism may comprise two stop surfaces. The mechanism may comprise a linkage element having at least one stop surface. The linkage element may rotate with the fork member. The linkage element may be arranged on a mudguard. The fork member may be cylindrically shaped. The steering head may further comprise a handlebar connected to one end of the fork member and a wheel fork connected to another end of the fork member.

The invention also provides a vehicle steering head comprising a support tube adapted to be fixed to a frame, a cylindrical member adapted to connect a wheel fork to a handlebar, the cylindrical member being rotatable with respect to the support tube, a linkage element being movable and comprising at least two stop surfaces, wherein one of the at least two stop surfaces limits the rotation of the cylindrical member in one direction, and wherein another of the at least two stop surfaces limits the rotation of the cylindrical member in another direction.

The linkage element may rotate with the cylindrical member. The linkage element may rotate with a mudguard.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a connecting element adapted to connect a wheel fork to a handlebar, the connecting element being rotatable with respect to the support tube, a linkage element being rotatable and comprising at least two stop surfaces, a mudguard that rotates with the linkage element, one of the at least two stop surfaces limiting the rotation of the connecting element in one direction, and another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

The invention also provides for a vehicle steering head comprising a support tube adapted to be fixed to a frame, a fork member adapted to connect a wheel fork to a handlebar, the fork member being rotatable with respect to the support tube, and a system which limits the rotational movement of the fork member in each of two directions, wherein the system includes one part which is non-rotatably mounted to the support tube and another part which rotates with the fork member.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

FIG. **1** is a schematic side view of a children's tricycle with one embodiment of the vehicle steering head according to the invention;

FIG. **2** is a simplified sectional side view of the steering head according to the invention in an unlocked state;

FIG. **3** is a side view, turned or oriented by 90° (a right angle) of the arrangement shown in FIG. **2**;

FIG. **4** is a sectional side view similar to FIG. **2**, in the locked state;

FIG. **5** is a side view, similar to FIG. **3**, of the view according to FIG. **4**;

FIG. **6** is a simplified perspective illustration of the linkage element according to the invention;

FIG. **7** is a schematic side view of a children's tricycle with another embodiment of the vehicle steering head according to the invention;

FIG. **8** is a sectional side view of the vehicle steering head according to the invention, in the unlocked state;

FIG. **9** is a side view, turned or oriented by 90° of the arrangement shown in FIG. **8**;

FIG. **10** is a sectional side view similar to FIG. **8**, in the locked state;

FIG. **11** is a side view, turned or oriented by 90° which is similar to FIG. **9**, in the locked state;

FIG. **12** is a top view on the linkage element according to the invention and on the associated mudguard;

FIG. **13** is a sectional view of the arrangement according to FIG. **12** along the sectional lines XIII—XIII of FIG. **12**;

FIG. **14** is an enlarged side view showing a portion of the slide and of the locking element in the locked state;

FIG. **15** is a view analogous to FIG. **14**, in the unlocked state;

FIG. **16** is a top view on the slide; and

FIG. **17** is a top view on the lower bearing.

DETAILED DESCRIPTION OF THE INVENTION

The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is

made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

A children's tricycle is shown in FIG. **1** and comprises a front wheel **14** which is supported on a wheel fork **4**. Wheel fork **4** is fixedly connected to a fork member **3**. A handlebar (not shown) can be secured to the upper end of fork member **3**.

Fork member **3** is supported in a support tube **2**. This support is accomplished by utilizing slide bearings **15** and **15'** which are shown in detail in FIGS. **2** to **5**. The slide bearings **15** and **15'** correspond to those of the prior art in this embodiment so that a detailed description is not needed.

Support tube **2** is firmly connected to a frame **16** which has mounted thereon a seat **17**. The tricycle also has a rear axle **18** with rear wheels **19**. Accordingly, a support tube **2** and a fork member **3** form a steering head **1**.

According to the invention, support tube **2** has arranged therein a linkage element **6** which has a substantially cylindrical configuration (see also FIG. **6**) and which is received with a play or clearance (so that it can slide) within support tube **2**. Linkage element **6** is also provided with a central recess through which fork member **3** extends or passes.

Support tube **2** also has formed therein a longitudinal slot **9** through which a connection element **10** extends or passes. This connection element **10** is connected to a slide **11** and linkage element **6**. The connection may be via a screw **20** (see FIGS. **2** and **4**) or other conventional connecting mechanism. In the illustrated embodiment, connection element **10** is integrally connected to or formed with slide **11** and extends in a recess **21** of linkage element **6**. However, connection element **10** and slide **11** may be made as separate components which are joined or secured together by any conventional attachment technique including a screw or threaded element.

On its front upper portion, linkage element **6** comprises two symmetrical opposite attachments or stops **12**. Each of these stops **12** may be provided with lateral stop surfaces **7**. When viewed from the top, these attachments or stops **12** are designed in a manner of a segment of a partial circle (pie shaped or wedge shaped), so that four stop surfaces **7** are formed, with each one being arranged in symmetry with one another. Of course, stops **12** may be separately formed and attached to linkage element **6** instead of being integrally formed therewith, as is shown.

