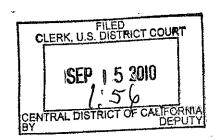
1 Alexander F. MacKinnon (SBN 146883) alexander.mackinnon@kirkland.com Allison Worthy Buchner (SBN 253102) allison.buchner@kirkland.com KIRKLAND & ELLIS LLP 2 3 333 South Hope Street Los Angeles, California 90071 Telephone: (213) 680-8400 Facsimile: (213) 680-8500 4 5 Charanjit Brahma (SBN 204771) KIRKLAND & ELLIS LLP 655 Fifteenth Street., N.W., Suite 1200 6 7 Washington, D.C. 20005 Telephone: (202) 879-5000 Facsimile: (202) 879-5200 8 9



Attorneys for Plaintiff Razor USA LLC

# UNITED STATES DISTRICT COURT CENTRAL DISTRICT OF CALIFORNIA

RAZOR USA LLC,

Plaintiff,

17 ∥ <sub>v.</sub>

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

Defendants.

Case NCV 10 6877-R

COMPLAINT FOR DECLARATORY JUDGMENT

JURY TRIAL DEMANDED

COPY

# **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 enforceable.
- 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"

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.

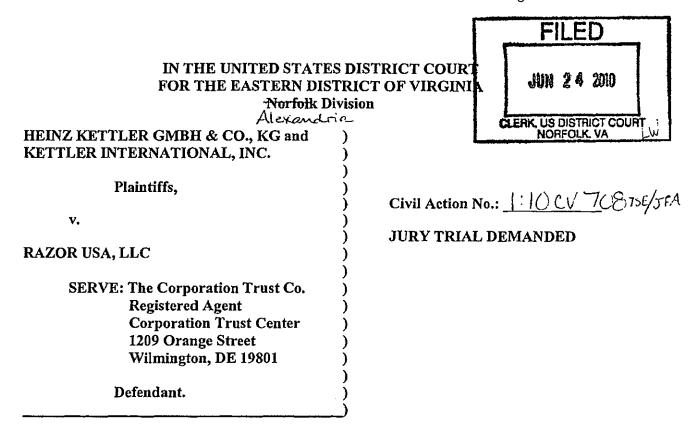
Awarding Razor its costs in this action;

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

1	Awarding Razor such other and further relief as this Court may deem just and
2	proper.
3	DATED: September 15, 2010 Respectfully submitted,
4	MID MOUND ACHAIN
5	Alexander F. MacKinnon
6	Allison Worthy Buchner KIRKLAND & ELLIS LLP
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13	Facsimile: (202) 879-5200 charanjit.brahma@kirkland.com
14	Counsel for Plaintiff Razor USA LLC
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# Exhibit A

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# **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

- 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. §§ 139 I(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 Internet, 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.

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.

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# (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) Assignce: 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 dis-

claimer.

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

(22)Filed: Nov. 22, 2006

**Prior Publication Data** (65)

> US 2007/0096425 A1 May 3, 2007

# Related U.S. Application Data

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

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

(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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227,746 A 5/1880 Fancher 565.718 A 8/1896 Boardman 2/1897 Foehl 576,566 A 579,664 A 3/1897 McConley 582,279 A 5/1897 Gold

## (Continued)

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CH 290478 4/1953

(Continued)

# OTHER PUBLICATIONS

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

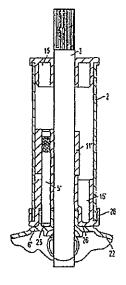
## (Continued)

Primary Examiner-Tony H. Winner (74) Attorney, Agent, or Firm-Greenblum & Bernstein,

#### (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





Case 1:10-cv-0070 SE -JFA Document 1-1 Filed 06/2 Page 2 of 18

# US 7,487,988 B2

Page 2

	υ	.s. patent	DOCUMENTS	Black and white picture allegedly showing mold parts having page No. RF12209.
	591.864 A	10/1897	Meyer	Sheet table in Italian having a stamp entitled "N. CITION & C.
	642.269 A		Smith	Sas.".
	1,279,540 A	9/1918	Hams	Cover page of Europeo (in color) having page RF12230 and dated
	1,438.042 A	12/1922	Kinenid	Feb. 1, 1991.
	2,027,522 A			Four sheets with page Nos. RF12244-A, -B, -C and -D (in color)
	2,246,191 A		Schmitz	
	2.415.735 A		Fastborg	showing valous pictures of trikes and a scooter on what appears to be notebook pages.
	4,006.915 A		Parker	
	4,029.329 A		Chambers	Four sheets with page Nos. RF12245-A, -B, -C and -D (in color)
	4,079.957 A		Blease	showing various pictures of trikes and a bike on what appears to be
	4.120.514 A		Sanders	notebook pages.
	4,138.131 A		Sommer	Pages 1 and 2 of a 1998 Radio Flyer catalog.
			Kassai	Three sheets labeled "Acknowledgment".
	4,261,588 A			A sheet entitled "Restricted Turning Prior Art".
	D278.325 S			A sheet entitled "Product Name: Roll N Ride".
	4,608.729 A		Huang	A sheet entitled "Product Name: Grow-With-Me-Trike".
	4,624.470 A			A sheet entitled "Product Name: Baby Too".
	4,674.761 A		Kassai	A sheet entitled "Product Name: Tough Trikes" and "Product Name:
	4.714.261 A			Push'n Pedal Trike".
	4,744,575 A		Tonelli	Two sheets entitled "HBC Model 29875 CS 04G".
	4,887,827 A	12/1989	Heggie	Two sheets entitled "Smoby Pilot Alu Plus Juguetes Pico S.A.".
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	5,291.797 A	3/1994	Chi	France".
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	5,314.207 A		Camfield et al.	Two sheets entitled "Processed Plastic Item 17800-2".
	D355.870 S		Dieudonne	Two sheets entitled "Fischer Price Kawasaki (US Patent 6.651.528)".
	5,505.493 A		Camfield et al.	Two sheets entitled "Mattel Hot Wheels".
	5,573.262 A			
	6,003.890 A			Two sheets entitled "Tek-Net Toys Int'l Inc. USA 020821 Emergency
	6,082.754 A		Jeunet et al.	911".
	6,170.841 B		Mizuta	Two sheets entitled "Fischer Price L&S Ride on Harley".
	6,186.524 B		McQueeny et al.	Two sheets entitled "Friendly Toys Item #7112 Fold-Up Trike".
	6,378.884 B		Kettler	Document showing Radio Flyer model #77 entitled "Restricted Turn-
	6,799.772 B		Kettler et al.	ing Prior Art".
	7,156,408 B		Kettler et al.	Italtrike "Kidson wheels" catalog (in color) pp. KET2818-KET2841
				dated Jan. 2005.
	6,378.884 C	1 172007	Kettler et al.	Italtrike International "Kids on wheels" catalog (in color) pp. 100004-
	FOR	FIGN PATE	NT DOCUMENTS	100027 dated Jan. 2000.
			Bocomestin	Italtrike International catalog pp. 100028-100039.
€IJ		314538	6/1956	Radio Flyer catalog (in color) entitled "Specialty Collection 2000"
DE		892722	10/1953	pp. RF01266-RF01273.
DE	2	3242863	5/1984	Radio Flyer catalog (in color) entitled "Product Catalog 2000" pp.
DE		3914050	10/1990	RF01274-RF01305.
DE		9901449	6/1999	Radio Flyer catalog (in color) entitled "Consumer Product Catalog"
DE		9911652	10/1999	pp. RF01306-RF01313.
DE		9822875	6/2000	Radio Flyer catalog (in color) entitled "Product Catalog 1999" pp.
DE		9962468	7/2000	RF01314-RF01349.
FR		2614002	10/1988	Radio Flyer entalog (in color) entitled "Specialty Collection Catalog
FR			5/1998	1999" pp. RF01350-RF01357.
	2755419			11
GB		145370	7/1920	Radio Flyer catalog (in color) pp. RF01358-RF01388
GB	815456		6/1959	Radio Flyer 1998 catalog (in color) pp. RF01389-RF01396.
GB	2042910		10/1980	Six Catalog pages of company Processed Plastic Company showing
GB	2129319		5/1984	a TimMee toy (1997).
GB	2145382		3/1985	Four pages of assembly Instructions for Push, Pedal & Ride Trike,
GB	2190635		11/1987	date unknown.
GB		2283217	5/1995	Figs. 1, 2A and 2B purporting to show the Push, Pedal & Ride Trike
WO	9	5/32118	11/1995	in a fully assembled state and a partially disassembled state, date
		OTHER PI	DIJOATIONE	unknown.
		OTHER PU	BLICATIONS	English language Translation of DE 29901449.
				Fallah Inggara Abstract of CD 915456

English language Abstract of GB 815456. English language Abstract of DE 3242863.

English language Translation of Swiss 290478.

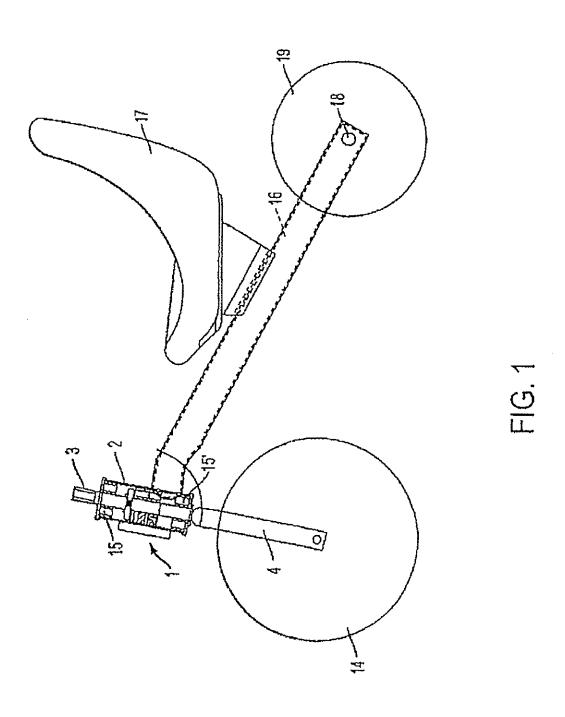
English language Abstract of 3914050.

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.

U.S. Patent Feb. 10, 2009

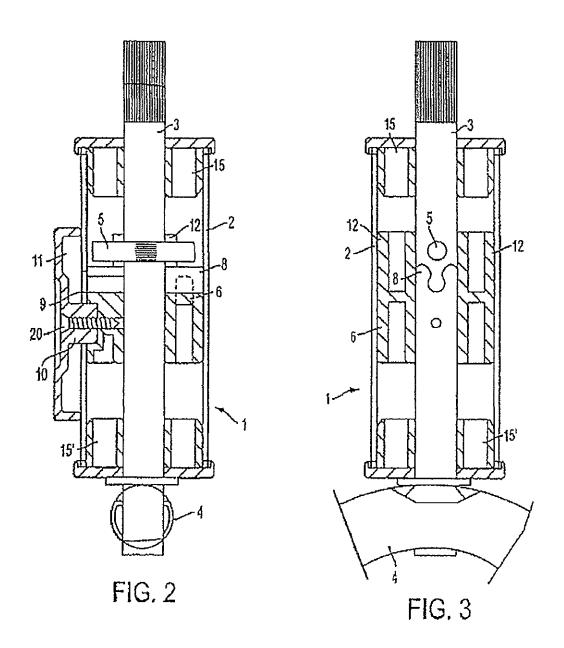
Sheet 1 of 9



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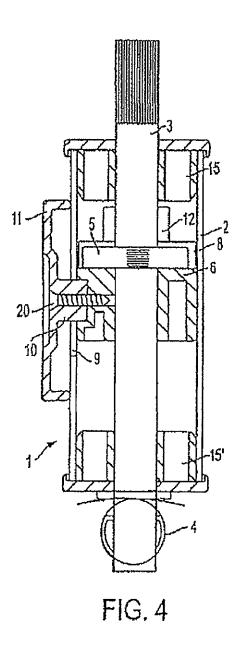
Sheet 2 of 9