In the illustrated embodiment two locking elements **8** may be utilized in which each is formed by a recess **13**. These locking elements **8** are preferably provided on linkage element **6** in retracted or set back manner with respect to stops **12**. As is apparent from FIG. **6**, the walls of at least one recess **13** may be made resilient to ensure a releasable locking of a bolt-like latch element **5** when linkage element **6** is pushed upwards or into engagement with bolt-like latch element **5**.

As is apparent from FIGS. **2** to **5**, fork member **3** is provided with a bolt-like or pin-like latch element **5** which extends or projects from at least one and preferably both sides of fork member **3**. Of course, latch element **5** may be integrally formed with fork member. Alternatively, latch element **5** may be a threaded or partially threaded member which threads into fork member **3**. However, it is preferred that latch element **5** be a pin having a centrally disposed exterior knurl which is press fit into a fork member as is shown. In its working position, latch element **5** rotates with fork member **3** when a deflection or rotation of the handlebar takes place. The deflection of the handlebar is limited by way of latch element **5** abutting on stop surfaces **7**, these stop surfaces **7** defining the limited range of motion of the handlebar.

When it is desired to lock the handlebar in a set position, latch element **5** is pressed or forced into recesses **13**. This engagement occurs when locking element **8**, which is disposed on linkage element **6**, is pushed upwards by slide **11**. Recesses **13** also utilize inclined inlet surfaces because they act as guiding lead-in surfaces which facilitate entry of pin **5** into recess **13**. In the locked state, which is shown in FIGS. **4** and **5**, a steering movement thus becomes impossible since the handlebar or fork member **3** is locked in a single direction. FIGS. **2** and **3** show a downwardly displaced condition of linkage element **6** in which latch element **5** is in a position which it does not cooperate with the locking element **8**. As a result, in this position fork member **3** and handlebar are free to rotate until latch element **5** abuts on stop surfaces **7**, this range of movement or rotation corresponding to a steering angle range.

According to a preferred aspect of the invention, linkage element **6** may be made from a plastic material. Of course, other materials are also contemplated.

Another embodiment of the vehicle steering head according to the invention is described with reference to FIGS. **7** to **16**. In this regard, like parts are provided with like reference numerals.

As for the description of FIG. **7**, reference can be made to the description of FIG. **1** to the extent that the same features are shown. The subsequent figures are illustrations elucidating the details which have been changed.

As in FIGS. **2** to **5**, FIGS. **8** and **9** and **10** and **11**, respectively, are illustrations showing the vehicle steering head on an enlarged scale. Again, like parts are here also provided with like reference numerals, so that reference can be made to the preceding explanations. Slide **11** utilizes connection element **10** and screw **20**. Connection element **10** also extends through a longitudinal slot **9**. Moreover, slide **11** comprises an outer grip portion **11** and an interior portion **11'** which is screwed to outer grip portion **11** by a screw **20**. A top view of slide **11** and **11'** is shown in FIG. **16**. As can be seen in this figure, a central recess **24** is provided through which fork member **3** extends or passes (with a clearance which allows slide **11'** to move up and down with respect to fork member **3**). Furthermore, slide **11'** also has a recess (see FIGS. **9**, **11** and **16**) which is formed so that it can accept a bolt-like latch element **5'**. Of course, this latch element **5'** may be pressed into this recess, threaded into the recess, or otherwise secured to slide **11'** in a suitable manner. Alternatively, latch element **5'** may be integrally formed with slide **11'**.

As already described in conjunction with a previous embodiment, a bearing **15** which serves as a slide bearing is used on the upper portion of steering head **1**.

Lower bearing **15'** in this embodiment is configured such that it has an upwardly projecting contour of a linkage element **6'** which can extend into bearing **15'**. Of course, the bearing and the upwardly projecting contour may be made as separate components which are joined together by conventional techniques rather than integrally formed as is shown. Additionally, as becomes apparent in FIG. **12**, linkage element **6'** may have a recess **25** into which latch element **5'** can be inserted (see also FIGS. **9** and **11**).

As can further be seen from the top view of FIG. **12**, linkage element **6'** comprises two lateral stop surfaces **7** which are angularly spaced apart from each other. This

design is such that a downwardly oriented attachment or stop **26** (see FIGS. **8** to **11**) of the bearing **15'**, which is connected to support tube **2**, forms a steering limitation of plus/minus approximately 45°. Of course, as with the previous embodiment, the range of steering limitation can be designed to any desired range.

FIG. **13** shows a lateral sectional view of mudguard **22** and of linkage element **6'**. Note that these components are integrally formed as a single member which reduces manufacturing costs associated with joining two separate components.

FIGS. **14** and **15** are front views of slide **11'** wherein handpiece **11** has been removed to illustrate the operation of locking element **8'**. Locking element **8'** is U-shaped and includes two movable or flexible lateral legs which can releasably be inserted into a recess **23** of bearing **15'**. Upon insertion and locking, locking element **8'** is pressed against an undercut and thereby held in position inside recess **23**. Accordingly, when it is desired to release the locked state of fork member **3**, slide **11'** must be pushed upwards which removes the legs from recess **23**. Of course, other locking mechanisms may be utilized and this embodiment is not limited to the use of this particular locking mechanism. For example, a pin may be used which has a floating ring disposed around its circumference. Alternatively, other conventional releasable locking mechanisms may be utilized.

FIG. **17** is a top view on lower bearing **15'** on an enlarged scale. The (downwardly projecting) attachment or stop **26** can be seen here as can recess **23** which receives locking element **8'**. Moreover, recess **27** is adapted to receive and guide bolt-like latch element **5'** therein. Furthermore, a surrounding collar-like edge **28** can be seen in which **29** designates two oppositely disposed attachments or projections which serve as anti-rotation engagements. These engagements are designed to engage recesses (not shown) of support tube **2**. Of course, lower bearing may be secured to support tube **2** in any conventional manner such as by bonding, welding, or screws. Moreover, this attachment may be releasable or more permanent in nature.

It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

What is claimed:

1. A tricycle vehicle steering head comprising:
a support tube adapted to be fixed to a frame;
a connecting member adapted to connect a wheel fork to a handlebar;
a mechanism which limits the rotational movement of the connecting member in each of two directions;
the mechanism being arranged on a mudguard;
an upper bearing support mounted to an upper end of the support tube;
a lower bearing support mounted to a lower end of the support tube,
the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports; and
a locking device that engages an opening in the mechanism;
wherein the mechanism and the lower bearing support cooperate to limit the rotational movement of the connecting member.

2. The steering head of claim **1**, wherein the upper and lower bearing supports are each non-rotatably fixed to the support tube.

3. The steering head of claim **1**, wherein the lower bearing support comprises at least one stop surface.

4. The steering head of claim **3**, wherein the lower bearing support comprises two stop surfaces.

5. The steering head of claim **1**, wherein the mechanism comprises at least one stop surface.

6. The steering head of claim **5**, wherein the mechanism comprises two stop surfaces.

7. The steering head of claim **1**, wherein the mechanism comprises a linkage element having at least one stop surface.

8. The steering head of claim **7**, wherein the linkage element rotates with the connecting member.

9. The steering head of claim **7**, wherein the linkage element and the mudguard comprise a one-piece structure.

10. The steering head of claim **1**, wherein the connecting member is cylindrically shaped.

11. The steering head of claim **1**, further comprising a handlebar connected to one end of the connecting member and a wheel fork connected to another end of the connecting member.

12. A tricycle vehicle steering head comprising:
a support tube adapted to be fixed to a frame;
a cylindrical member adapted to connect a wheel fork to a handlebar;
the cylindrical member being rotatable with respect to the support tube;
a recessed portion arranged at a lower end of the support tube and comprising first and second stop surfaces;
an arcuate projecting portion configured to rotate within the recessed portion and comprising first and second stop surfaces; and
an arc length of the arcuate protecting portion being greater than 180 degrees between the first and second stop surfaces,
wherein contact between the first stop surfaces of the projecting portion and the recessed portion limits the rotation of the cylindrical member in one direction, and
wherein contact between the second stop surfaces of the projecting portion and the recessed portion limits the rotation of the cylindrical member in another direction.

13. The steering head of claim **12**,
wherein the arcuate projecting portion rotates with the cylindrical member; and
wherein a lower bearing support includes the recessed portion.

14. The steering head of claim **12**, wherein the arcuate projecting portion is coupled to a mudguard.

15. A tricycle vehicle steering head comprising:
a support tube adapted to be fixed to a frame;
a connecting element adapted to connect a wheel fork to a handlebar;
the connecting element being rotatably mounted to the support tube via upper and lower bearing supports;

a rotatably mounted linkage element comprising at least two stop surfaces and an opening;

the linkage element engaging the lower bearing support;

a mudguard that rotates with the linkage element;

a movably mounted pin that engages the opening in the linkage element in a locking position and that does not engage the opening in the linkage element in a unlocked position:

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

16. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting member adapted to connect a wheel fork to a handlebar;

the connecting element being rotatably mounted to the support tube via upper and lower bearing supports;

a locking device that, in a locked position, prevents rotational movement of the fork member and that, in an unlocked position, allows rotational movement of the fork member in each of two directions;

a system which is arranged at a lower end of the support tube and that limits the rotational movement of the fork member in each of the two directions,

wherein the system includes an arcuate projecting part and a recessed part which is configured to receive the arcuate projecting part, and

wherein the recessed part is non-rotatably mounted and wherein the arcuate projecting part rotates with the connecting member.

17. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatably mounted to the support tube via upper and lower bearing supports;

a mechanism that is rotatable and comprises an opening and at least two stop surfaces arranged on an arcuate projecting portion;

the mechanism engaging with the lower bearing support;

a movably mounted pin that, in a locking position, engages with the opening in the mechanism;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction.

18. The vehicle steering head of claim **17**, the mechanism is arranged on a mudguard.

19. The vehicle steering head of claim **18**, wherein the movably mounted pin moves parallel to an axis of the connecting element.