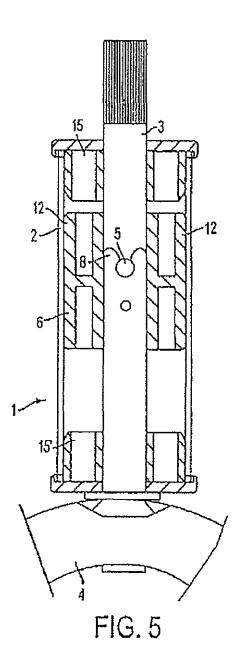


U.S. Patent

Feb. 10, 2009

Sheet 3 of 9





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U.S. Patent

Feb. 10, 2009

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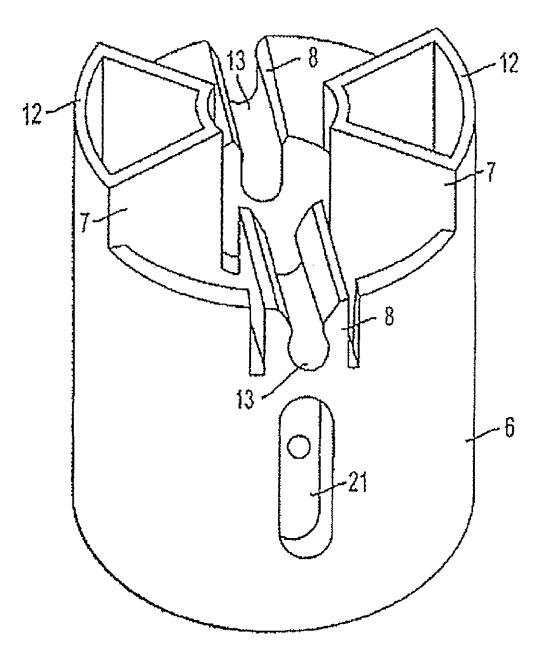
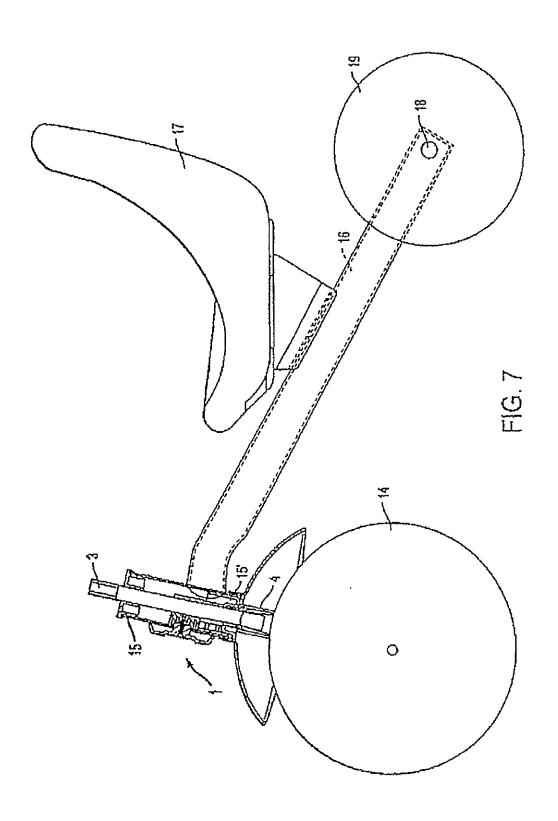


FIG. 6

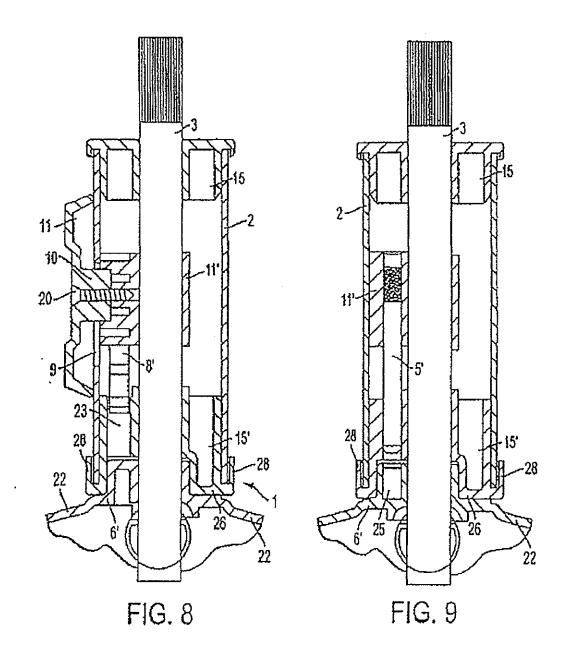
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U.S. Patent

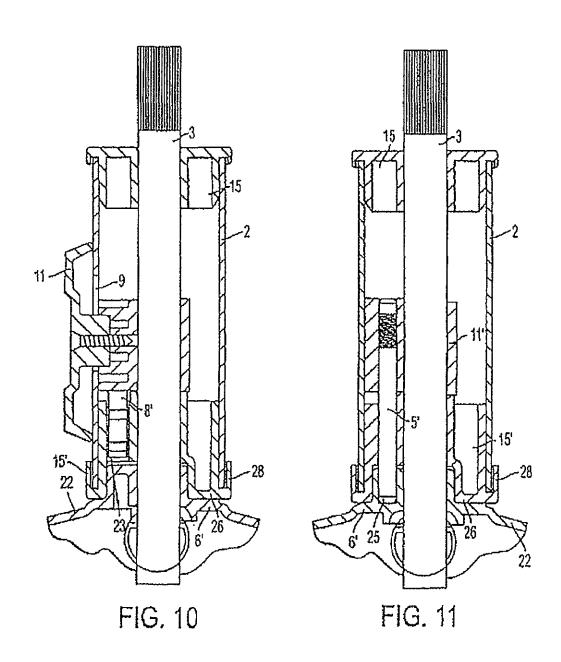
Feb. 10, 2009

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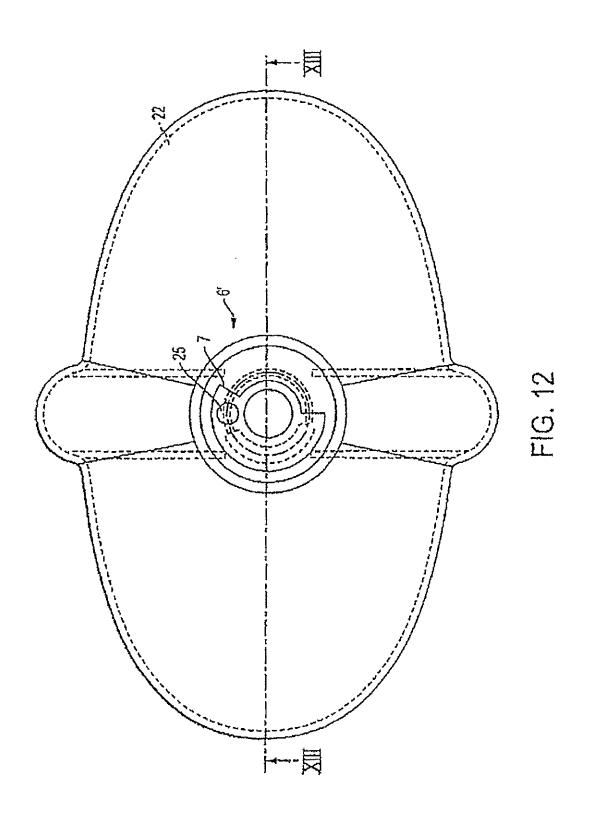


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# VEHICLE STEERING HEAD

# 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 15 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 a 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 30 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 adeflection (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.

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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 motation 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

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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 10 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 15 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 20 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 25 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 30 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 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

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 45 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 50 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 55 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 60 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

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°

The invention provides a vehicle steering head including a attachments or stops are in symmetry with each other and are 35 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. Case 1:10-cv-0070b ລຣE -JFA Document 1-1 Filed 06/24/ສປ Page 14 of 18

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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 to 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 25 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 30 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 35 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 40 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 50 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 55 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-clock- 60 wise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counterclockwise 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 15 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.

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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 5 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 to 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 rota- 15 tional 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 20 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 as 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 55 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 60 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, 65 the fork member being rotatable with respect to the support tube, and a system which limits the rotational movement of

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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 solocked 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

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.

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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 10 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 mecha- 20 nism. 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 25 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 30 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 35 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 40 used on the upper portion of steering head 1. 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 holt-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 pro- 45 vided 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 50 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 handlebartakes place. The 55 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 60 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 65 and 5, a steering movement thus becomes impossible since the handlebar or fork member 3 is locked in a single direction.

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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

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

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 hearing 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 hearing 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

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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 5 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 10 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 boltlike latch element 5' therein. Furthermore, a surrounding collar-like edge 28 can be seen in which 29 designates two 15 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. 20 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 25 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 30 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 35 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 handlehar;
- an upper bearing support mounted to an upper end of the 45 member is cylindrically shaped. 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; 50
- 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 sur- 55 faces 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
- 5. The steering head of claim 4, wherein the mudguard is 65 of the projection extends into the support tube. arranged between the wheel fork and the lower bearing support.

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- 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 sup-
- 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
  - 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 direc-
- 16. The steering head of claim 15, wherein an upper portion
  - 17. The steering head of claim 15, wherein the recess is an arcuate recess.

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- 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 <sup>15</sup> support tube and comprising an arcunte recess;
  - the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports;

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- 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)	Assignce:	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.			
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Jul. 5, 1999 (DE)					
<b>(51)</b>	Int. Cl.7	B62K 5/02			
	U.S. Cl				
	Field of Search				
(56)	References Cited				
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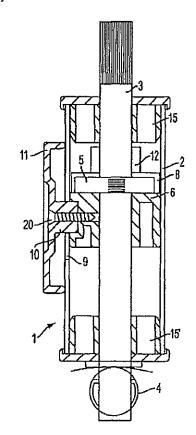
<sup>\*</sup> cited by examiner

Primary Examiner—Avraham Lerner
Assistant Examiner—Tony Winner
(74) Attorney, Agent, or Firm—Greenblum & Bernstein
BLC

# (57) ABSTRACT

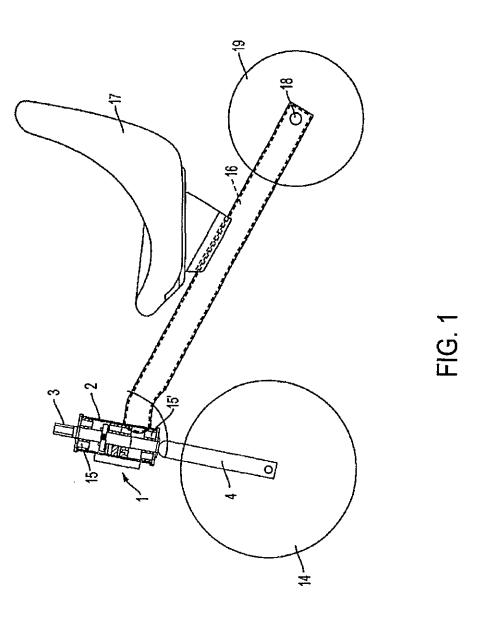
A vehicle steering head including a fork tube adapted to engage a handlebar, a support tube which rotatably supports the fork tube, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position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





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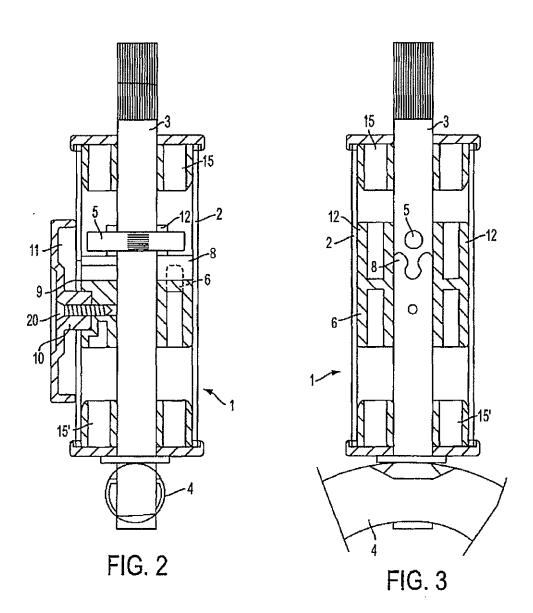


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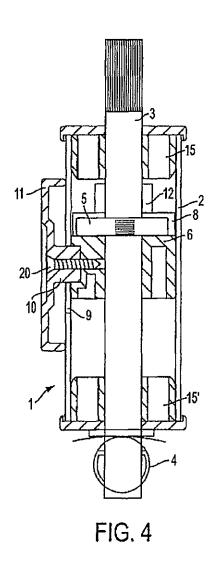
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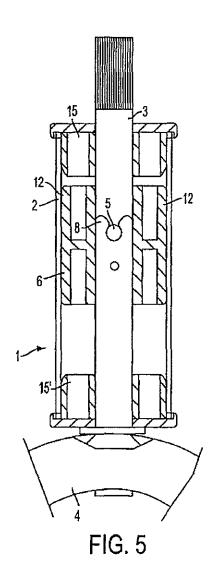