20. The vehicle steering head of claim **17**, wherein the lower bearing support comprises at least two stop surfaces that are engagable with the at least two stop surfaces of the arcuate projecting portion.

21. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a movable locking member which engages with an opening to prevent rotational movement of the connecting element and which disengages from the opening to allow rotational movement of the connecting element;

a first stop surface limiting the rotation of the connecting element in one direction; and

a second stop surface limiting the rotation of the connecting element in another direction,

wherein the opening, the first stop surface and the second stop surface are each arranged on a mudguard.

22. The vehicle steering head of claim **21**, wherein the first and second stop surfaces rotate with the mudguard.

23. The vehicle steering head of claim **21**, wherein the first and second stop surfaces are disposed on an arcuate projecting portion of the mudguard.

24. The vehicle steering head of claim **21**, wherein the opening rotates with the connecting element.

25. The vehicle steering head of claim **21**, wherein the movable locking member comprises a pin.

26. The vehicle steering head of claim **21**, wherein the first and second stop surfaces moveably engage two stop surfaces which do not move.

27. The vehicle steering head of claim **21**, further comprising a lower bearing support that comprises the two stop surfaces which do not move, wherein the two stop surfaces which do not move engage the first and second stop surfaces.

28. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting member adapted to connect a wheel fork to a handlebar;

the connecting member being rotatable with respect to the support tube; and

a system which limits the rotational movement of the fork member in each of two directions;

the system including one part which is non-rotatably mounted to an end of the support tube and another part which rotates with the connecting member;

a pin that engages, in a locking position, an opening in the other part,

wherein the other part is an arcuate projection and the one part is an arcuate guiding recess within which the arcuate projection moves.

29. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a cylindrical member adapted to connect a wheel fork to a handlebar;

the cylindrical member being rotatably mounted to the support tube; and

a system which limits the rotational movement of the cylindrical member in each of two directions, the system including one part which is non-rotatably mounted to the support tube and another part which rotates with the cylindrical member;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being configured to move in a direction which is parallel to an axis of the support tube; and

the opening being arranged on the other part and being configured to rotate with the cylindrical member,

wherein, when the pin engages the opening, the cylindrical member is prevented from rotating, and

wherein when the pin does not engage the opening, the cylindrical member is free to rotate in each of two directions.

30. A tricycle vehicle steering head coupled to a frame, said steering head comprising:

a support tube adapted to be fixed to the frame;

a lower bearing support non-movably mounted to the support tube;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being rotatable with respect to the support tube;

a mechanism that limits rotational movement of the connecting element;

the mechanism comprising at least two stop surfaces which engage with first and second stop surfaces of the lower bearing support;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction; and

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction,

wherein the mechanism comprises an arcuate projection, an arc length of the arcuate projection between the at least two stop surfaces being greater than an arc length of a space defined by the at least two stop surfaces, whereby the arcuate projection and the space comprise an arc length equal to a circle.

31. The vehicle steering head of claim **30**, wherein the mechanism is coupled to a mudguard.

32. The vehicle steering head of claim **30**, further comprising a device that engages the mechanism to prevent movement thereof.

33. The vehicle steering head of claim **32**, wherein the device that engages the mechanism comprises a pin.

34. A tricycle vehicle steering head coupled to a frame, comprising:

a support tube fixed to the frame;

a connecting element adapted to connect a wheel fork to a handlebar;

the connecting element being configured to rotate with respect to the support tube;

a mechanism that limits rotational movement of the connecting element;

the mechanism comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting element in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting element in another direction; and

a locking system that prevents rotational movement of the connecting element,

the locking system comprising a movable engaging member and an opening that can receive the engaging member and which can rotate with the connecting element,

wherein the opening is arranged on the mechanism.

35. The vehicle steering head of claim **34**, wherein the engaging member can move between a first position that allows the connecting element to rotate in each of two directions and a second position wherein the connecting element is prevented from rotational movement in each of the two directions.

36. The vehicle steering head of claim **34**, wherein the engaging member can move from a first position to a second position, wherein, in the first position, the connecting element can rotate in each of two directions and wherein, in the second position, the engaging member enters the opening and the connecting element is prevented from rotational movement in each of the two directions.

37. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting member rotatably mounted to the support tube;

a mechanism that limits rotational movement of the connecting member in each of two directions;

the mechanism comprising at least two stop surfaces;

one of the at least two stop surfaces limiting the rotation of the connecting member in one direction;

another of the at least two stop surfaces limiting the rotation of the connecting member in another direction; and

a locking system which utilizes a movable locking member and an opening;

wherein, when the locking member does not engage the opening, the connecting member can rotate in each of the two directions, and wherein, when the locking member engages the opening, the connecting member is prevented from rotating in each of the two directions.

38. The vehicle steering head of claim **37**, further comprising a mudguard.

39. The vehicle steering head of claim **37**, wherein the locking member moves in a direction that is parallel to an axis of the connecting member.

40. The vehicle steering head of claim **37**, wherein the connecting member is mounted to the support tube via upper and lower bearing supports.

41. The vehicle steering head of claim **37**, wherein the mechanism moves when the connecting member moves.

42. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a connecting element rotatably mounted to the support tube via upper and lower bearing supports;

a mudguard;

a system which limits the rotational movement of the connecting element in each of two directions;

a locking system comprising a movable locking member and an opening arranged on the mudguard;

wherein, when the locking member does not engage the opening, the connecting element can rotate in each of the two directions, and wherein, when the locking member engages the opening, the connecting element is prevented from rotating in each of the two directions.

43. The vehicle steering head of claim **42**, wherein the locking member moves in a direction that is parallel to an axis of the connecting element.

44. The vehicle steering head of claim **42**, wherein the mechanism moves when the connecting element moves.

45. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member rotatably mounted to the support tube via upper and lower bearing supports;

a system which limits the rotational movement of the fork member in each of two directions; and

a locking system comprising a movable locking member and an opening,

wherein the locking member moves in a direction that is parallel to an axis of the support tube, and

wherein, when the locking member does not engage the opening, the fork member can rotate in each of the two directions, and wherein, when the locking member engages the opening, the fork member is prevented from rotating in each of the two directions.

46. The vehicle steering head of claim **45**, wherein the locking member comprises a pin.

47. A tricycle vehicle steering head comprising:

a support tube adapted to be fixed to a frame;

a fork member rotatably mounted to the support tube;

a mudguard;

a locking system comprising a pin and an opening configured to receive the pin;

the pin being movably mounted; and

the opening being arranged on a surface of the mudguard;

wherein, when the pin engages the opening, the fork member is prevented from rotating, and

wherein, when the pin does not engage the opening, the fork member is free to rotate in each of two directions.

48. The vehicle steering head of claim **47**, wherein the pin can move in a direction that is parallel to an axis of the support tube.

49. The vehicle steering head of claim **47**, further comprising a system which limits the rotational movement of the fork member in each of the two directions.

50. The vehicle steering head of claim **47**, wherein the fork member can rotate approximately 45 degrees in each of the two directions.

51. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard; and

a movement limiting system that limits rotational movement of the connecting element in each of two directions,

wherein the movement limiting system comprises an arcuate recess and an arcuate projection, the arcuate projection having an arc length between two stop surfaces that is

greater and an arc length of a space defined by the two stop surfaces of the arcuate projection, whereby the arcuate projection and the space comprise an arc length equal to a circle, and the arcuate recess having an arc length between two other stop surfaces that is greater than the arc length of the arcuate projection.

52. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mechanism which limits rotational movement of the connecting element; and

a locking system which cooperates with the lower bearing support and which can be moved by a user,

wherein, when moved to one position, the locking system is structured and arranged to prevent the connecting element from rotating in each of the two directions, and wherein, when moved to another position, the locking system is structured and arranged to allow the connecting element to rotate in each of the two directions.

53. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard comprising a mechanism for limiting rotational movement of the connecting element and an opening; and

a locking system which can be moved by a user to engage the opening,

wherein, when moved to one position, the locking system is structured and arranged to prevent the connecting element from rotating in each of the two directions, and wherein, when moved to another position, the locking system is structured and arranged to allow the connecting element to rotate in each of the two directions.

54. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard;

a movement limiting system that limits rotational movement of the connecting

element in each of two directions;

the movement limiting system comprising one part arranged on the mudguard and another part arranged on the lower bearing support; and

a locking system which can be moved by a user,

wherein, when moved to one position, the locking system is structured and arranged to prevent the connecting element from rotating in each of the two directions, and wherein, when moved to another position, the locking system is structured and arranged to allow the connecting element to rotate in each of the two directions.

55. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element rotatably mounted to the support tube via the upper and lower bearing supports;

a mudguard;

a locking system comprising a pin and an opening arranged on the mudguard; and

a movement limiting system that limits rotational movement of the connecting element in each of two directions,

the movement limiting system comprising an arcuate recess arranged on the lower bearing support and an arcuate projection arranged on the mudguard,

wherein the arcuate projection has an arc length between two stop surfaces that is greater and an arc length of a space defined by the two stop surfaces of the arcuate projection, whereby the arcuate projection and the space comprise an arc length equal to a circle, and

wherein the arcuate recess has an arc length between two other stop surfaces that is greater than the arc length the arcuate projection.

56. The vehicle steering head of claim **55**, further comprising a device for locking the pin in a locking position.

57. The vehicle steering head of claim **56**, wherein the device for locking the pin in the locking position engages the lower bearing support.

58. The vehicle steering head of claim **55**, wherein the pin moves parallel to an axis of the connecting element.

59. The vehicle steering head of claim **55**, wherein the arcuate projection extends from a surface of the mudguard which rotatably engages the lower bearing support.

60. The vehicle steering head of claim **55**, wherein the lower bearing support comprises an opening which allows an end of the pin to pass therethrough.

61. The vehicle steering head of claim **55**, wherein the arcuate projection and the mudguard comprise a one-piece structure.