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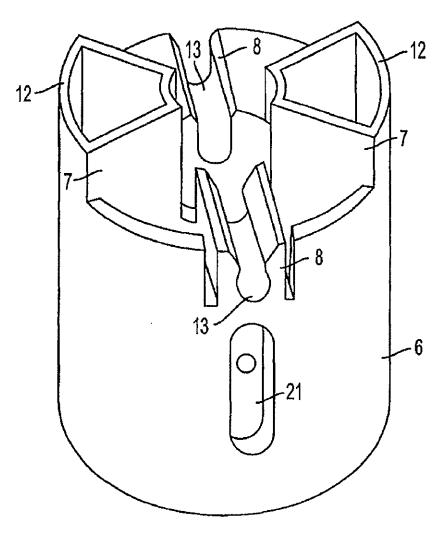
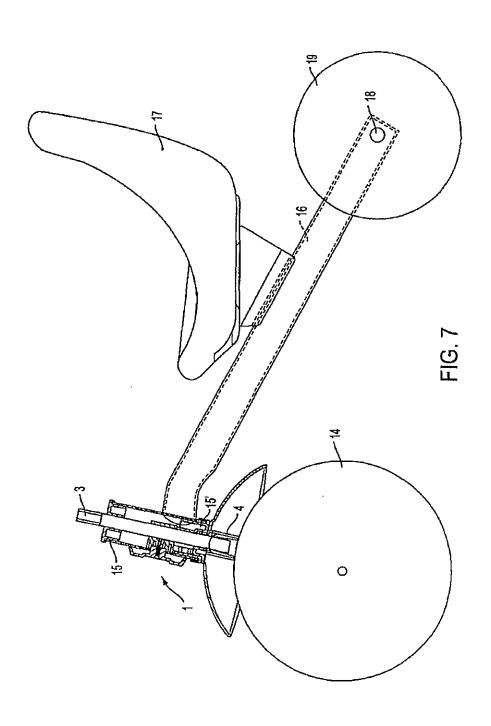


FIG. 6

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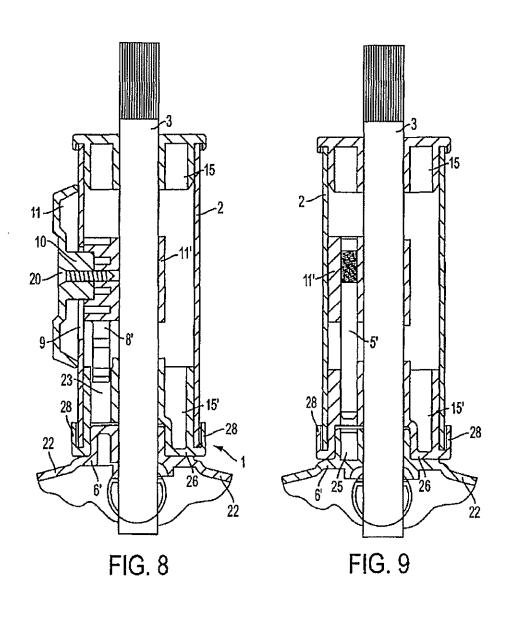
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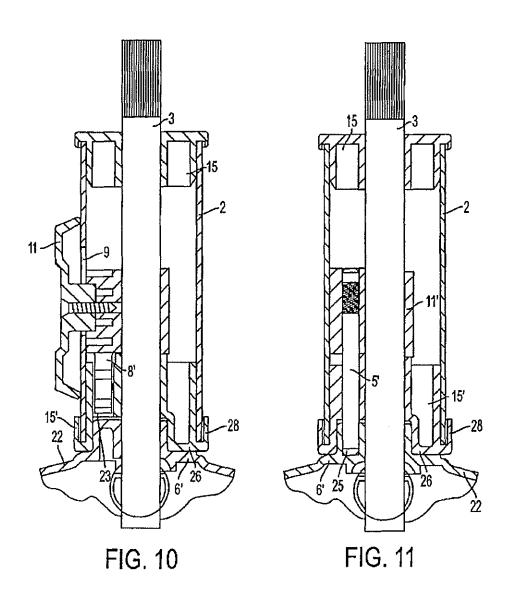
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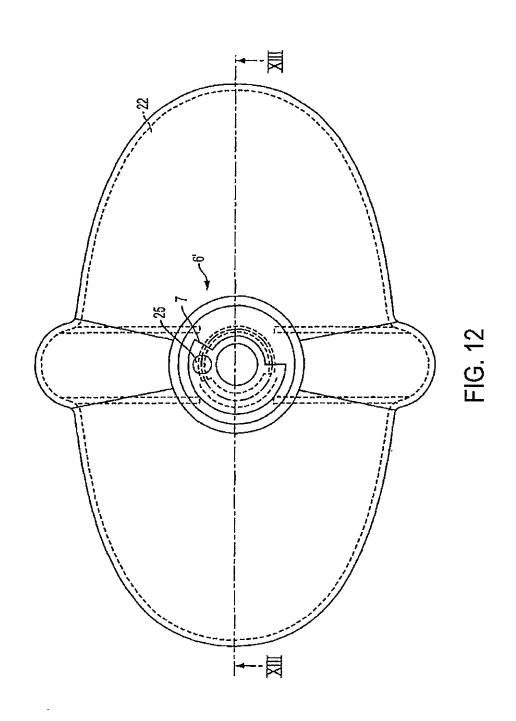


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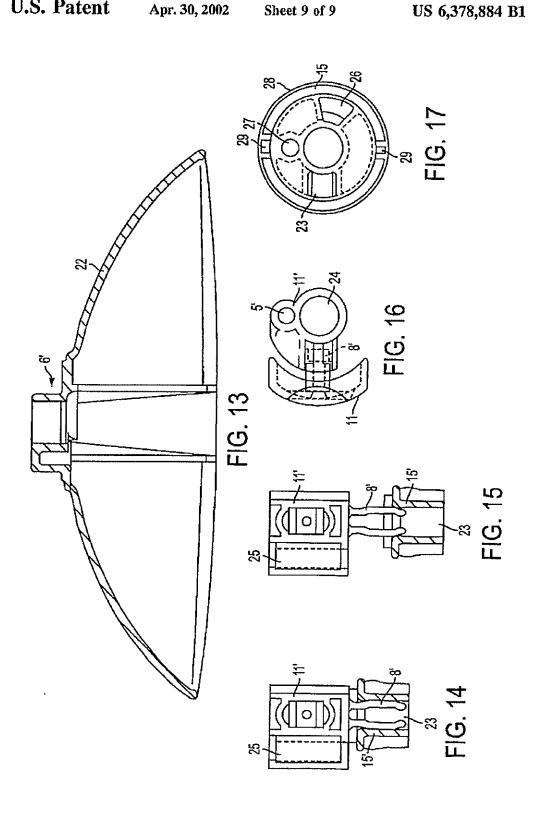
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### VEHICLE STEERING HEAD

# 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 15 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.

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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 5 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 10 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 5 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 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 corre-sponding 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 25 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 30 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 35 stop surface. The linkage element may further comprise at 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 40 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 45 connecting element to pass therethrough. The opening may 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

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 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 60 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 casy 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 slide facilitates the ease of handling or movement of 10 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

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 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 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 50 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 all functional parts separately in a very simple manner. As a 55 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.

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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 5 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 10 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 60 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 65 the fork tube between the fork end and the handlebar end, the latch element being disposed within the support tube, a

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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 35 hearing 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

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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 5 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 10 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 25 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 50

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 65 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.

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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 serew 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 50 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 55 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

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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 10 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 15 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 35 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 40 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 45 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, 50 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 55 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 60 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 65 which are angularly spaced apart from each other. This design is such that a downwardly oriented attachment or

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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 L1 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:

- 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

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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 5 locking the fork tube in a single position.
- 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 10 comprises a pin.
- The steering head of claim 4, wherein the pin projects substantially perpendicular to the axis of the fork tube.
- The steering head of claim 1, wherein the linkage element comprises a substantially cylindrical shape.
- 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 20 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 30 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 35 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 40 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 50 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 counterclockwise 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 so 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 65 upper bearing disposed on one end of the support tube and a lower bearing disposed on another end of the support tube,

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cach 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
- 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

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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 10 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 20 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 30 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 40 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 45 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 55 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 65 from a first position, wherein the latch element and the at least one stop cooperate to limit the rotational

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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 rube 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 bandlebar 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;

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- 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 <sup>20</sup> 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.

\* \* \* \* \*

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# UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

PATENT NO. : 6,378,884 B1 DATED : April 30, 2002 Page 1 of 1

INVENTOR(S) : April 30, 2

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

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# 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

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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

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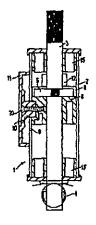
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Document showing Radio Flyer model #77 entitled "Restricted Turning Prior Art".

Italtrike "Kids on wheels" catalog (in color) pp. KET2818-KET2841 dated Jan. 2005.

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Radio Flyer 1998 catalog (in color) pp. RF01389-RF01396. 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. RI 12206 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.

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# US 6,378,884 C1

Page 3

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

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.

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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.

\* \* \* \* \*



# (12) United States Patent Kettler et al.

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

(34)	VEHICLE	SIEERING I	1EAU
(75)	Inventores	Holmy Kettler	Ence-Pareit (DE

MULTICLE CERRODING HEAD

ors: Heinz Kettler, Ense-Parsit (DE);
Joachim Kettler, Worl (DE); Reighard

Rocholl, Werl (DE)

(73) Assignee: Helnz 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

Ju	I. 5, 1999	(DE)	299 11 652 U
(51)	Int. Cl.7	4 1144(610100-0010=====1510704)()()()00111-10111-1011	. B62K 5/02
		280/279- 280	

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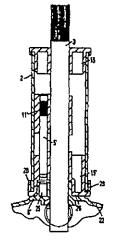
\* cited by examiner

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

### (57) ABSTRACT

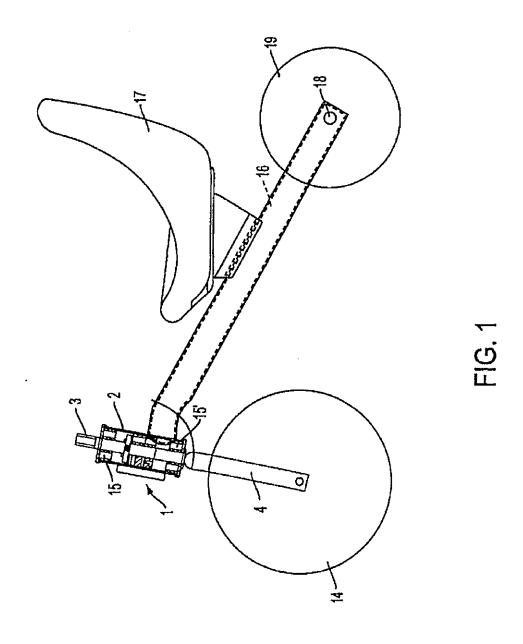
Vehicle steering head including a connecting element adapted to engage a handlebar. A support tube rotatably supports the connecting element. A fork member adapted to connect a wheel fork to a handlebar. The fork member is rotatable with respect to the support tube. A mechanism limits the rotational 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

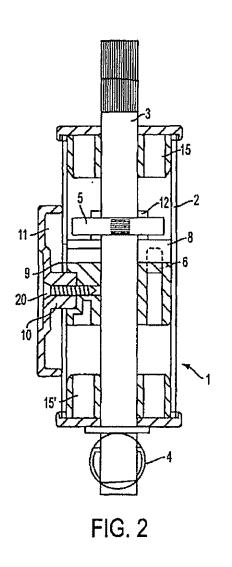


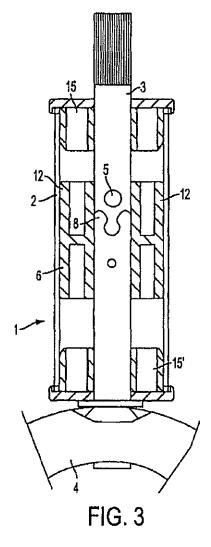


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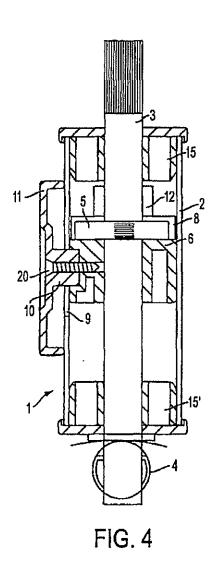


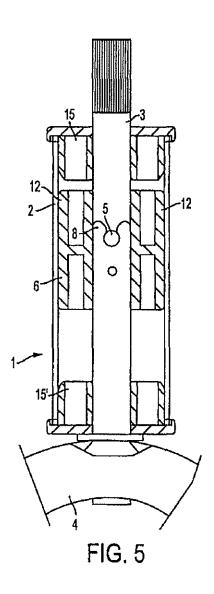


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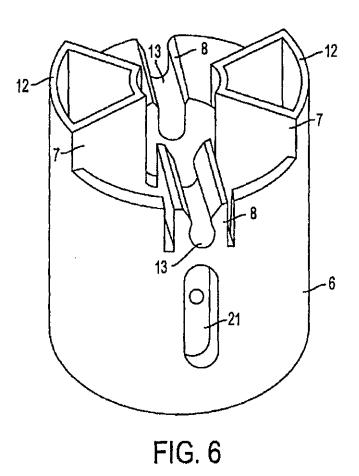
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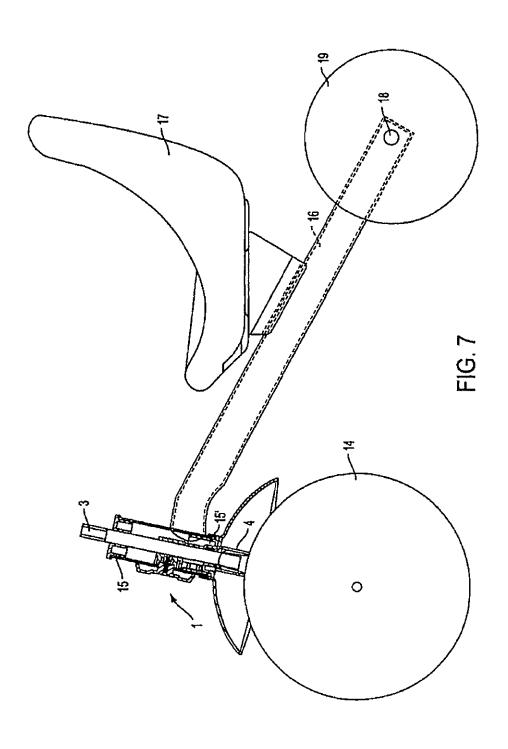