62. A vehicle steering head for a tricycle having a frame, the vehicle steering head comprising:

a support tube fixed to the frame of the tricycle;

an upper bearing support mounted to the support tube;

a lower bearing support mounted to the support tube;

a connecting element mounted to the support tube via the upper and lower bearing supports;

a wheel fork rotating with respect to the support tube;

a first part comprising stop surfaces;

a second part comprising stop surfaces;

one stop surface of the first part contacting one stop surface of the second part when the wheel fork is rotated in one direction and another stop surface of the first part contacting another stop surface of the second part when the wheel fork is rotated in another direction;

the first part and the second part being structured and arranged to allow rotational movement of the wheel fork in each of two directions while also limiting rotational movement of the wheel fork in each of the two directions within an angular range; and

a locking system which, in a locked position, prevents rotational movement of the wheel fork and which, in an unlocked position, allows the wheel fork to rotate in each of the

two directions within the angular range.

63. The vehicle steering head of claim **62**, wherein the first part comprises a projecting part and the second part comprises a recess which receives therein the projecting part.

64. The vehicle steering head of claim **62**, wherein the locking system comprises a movable first member and a second member that receives therein an end of the movable first member.

65. The vehicle steering head of claim **64**, wherein the movable first member moves parallel to an axis of the connecting member and the second member comprises an opening.

66. The vehicle steering head of claim **62**, wherein each of the first part and the second part are arcuate-shaped.

67. The vehicle steering head of claim **66**, wherein the first part has an arc length between the stop surfaces that is greater and an arc length of a space defined by the stop surfaces of the first part, whereby the first part and the space comprise an arc length equal to a circle, and wherein the second part has an arc length between the stop surfaces of the second part that is greater than the arc length the first part.

68. The vehicle steering head of claim **62**, further comprising a mudguard, wherein the first part is arranged on the mudguard and the second part is arranged on the lower bearing support.

69. The vehicle steering head of claim **62**, wherein the locking system comprises a pin and an opening that receives therein an end of the pin in the locked position.

70. The vehicle steering head of claim **62**, wherein the locking system comprises a device that is movably mounted and an opening that, in the locked position,

receives therein an end of the device.

71. The vehicle steering head of claim **62**, wherein the locking system comprises one part having an opening which receives therein the connecting element and another part having an opening which, in the locked position, receives therein a portion of the one part.

* * * * *

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

NOTICE OF ASSIGNMENT TO UNITED STATES MAGISTRATE JUDGE FOR DISCOVERY

This case has been assigned to District Judge Manuel Real and the assigned discovery Magistrate Judge is Frederick F. Mumm.

The case number on all documents filed with the Court should read as follows:

CV10- 6877 R (FFMx)

Pursuant to General Order 05-07 of the United States District Court for the Central District of California, the Magistrate Judge has been designated to hear discovery related motions.

Unless otherwise ordered, the United States District Judge assigned to this case will hear and determine all discovery related motions.

NOTICE TO COUNSEL

A copy of this notice must be served with the summons and complaint on all defendants (if a removal action is filed, a copy of this notice must be served on all plaintiffs).

Subsequent documents must be filed at the following location:

[X] **Western Division**
312 N. Spring St., Rm. G-8
Los Angeles, CA 90012

[ ] **Southern Division**
411 West Fourth St., Rm. 1-053
Santa Ana, CA 92701-4516

[ ] **Eastern Division**
3470 Twelfth St., Rm. 134
Riverside, CA 92501

Failure to file at the proper location will result in your documents being returned to you.

Name & Address:
Alexander F. MacKinnon (SBN 146883)
Allison Worthy Buchner (SBN 253102)
KIRKLAND & ELLIS LLP
333 South Hope Street
Los Angeles, CA 90071 - Telephone: 213-680-8400

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

RAZOR USA LLC

PLAINTIFF(S)

v.

HEINZ KETTLER GMBH & CO., KG and KETTLER INTERNATIONAL, INC.,

DEFENDANT(S).

CASE NUMBER

CV 10 6877-R (FFMx)

SUMMONS

TO: DEFENDANT(S): _____

A lawsuit has been filed against you.

Within 21 days after service of this summons on you (not counting the day you received it), you must serve on the plaintiff an answer to the attached ☑ complaint ☐ _____ amended complaint ☐ counterclaim ☐ cross-claim or a motion under Rule 12 of the Federal Rules of Civil Procedure. The answer or motion must be served on the plaintiff's attorney, Alexander F. MacKinnon, whose address is 333 South Hope Street, Los Angeles, CA 90071. If you fail to do so, judgment by default will be entered against you for the relief demanded in the complaint. You also must file your answer or motion with the court.

Clerk, U.S. District Court

Dated: 15 SEP 2010

By: MARILYN DAVIS
Deputy Clerk

(Seal of the Court)

[Use 60 days if the defendant is the United States or a United States agency, or is an officer or employee of the United States. Allowed 60 days by Rule 12(a)(3)].

UNITED STATES DISTRICT COURT, CENTRAL DISTRICT OF CALIFORNIA
CIVIL COVER SHEET

I (a) PLAINTIFFS (Check box if you are representing yourself ☐)
RAZOR USA LLC,

DEFENDANTS
HEINZ KETTLE GMBH & CO., KG AND KETTLER INTERNATIONAL, INC.

(b) Attorneys (Firm Name, Address and Telephone Number. If you are representing yourself, provide same.)
Alexander F. MacKinnon-SBN 146883; Allison Worthy Buchner-SBN 253102
Kirkland & Ellis LLP, 333 South Hope Street, Los Angeles, CA 90071
Telephone: 213-680-8400

Attorneys (If Known)
John C. Lynch, Liz S. Flowers, Ethan G. Ostroff
Troutman Sanders LLP,
222 Central Park Ave, Suite 2000, Virginia Beach, VA 23462
Telephone: 757-687-7765

II. BASIS OF JURISDICTION (Place an X in one box only.)

☐ 1 U.S. Government Plaintiff
☑ 3 Federal Question (U.S. Government Not a Party)
☐ 2 U.S. Government Defendant
☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES - For Diversity Cases Only (Place an X in one box for plaintiff and one for defendant.)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated or Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated and Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. ORIGIN (Place an X in one box only.)

☑ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from Appellate Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify): ☐ 6 Multi-District Litigation ☐ 7 Appeal to District Judge from Magistrate Judge

V. REQUESTED IN COMPLAINT: JURY DEMAND: ☑ Yes ☐ No (Check 'Yes' only if demanded in complaint.)

CLASS ACTION under F.R.C.P. 23: ☐ Yes ☒ No ☐ **MONEY DEMANDED IN COMPLAINT: $** _____

VI. CAUSE OF ACTION (Cite the U.S. Civil Statute under which you are filing and write a brief statement of cause. Do not cite jurisdictional statutes unless diversity.)
Declaratory Judgment pursuant to 28 U.S.C. §§ 2201, 2202

VII. NATURE OF SUIT (Place an X in one box only.)

OTHER STATUTES
☐ 400 State Reapportionment
☐ 410 Antitrust
☐ 430 Banks and Banking
☐ 450 Commerce/ICC Rates/etc.
☐ 460 Deportation
☐ 470 Racketeer Influenced and Corrupt Organizations
☐ 480 Consumer Credit
☐ 490 Cable/Sat TV
☐ 810 Selective Service
☐ 850 Securities/Commodities/ Exchange
☐ 875 Customer Challenge 12 USC 3410
☐ 890 Other Statutory Actions
☐ 891 Agricultural Act
☐ 892 Economic Stabilization Act
☐ 893 Environmental Matters
☐ 894 Energy Allocation Act
☐ 895 Freedom of Info. Act
☐ 900 Appeal of Fee Determination Under Equal Access to Justice
☐ 950 Constitutionality of State Statutes

CONTRACT
☐ 110 Insurance
☐ 120 Marine
☐ 130 Miller Act
☐ 140 Negotiable Instrument
☐ 150 Recovery of Overpayment & Enforcement of Judgment
☐ 151 Medicare Act
☐ 152 Recovery of Defaulted Student Loan (Excl. Veterans)
☐ 153 Recovery of Overpayment of Veteran's Benefits
☐ 160 Stockholders' Suits
☐ 190 Other Contract
☐ 195 Contract Product Liability
☐ 196 Franchise

REAL PROPERTY
☐ 210 Land Condemnation
☐ 220 Foreclosure
☐ 230 Rent Lease & Ejectment
☐ 240 Torts to Land
☐ 245 Tort Product Liability
☐ 290 All Other Real Property

TORTS PERSONAL INJURY
☐ 310 Airplane
☐ 315 Airplane Product Liability
☐ 320 Assault, Libel & Slander
☐ 330 Fed. Employers' Liability
☐ 340 Marine
☐ 345 Marine Product Liability
☐ 350 Motor Vehicle
☐ 355 Motor Vehicle Product Liability
☐ 360 Other Personal Injury
☐ 362 Personal Injury-Med Malpractice
☐ 365 Personal Injury-Product Liability
☐ 368 Asbestos Personal Injury Product Liability

IMMIGRATION
☐ 462 Naturalization Application
☐ 463 Habeas Corpus-Alien Detainee
☐ 465 Other Immigration Actions

TORTS PERSONAL PROPERTY
☐ 370 Other Fraud
☐ 371 Truth in Lending
☐ 380 Other Personal Property Damage
☐ 385 Property Damage Product Liability

BANKRUPTCY
☐ 422 Appeal 28 USC 158
☐ 423 Withdrawal 28 USC 157

CIVIL RIGHTS
☐ 441 Voting
☐ 442 Employment
☐ 443 Housing/Accommodations
☐ 444 Welfare
☐ 445 American with Disabilities - Employment
☐ 446 American with Disabilities - Other
☐ 440 Other Civil Rights

PRISONER PETITIONS
☐ 510 Motions to Vacate Sentence Habeas Corpus
☐ 530 General
☐ 535 Death Penalty
☐ 540 Mandamus/ Other
☐ 550 Civil Rights
☐ 555 Prison Condition