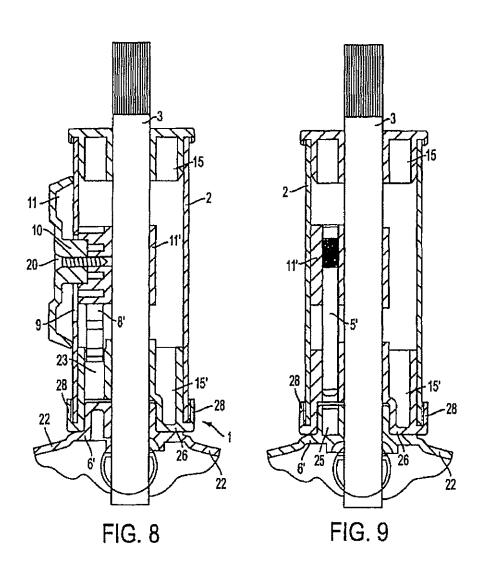
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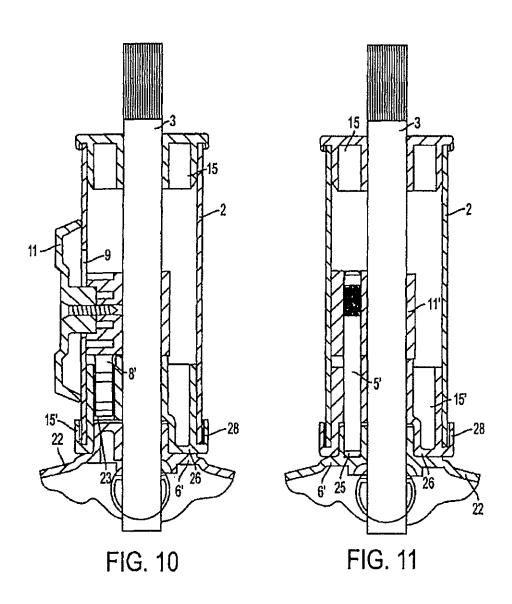
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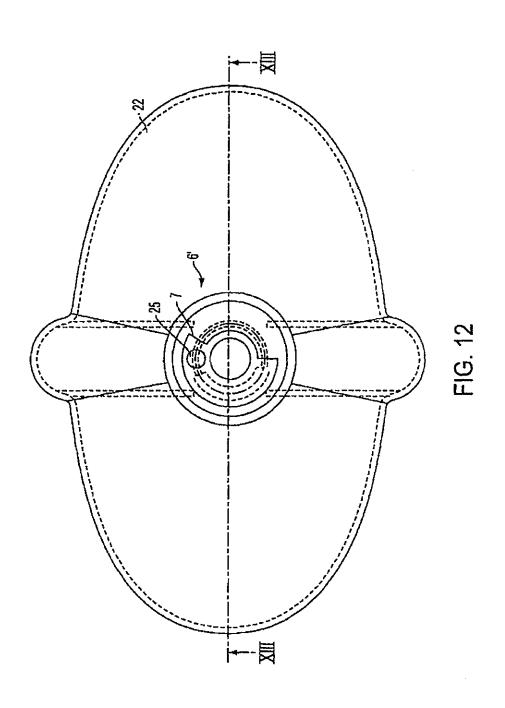
U.S. Patent Oct. 5, 2004 Sheet 6 of 9 US 6,799,772 B2



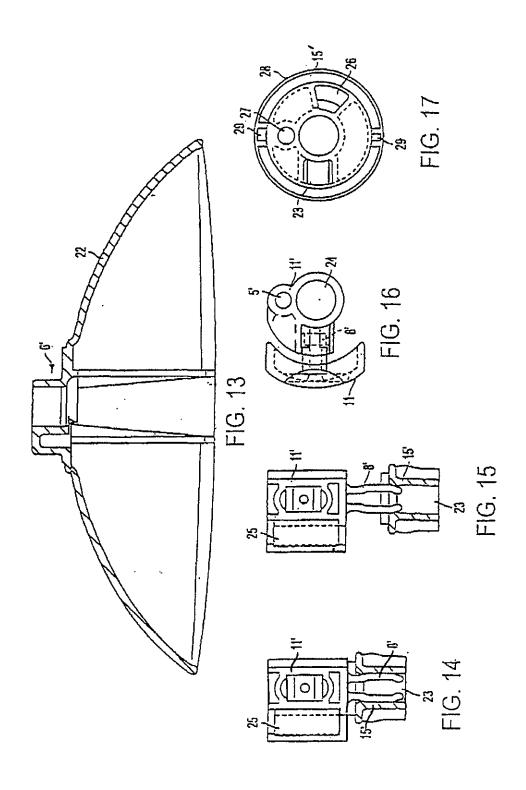
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### VEHICLE STEERING HEAD

### 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

25 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 30 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 35 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 40 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.

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 60 extend through the fork member such that it projects at both 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 65 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 According to one aspect of the invention a latch element 55 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 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.

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It should be noted that the manufacturing costs of the steering bead 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, 60 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 locking 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 Case 1:10-cv-00708-. JE -JFA Document 1-3 Filed 06/24, J Page 13 of 22

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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 25 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 30 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 35 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 40 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 45 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. 50 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 55 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 65 rotation between the at least two stops may be approximately 45 degrees.

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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

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 hearing 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 jocluding 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

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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 10 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, 15 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 20 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 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 60 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 65 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

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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 5 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 10 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 40 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 50 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 55 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 60 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 65 that latch element 5 be a pin having a centrally disposed exterior knurl which is press fit into a fork member as is

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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 3 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

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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

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- 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.
- The steering head of claim 1, further comprising a locking element connected to one of a slide and the linkage element.
- The steering head of claim 1, wherein the linkage element rotates with the fork member.
- 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.
- 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 50 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,

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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 15 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 25 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 35 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; 50 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;

- 14 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;

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- 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 10 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 nonrotatably 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 35 midmard.
  - 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 nonrotatably 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 55 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

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- 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 cach 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;

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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, 5 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 15 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;
- a device that engages the mechanism to prevent movement thereof,
- wherein the device that engages the mechanism comprises a pin, and
- 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 45 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. 50
- 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 55 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 60 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 65 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 wherein the pin is movable parallel to an axis of the 30 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 35 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.

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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 5 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 10 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 15 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 20 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 mudeuard:
- 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; 35 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:
  - 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 50
  - 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 60 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 65 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;
  - 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
  - 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 an upper bearing support mounted to an upper end of the 45 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.

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- 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 5 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 <sup>25</sup> 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 35 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 <sup>45</sup> 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 50 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 60 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 baving 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;

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- 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

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- 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
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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. Ci. B62K 5/02 (2006.01)

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

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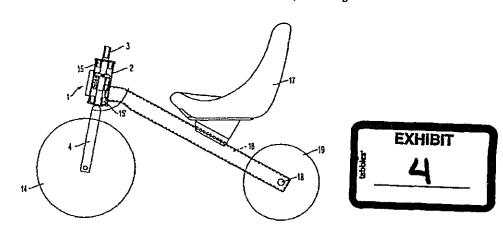
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Primary Examiner—Tony Winner (74) Attorney, Agent, or Firm—Greenblum & Bernstein, P.L.C.

#### (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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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.

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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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Black and while picture allegedly showing a mold having page No. RF12208. Black and white picture allegedly showing mold parts having page

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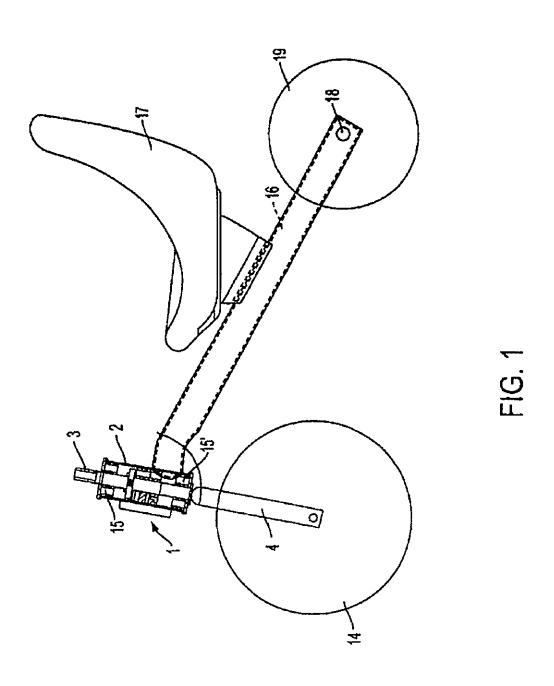
Four sheets with page Nos. RF12245-A, -B, -C and -D (in color) showing various pictures of trikes and a bike on what appears to be notebook pages.

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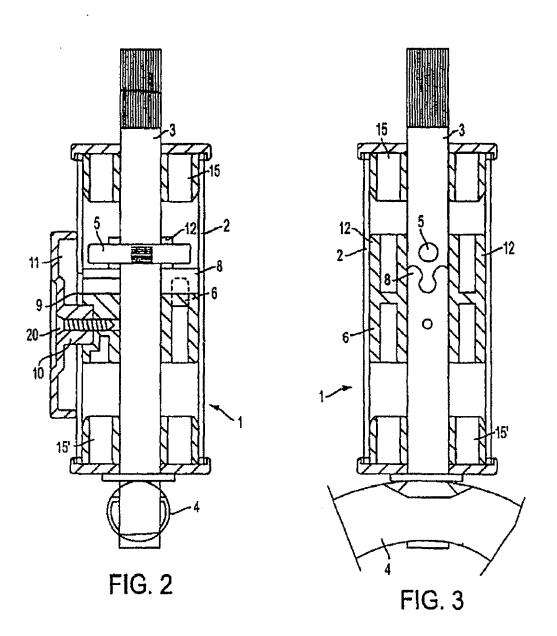
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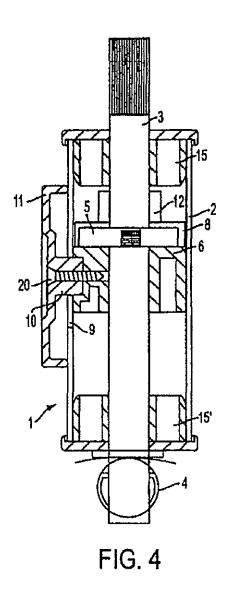
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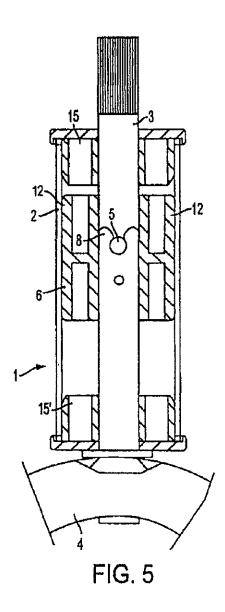