FORFEITURE / PENALTY
☐ 610 Agriculture
☐ 620 Other Food & Drug
☐ 625 Drug Related Seizure of Property 21 USC 881
☐ 630 Liquor Laws
☐ 640 R.R. & Truck
☐ 650 Airline Regs
☐ 660 Occupational Safety /Health
☐ 690 Other

LABOR
☐ 710 Fair Labor Standards Act
☐ 720 Labor/Mgmt. Relations
☐ 730 Labor/Mgmt. Reporting & Disclosure Act
☐ 740 Railway Labor Act
☐ 790 Other Labor Litigation
☐ 791 Empl. Ret. Inc. Security Act

PROPERTY RIGHTS
☐ 820 Copyrights
☑ 830 Patent
☐ 840 Trademark

SOCIAL SECURITY
☐ 861 HIA (1395ff)
☐ 862 Black Lung (923)
☐ 863 DIWC/DIWW (405(g))
☐ 864 SSID Title XVI
☐ 865 RSI (405(g))

FEDERAL TAX SUITS
☐ 870 Taxes (U.S. Plaintiff or Defendant)
☐ 871 IRS-Third Party 26 USC 7609

CV10 6877

FOR OFFICE USE ONLY: Case Number: _____

AFTER COMPLETING THE FRONT SIDE OF FORM CV-71, COMPLETE THE INFORMATION REQUESTED BELOW.

UNITED STATES DISTRICT COURT, CENTRAL DISTRICT OF CALIFORNIA
CIVIL COVER SHEET

VIII(a). IDENTICAL CASES: Has this action been previously filed in this court and dismissed, remanded or closed? ☑ No ☐ Yes
If yes, list case number(s): _____

VIII(b). RELATED CASES: Have any cases been previously filed in this court that are related to the present case? ☑ No ☐ Yes
If yes, list case number(s): _____

Civil cases are deemed related if a previously filed case and the present case:
(Check all boxes that apply) ☐ A. Arise from the same or closely related transactions, happenings, or events; or
☐ B. Call for determination of the same or substantially related or similar questions of law and fact; or
☐ C. For other reasons would entail substantial duplication of labor if heard by different judges; or
☐ D. Involve the same patent, trademark or copyright, and one of the factors identified above in a, b or c also is present.

IX. VENUE: (When completing the following information, use an additional sheet if necessary.)

(a) List the County in this District; California County outside of this District; State if other than California; or Foreign Country, in which **EACH** named plaintiff resides.
☐ Check here if the government, its agencies or employees is a named plaintiff. If this box is checked, go to item (b).

County in this District:*	California County outside of this District; State, if other than California; or Foreign Country
Los Angeles	

(b) List the County in this District; California County outside of this District; State if other than California; or Foreign Country, in which **EACH** named defendant resides.
☐ Check here if the government, its agencies or employees is a named defendant. If this box is checked, go to item (c).

County in this District:*	California County outside of this District; State, if other than California; or Foreign Country
	Virginia; Germany

(c) List the County in this District; California County outside of this District; State if other than California; or Foreign Country, in which **EACH** claim arose.
Note: In land condemnation cases, use the location of the tract of land involved.

County in this District:*	California County outside of this District; State, if other than California; or Foreign Country
Los Angeles	

*** Los Angeles, Orange, San Bernardino, Riverside, Ventura, Santa Barbara, or San Luis Obispo Counties**
Note: In land condemnation cases, use the location of the tract of land involved

X. SIGNATURE OF ATTORNEY (OR PRO PER): [signature] Date 9/15/2010

Notice to Counsel/Parties: The CV-71 (JS-44) Civil Cover Sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law. This form, approved by the Judicial Conference of the United States in September 1974, is required pursuant to Local Rule 3-1 is not filed but is used by the Clerk of the Court for the purpose of statistics, venue and initiating the civil docket sheet. (For more detailed instructions, see separate instructions sheet.)

Key to Statistical codes relating to Social Security Cases:

Nature of Suit Code	Abbreviation	Substantive Statement of Cause of Action
861	HIA	All claims for health insurance benefits (Medicare) under Title 18, Part A, of the Social Security Act, as amended. Also, include claims by hospitals, skilled nursing facilities, etc., for certification as providers of services under the program. (42 U.S.C. 1935FF(b))
862	BL	All claims for "Black Lung" benefits under Title 4, Part B, of the Federal Coal Mine Health and Safety Act of 1969. (30 U.S.C. 923)
863	DIWC	All claims filed by insured workers for disability insurance benefits under Title 2 of the Social Security Act, as amended; plus all claims filed for child's insurance benefits based on disability. (42 U.S.C. 405(g))
863	DIWW	All claims filed for widows or widowers insurance benefits based on disability under Title 2 of the Social Security Act, as amended. (42 U.S.C. 405(g))
864	SSID	All claims for supplemental security income payments based upon disability filed under Title 16 of the Social Security Act, as amended.
865	RSI	All claims for retirement (old age) and survivors benefits under Title 2 of the Social Security Act, as amended. (42 U.S.C. (g))