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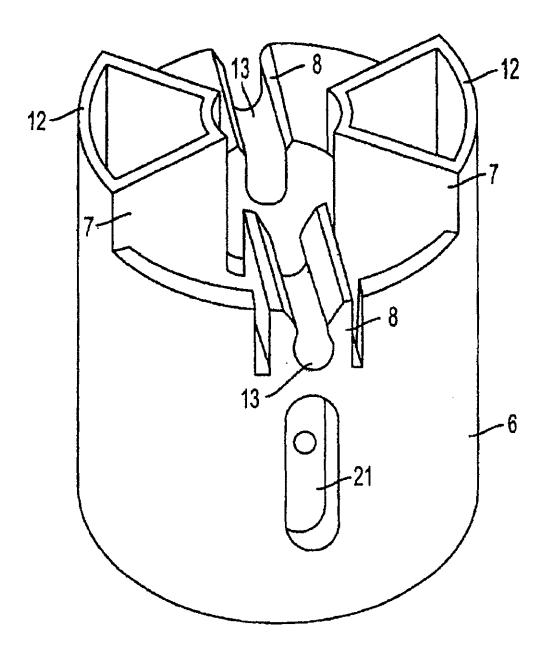
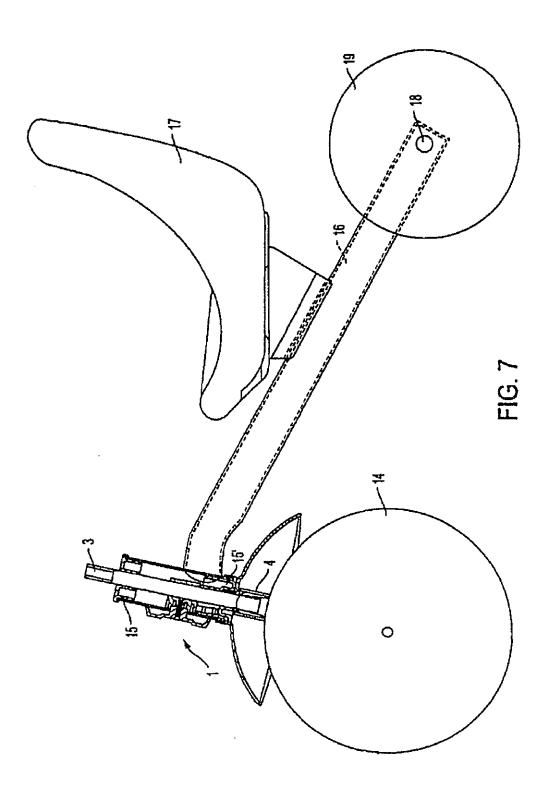


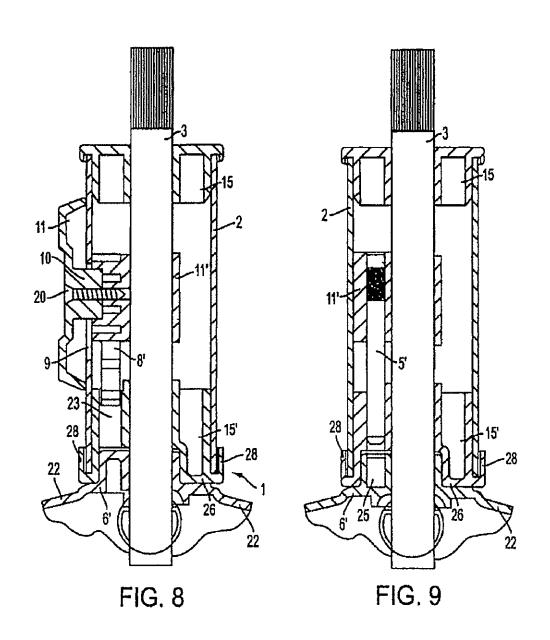
FIG. 6

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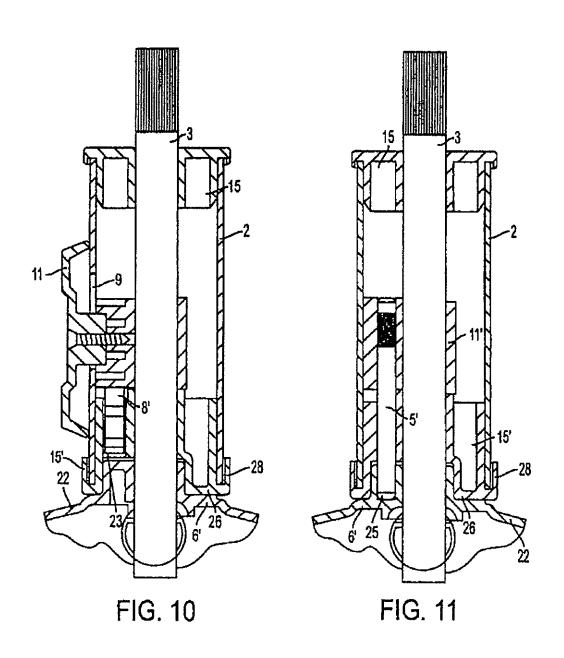
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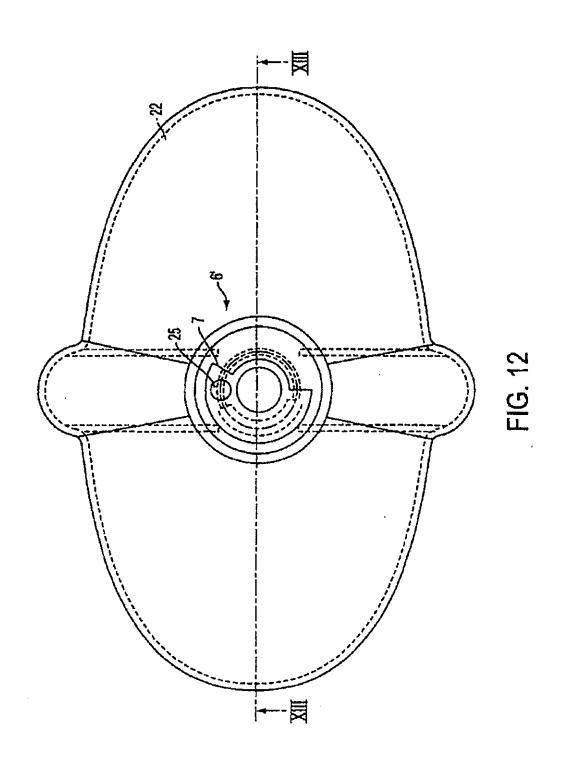
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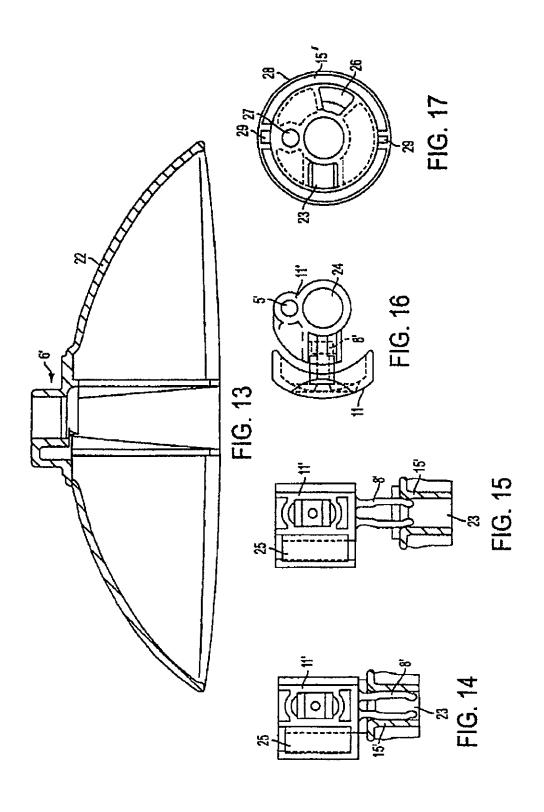
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#### US 7,156,408 B2

#### 1 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. 10 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. 15 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 25

## 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 45 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 55 latch element. This design ensures that when a push rod is 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 60 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, 65 the linkage element comprises at least one locking element which is releasably connectable to the latch element.

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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 30 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 50 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 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

3 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 10 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 20 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 45 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 50 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 ss comprise a plurality of hollow chambers separated by conthe 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 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 65 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 40 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 necting 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 recess to be centrally arranged between the two attachments 60 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 5 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 15 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.

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 dis- 30 posed 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 mem- 45 ber. 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. 50

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 55 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 65 counter-clockwise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise

6 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 10 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 The steering head may further comprise an upper bearing 20 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 25 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

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

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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 10 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 15 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 20 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 25 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, 30 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 35 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 two stop surfaces. 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 state; at least two stop surfaces limits the rotation of the cylindrical member in one direction, and wherein mother 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 60 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 65 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

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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 5 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 10

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 15 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 axic 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 25 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 30 (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 35 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 40 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 45 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 50 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 55 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 sides of fork member 3. Of course, latch element 5 may be integrally formed with fork member. Alternatively, latch clement 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 65 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.

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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 20 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 rocess, threaded into the recess, or otherwise secured to slide II' 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 I.

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 extends or projects from at least one and preferably both 60 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

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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 5 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 15 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 20 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 30 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 33 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 pro- 40 vided 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 45 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 50 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 55

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

- 12 a lower bearing support mounted to a lower end of the support tube,
- the connecting member being rotatibly 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.
- The steering head of claim 1, wherein the upper and lower bearing supports are each non-rotatably fixed to the support tube.
- The steering head of claim 1, wherein the lower bearing support comprises at least one stop surface.
- The steering head of claim 3, wherein the lower bearing support comprises two stop surfaces.
- The steering head of claim 1, wherein the mechanism comprises at least one stop surface.
- 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.
- The steering head of claim 7, wherein the linkage element rotates with the connecting member.
- The steering head of claim 7, wherein the linkage element and the mudguard comprise a one-piece structure.
- 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 members.
  - 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;

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- 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 5 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 15 movable locking member comprises a pin. a bandlebar:
- 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 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 30 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
- 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 55 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 60 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 65 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,

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- 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 10 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
  - 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 comrotational movement of the fork member and that, in an 20 prising 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 arcuste 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
  - a connecting element adapted to connect a wheel fork to a handlebar;

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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 5 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 10 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, 15 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.

  20 and lower bearing supports.

  41. The vehicle steering mechanism moves when the
- 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, 25 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 <sup>30</sup> 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 <sup>35</sup>

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
clement.

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 65 connecting member in each of two directions;
  - the mechanism comprising at least two stop surfaces;

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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;

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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 5 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 hearing 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 direc-
- wherein the movement limiting system comprises an 25 the vehicle steering head comprising: arcuste recess and an arcuste projection, the arcuste projection having an arc length between two ston surfaces that is
- greater and an arc length of a space defined by the two stop surfaces of the arcuste projection, whereby the 30 arcuste 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, 35 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 40 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 connect- 50 ing 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 60 an end of the pin to pass therethrough. 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 65 the vehicle steering head comprising: element from rotating in each of the two directions, and wherein, when moved to another position, the locking

18 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;
- 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 mudgiard 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,

- 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 direc-
- the movement limiting system comprising an arcuste recess arranged on the lower bearing support and an arcuate projection arranged on the mudguard,
- wherein the arcuste 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
- 61. The vehicle steering head of claim 55, wherein the arcuate projection and the mudguard comprise a one-piece
- 62. A vehicle steering head for a tricycle having a frame,
  - a support tube fixed to the frame of the tricycle;
  - an upper bearing support mounted to the support tube;

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- 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 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 15 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
- 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
- 65. The vehicle steering head of claim 64, wherein the 30 movable first member moves parallel to an axis of the connecting member and the second member comprises an opening.

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- 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 first part contacting another stop surface of the second 10 the second part that is greater than the arc length the first
  - 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.

Case 1:10-cv-0070 SE -JFA Document 1-5 Filed 06/2 (0 Page 1 of 1

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JS 44 (Rev. 11/04) Case 1:10-cv-0070 3E -JFA Document 1-6 Filed 06/2 .0 Page 1 of 1

## CIVIL COVER SHEET

The 3S 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.)

Table A INCIDEN	INS ON THE REV	ERSE OF 11	ie form.)	DEFENDA	NTC	····		
I.(a) PLAINTIFFS HEINZ KETTLER GMBH & CO., KG and KETTLER INTERNATIONAL, INC.			RAZOR USA, LLC					
INTERNATIONAL, INC.								
(b) County of Residence of First Listed Plaintiff: (EXCEPT IN U.S. PLAINTIFF CASES)			County of Residence of First Listed Defendant					
•		•			(IN U.S. PLAINTIFF CASES ONLY)			
(c) Attorney's (Firm Name,		•	imber)	NOTE: IN LA	AND CONDEMNA	ATION CASES	, USE THE LOCATION OF THE	LAND INVOLVED.
John C. Lynch Liz S. Flowers	s, Esq. (VSB\$	78487)		Attorneys (If	Known)			
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222 Central Pa				l				
	ach, Virginia 2							
	s: (757) 687-7 : (757) 687-15							
E-mail: john.lync			\m					
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II. BASIS OF JURISDIC			(Only)	III. CITIZ	ENSHIP OF	PRINCIPA	L PARTIES (Place an "X" in O	ne Box for Plaintiff and One
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1 U.S. Government Plaintiff	⊠ 3Federal (U.S. G	Question overnment h	lot a Party)	Citizen of This	State	]1 🗀1	Incorporated or Principal Place of Business in This State	<b>□</b> 4 □4
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120 Marine 130 Miller Act	310 Airplane			nal Injury – Mod.	620 Other Food	& Drug	423 Withdrawal 28 USC 157	410 Antitrust 430 Banks and Banking
140 Negotiable Instrument	320 Assault, Libe	l & Slander	365 Person	nal Injury – Product	Property 21 US	C 881		450 Commerce
☐ 150 Recovery of Overpayment & Enforcement of Judgment	330 Federal Empl     Liability	loyers"		tos Personal Injury	630 Liquer Law		PROPERTY RIGHTS  B20 Copyrights	460 Deportation 470 Racketeer Influenced an
☐ 151 Medicare Act ☐ 152 Recovery of Defaulted	340 Marine 345 Marine Produ	ect Liability	Product Liabit PERSONAL		650 Airline Reg		830 Patent     □ 840 Trademark	Corrupt Organization  480 Consumer Credit
Student Loans (Excl. Veterans)  153 Recovery of Overpayment of	350 Motor Vehic		370 Other		690 Other	OR .	SOCIAL SECURITY	490 Cable/Sat TV B10 Selective Service
Veteran's Benefits  160 Stockholders' Suits	Liability  360 Other Person		380 Other Damage	Personal Property	710 Fair Labor	Standards Act	861 HIA (1395ff)	☐ 850 Securities/ Commodities Exchange
190 Other Contract		ju. j	☐ 385 Prope	rty Damage Product	720 Labor/Mgn	at. Reporting &	862 Black Lung (923) 863 DIWC/DIWW (405(g))	☐ 875 Customer Challenge 12
☐ 195 Contract Product Liability ☐ 196 Franchise			Liability		Disclosure Act	ibor Act	☐ 864 SSID Tate XVI ☐ 865 RSI (405(g))	USC 3410  890 Other Statutory Actions
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REAL PROPERTY  210 Land Condemnation	CIVIL RIG	HTS	PRISONI  510 Motio	ER PETITIONS	790 Other Labo		FEDERAL TAX SUITS  870 Taxes (U.S. Plaintiff or	893 Environmental
220 Foreclosure	442 Employment		Sentence		1377 Empt. Rec.	ine. Security Act	Defendant	894 Energy Allocation Act
230 Rent Lease & Ejectment 240 Torts to Land	Accommodation	•	530 Gener				871 1RS - Third Party 26 USC 7609	895 Freedom of Information 5 900 Appeal of Fee
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V. ORIGIN (Place an "X" in One Box Only)  1 Original Proceeding 2 Remanded from 3 Remanded from 4 Reinstated or 5 Transferred from 6 Muhidistrict 7 Appeal to District Judge from State Court Appellate Court Responsed another district Litication Magistrate Judgment								
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VII. REQUESTED IN COMPLAINT: CHECK IF THIS IS A CLASS ACTION DEMAND 5. CHECK IES Only II demanded in complaint:  UNDER F.R.C.P. 23  JURY DEMAND: Yes No								
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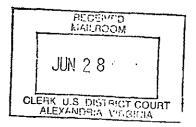
Case 1:10-cv-0070 SE -JFA Document 1-7 Filed 06/2 .0 Page 1 of 1

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# 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;
- 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** 

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#:110 Case 1:10-cv-0070 . SE -JFA Document 1-8 Filed 06/2...10 Page 1 of 1

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# TROUTMAN SANDERS

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

(5.4)	STREET OF TO	OMPONIO	XXX2 4 X
(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

(56)

(30) Foreign Application Priority Data

280/271, 282, 89; 403/354, 83; 74/495

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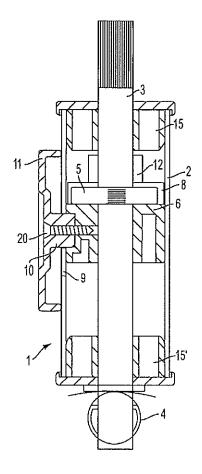
Primary Examiner—Avraham Lerner Assistant Examiner—Tony Winner

(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.

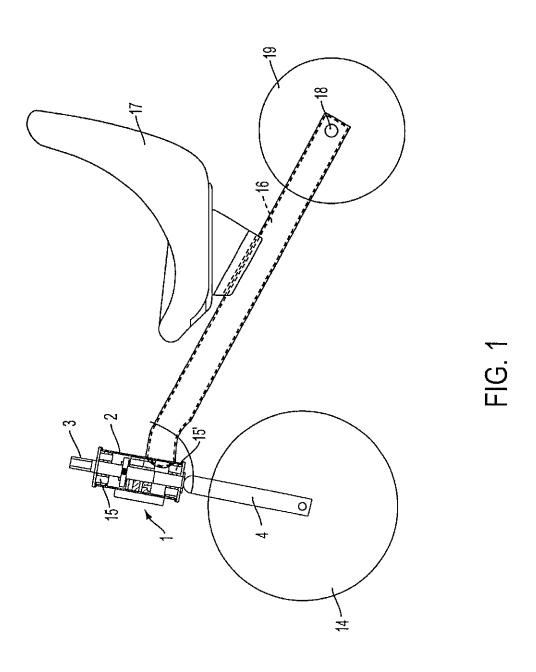
58 Claims, 9 Drawing Sheets



Apr. 30, 2002

Sheet 1 of 9

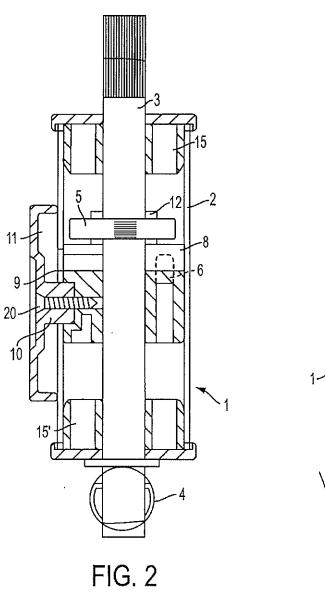
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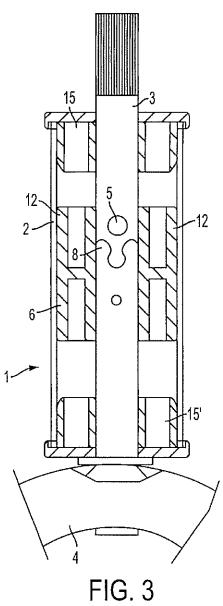


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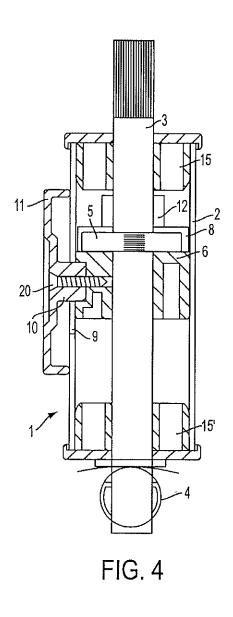


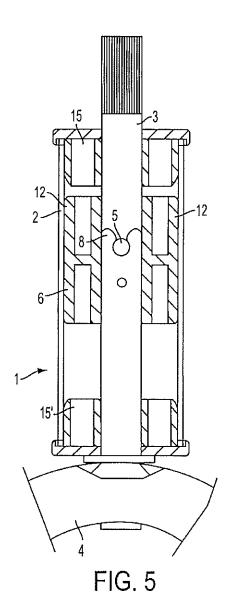


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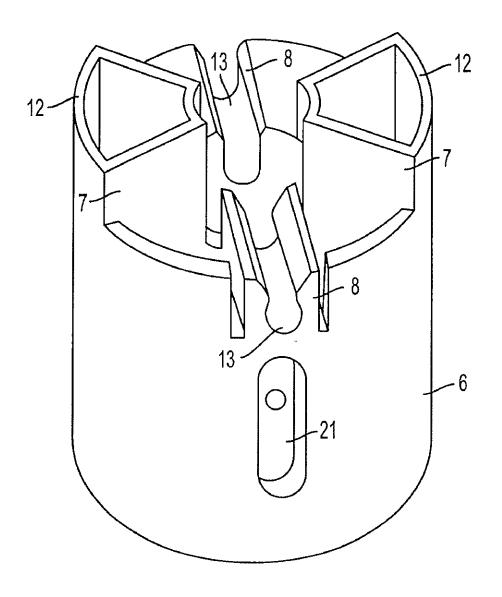
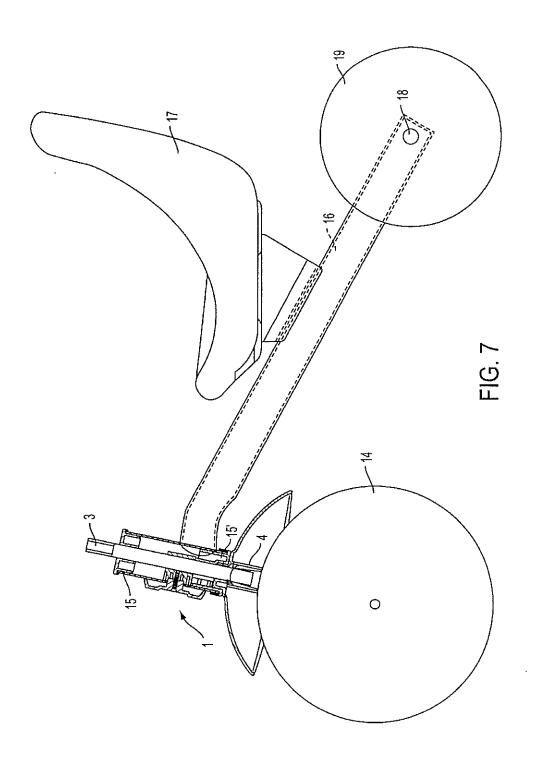


FIG. 6

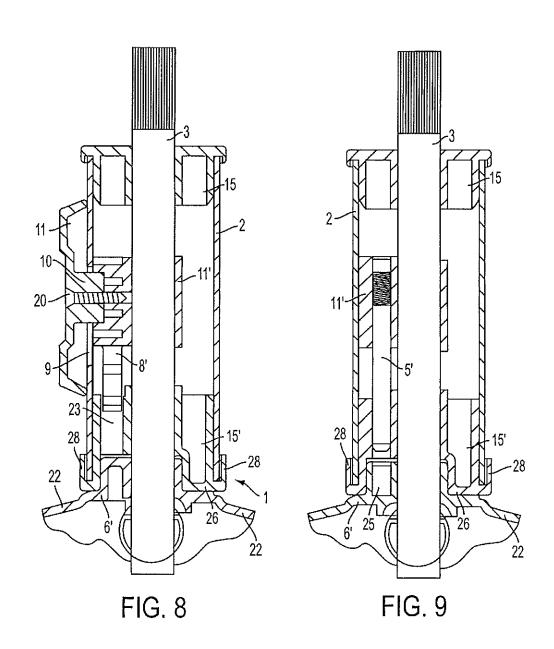
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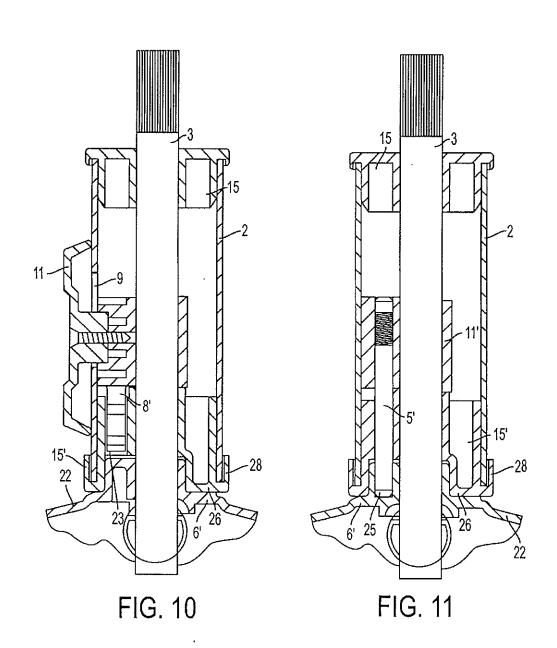
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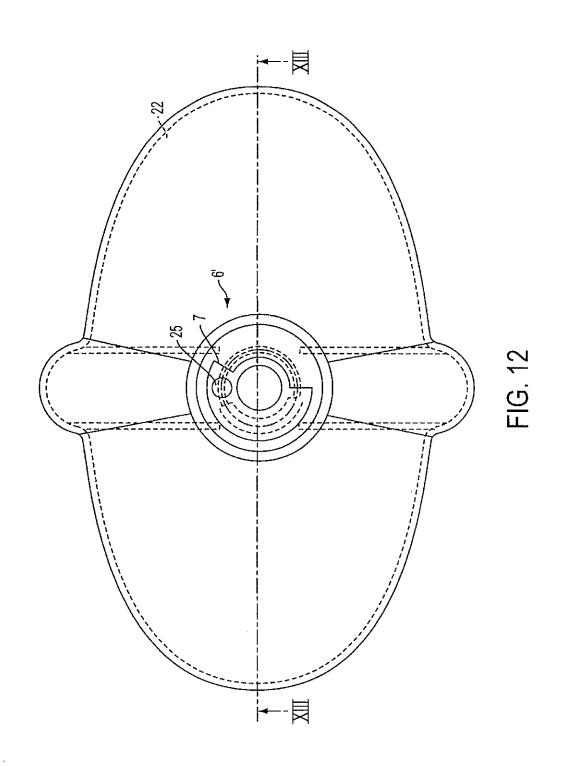
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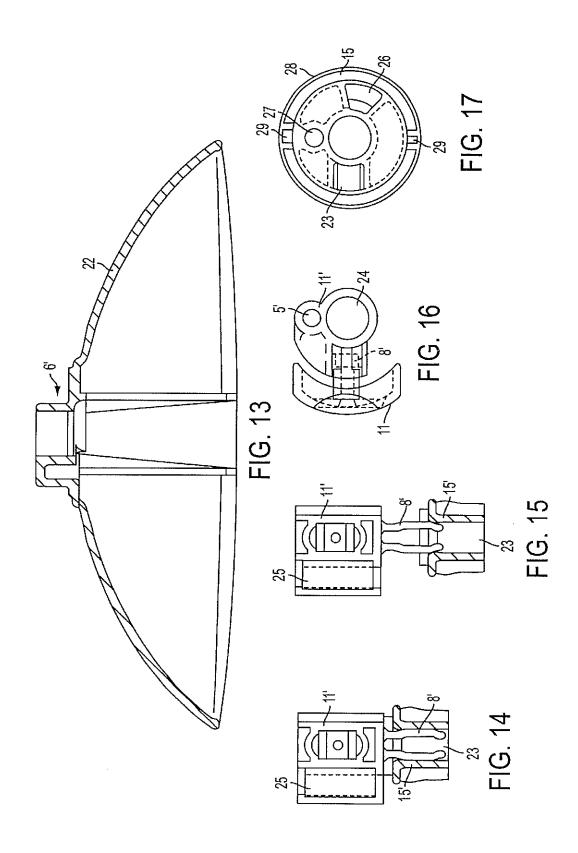
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# VEHICLE STEERING HEAD

# 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.

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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 5 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 10 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

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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 5 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 60 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.

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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 5 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 10 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 45 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 50 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 55 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 60 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 lork end, a handlebar, and a latch element projecting from 65 the fork tube between the fork end and the handlebar end, the latch element being disposed within the support tube, a

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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 lork 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 20 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

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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 10 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 25 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 50 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 65 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.

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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, 5 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 10 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 15 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 45 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, 50 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 55 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 60 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 65 which are angularly spaced apart from each other. This design is such that a downwardly oriented attachment or

10 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

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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 s 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 10 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 20 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 30 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 35 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 40 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 60 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 6s 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. Avehicle 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

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- 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. Avehicle 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 <sup>10</sup> 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 20 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  $_{30}$  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  $_{40}$  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 45 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 65 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 rube 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;

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- 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 <sup>20</sup> least one stop surface;

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- 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

: April 30, 2002

Page 1 of 1

DATED

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

# (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);

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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 dis-

laimer

(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

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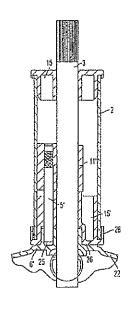
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Primary Examiner—Tony H. Winner (74) Attorney, Agent, or Firm—Greenblum & Bernstein, P.L.C.

# (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



Page 2

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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.

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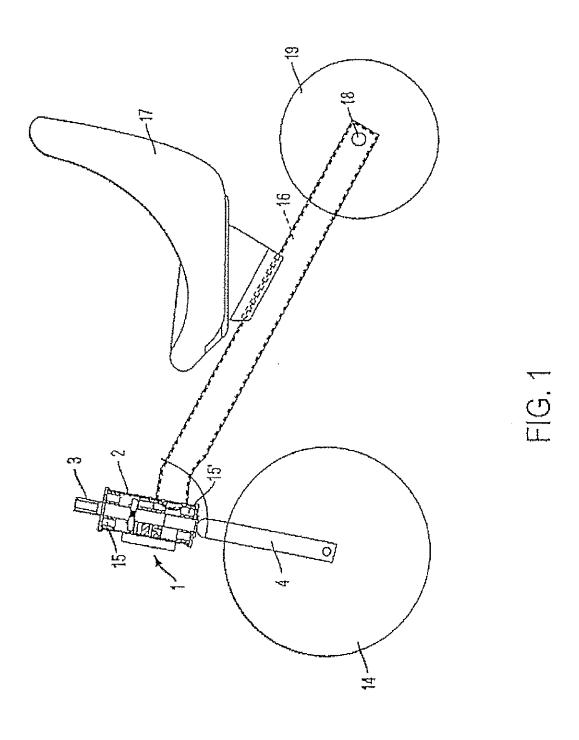
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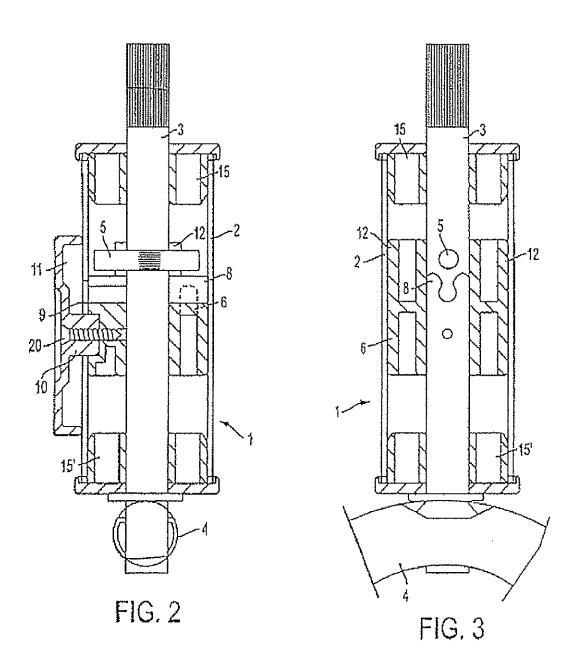
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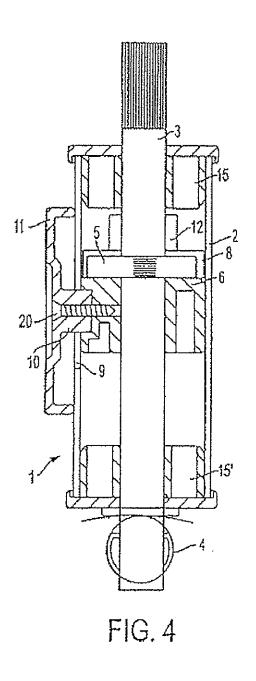


FIG. 5

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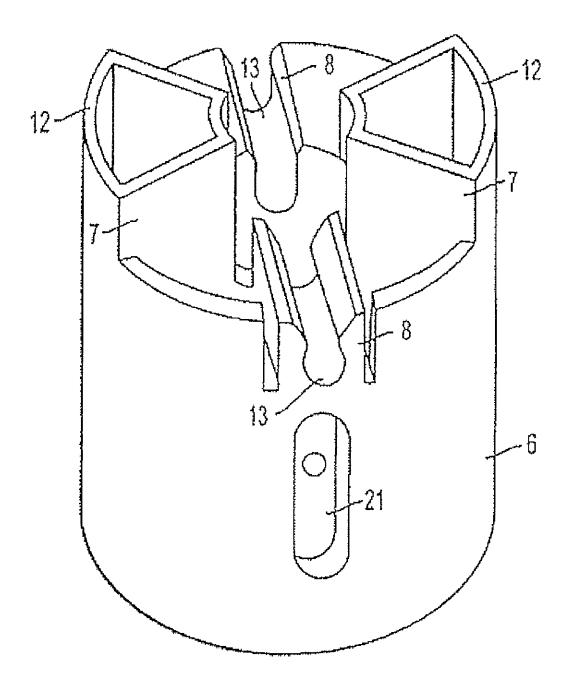
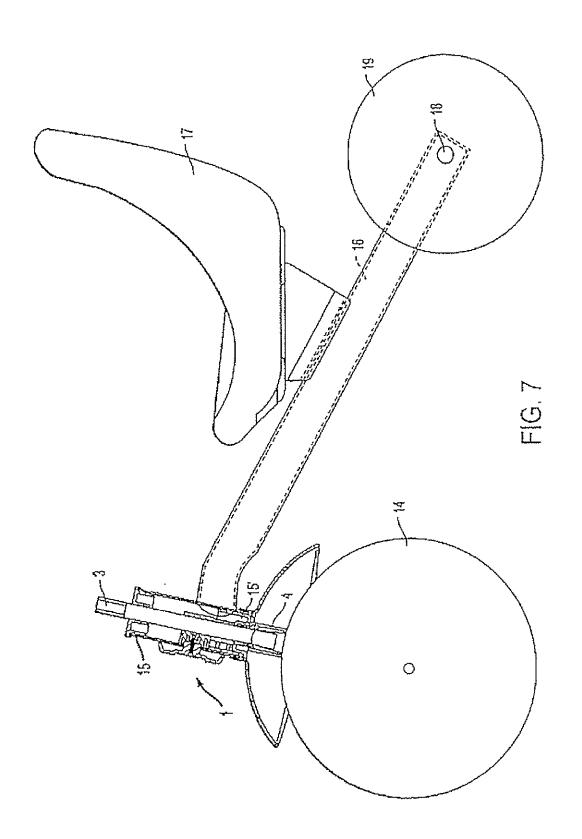


FIG. 6

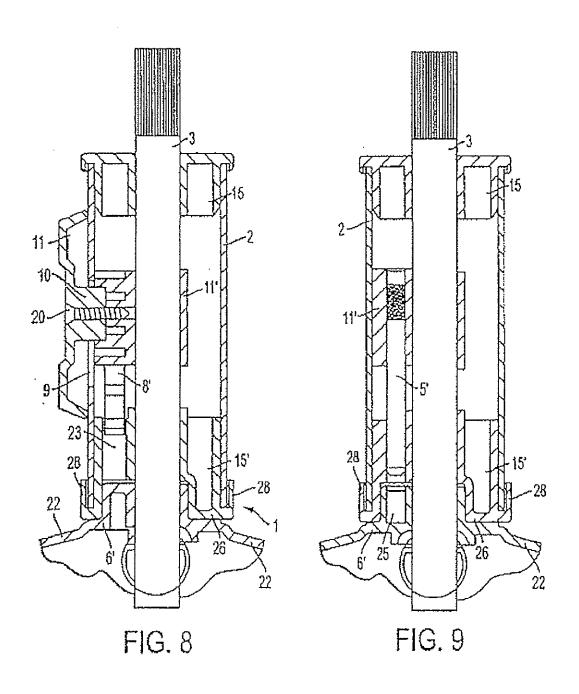
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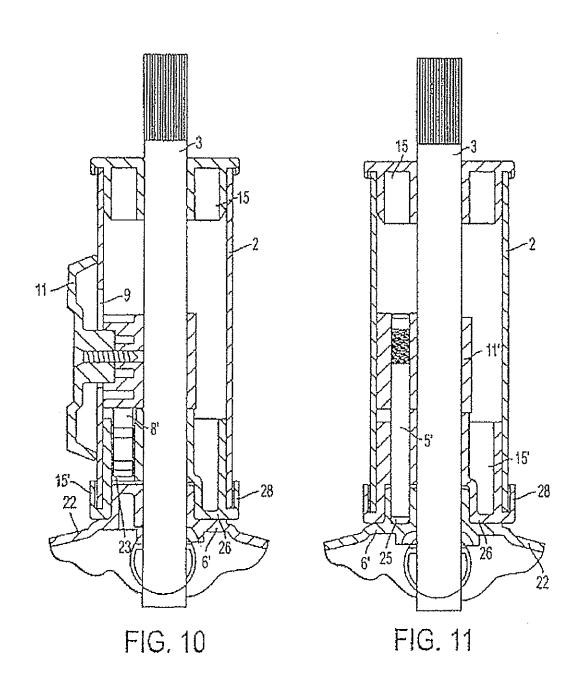
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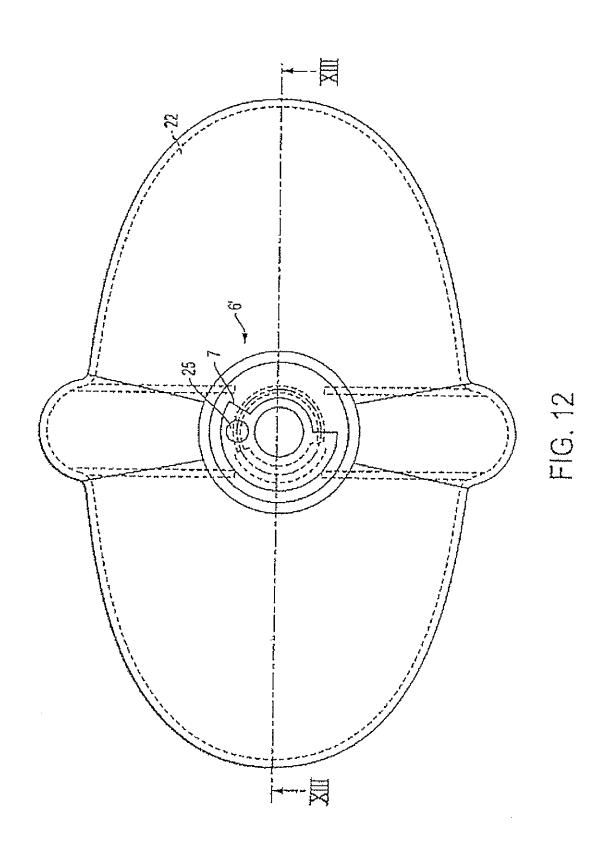
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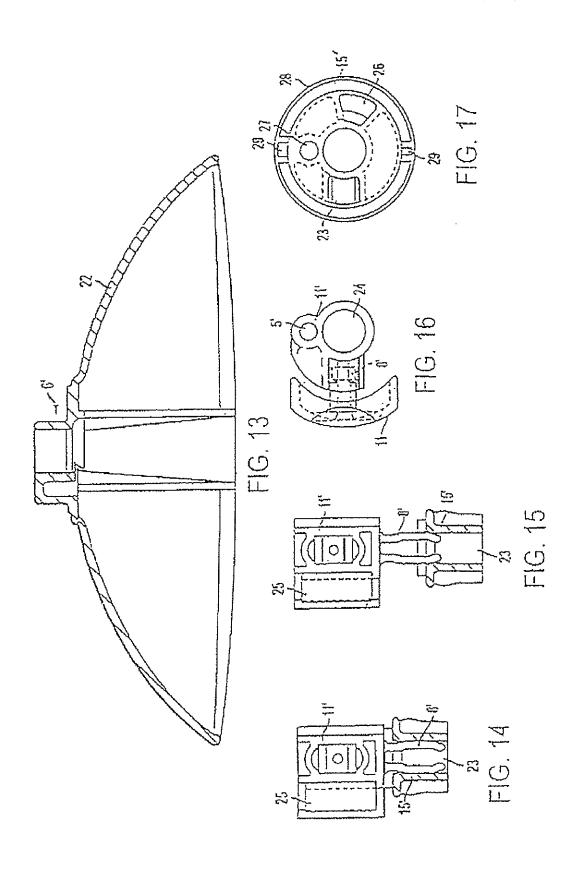
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# 1

# 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 entirctics. Further, the present application claims priority 15 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 25 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 30 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 35 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 45 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 55 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.

#### 2

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 10 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 15 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 20 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 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 30 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 35 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 45 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 50 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 55 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 60 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 locking mechanism or fixing mechanism allows for fixing the 25 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°

> 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.

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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 10 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 25 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 30 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 35 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 40 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

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 50 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 55 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-clock- 60 wise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counterclockwise direction. The limited range of rotation between the at least two stops may be approximately 45 degrees.

connected to the slide.

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 longitu-

dinal in the support tube. The longitudinal slot may limit the

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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.

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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 5 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 10 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 rota- 15 tional 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 20 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 surfaces. The mechanism may comprise a linkage element having at least one stop surface. The linkage element may a surface 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 one 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 55 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. 65 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 clocked 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.

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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 10 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 mecha- 20 nism. 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 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 30 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 35 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 40 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 pro- 45 vided 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 50 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 55 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 60 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 65 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

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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

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 which are joined or secured together by any conventional 25 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

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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 5 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 10 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 boltlike latch element 5' therein. Furthermore, a surrounding collar-like edge 28 can be seen in which 29 designates two 15 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. 20 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 25 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 30 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 35 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  $_{45}$  member is cylindrically shaped. 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;  $_{50}$
- a mudguard comprising an integrally formed projection;
- 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 sur- 55 faces 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
- 5. The steering head of claim 4, wherein the mudguard is 65 of the projection extends into the support tube. arranged between the wheel fork and the lower bearing support.

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- 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 sup-
- 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 handle-
  - 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
  - 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
- 17. The steering head of claim 15, wherein the recess is an arcuate recess.

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- 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 blocking 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 <sup>15</sup> support tube and comprising an arcuate recess;
  - the connecting member being rotatably mounted to the support tube via the upper and lower bearing supports;

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- 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

# (12) United States Patent Kettler et al.

(10) Patent No.: US 7,156 (45) Date of Patent: Ja

US 7,156,408 B2 Jan. 2, 2007

# (54) VEHICLE STEERING HEAD

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(\*) 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)

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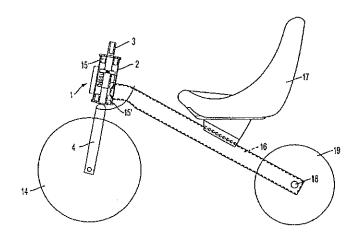
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Primary Examiner—Tony Winner (74) Attorney, Agent, or Firm—Greenblum & Bernstein, P.L.C.

#### (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



Page 2

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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.

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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.

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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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Page 3

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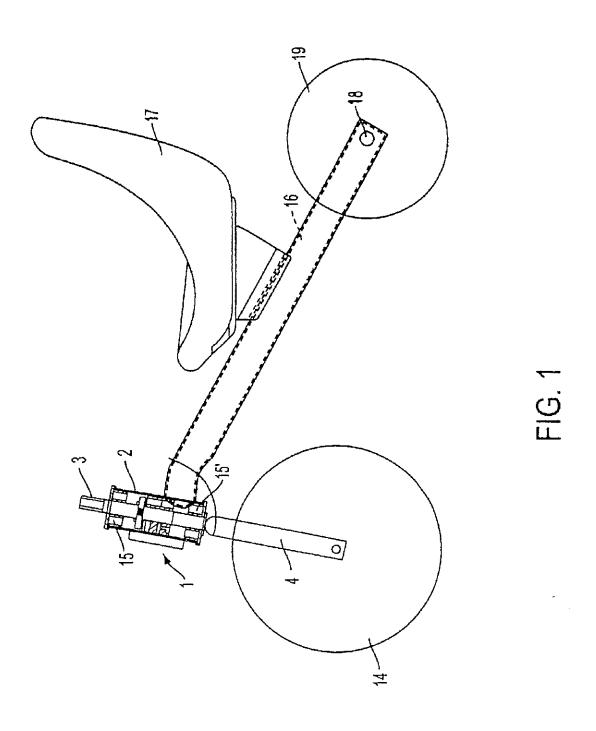
Four sheets with page Nos. RF12244-A, -B, -C and -D (in color) showing various pictures of trikes and a scooter on what appears to be notebook pages.

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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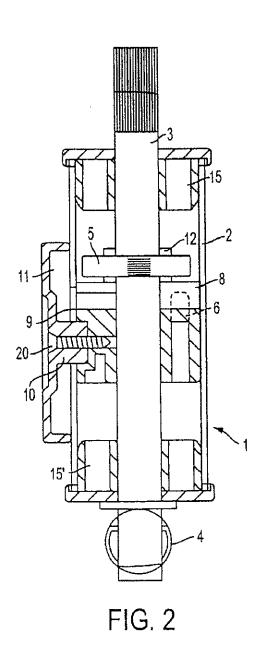
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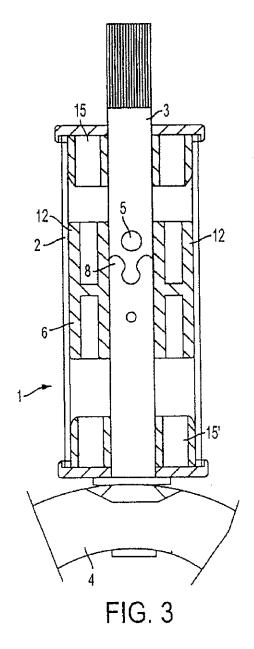
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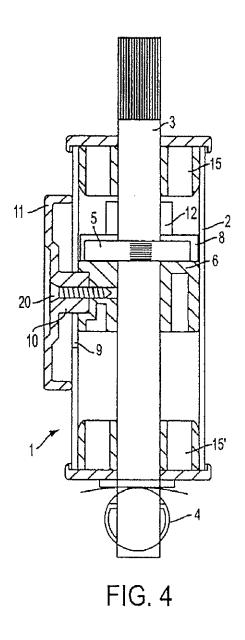
Sheet 2 of 9

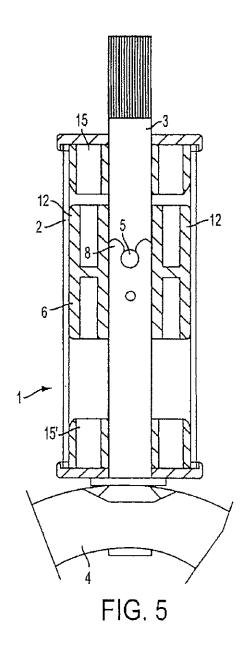




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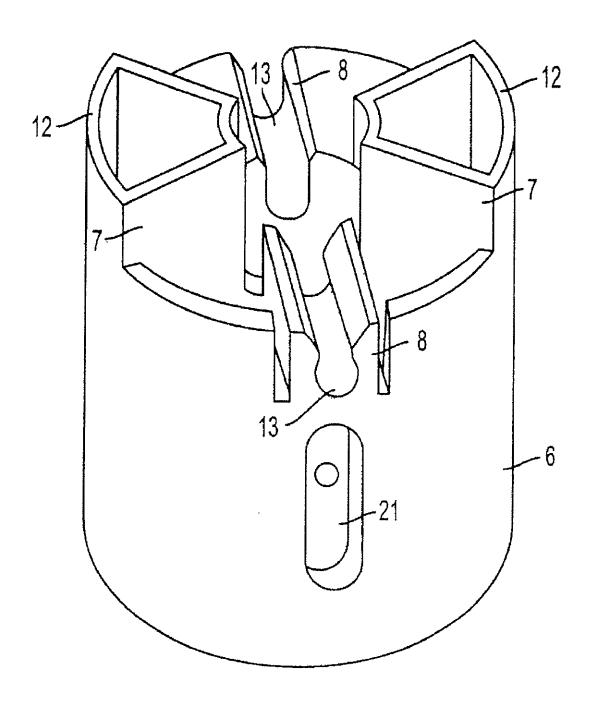
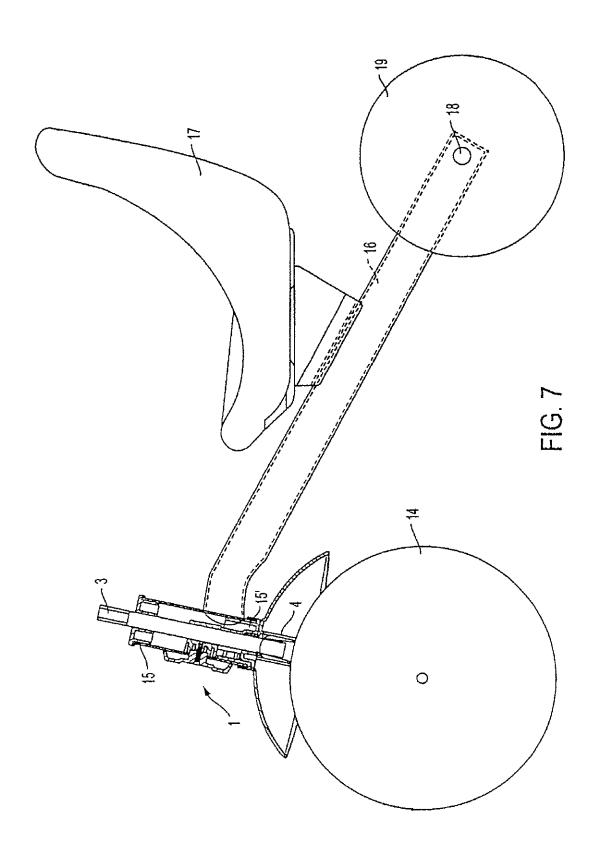


FIG. 6

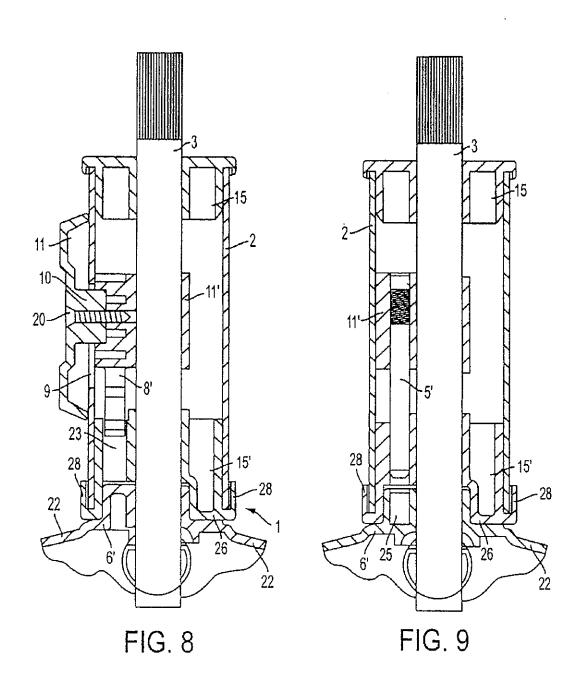
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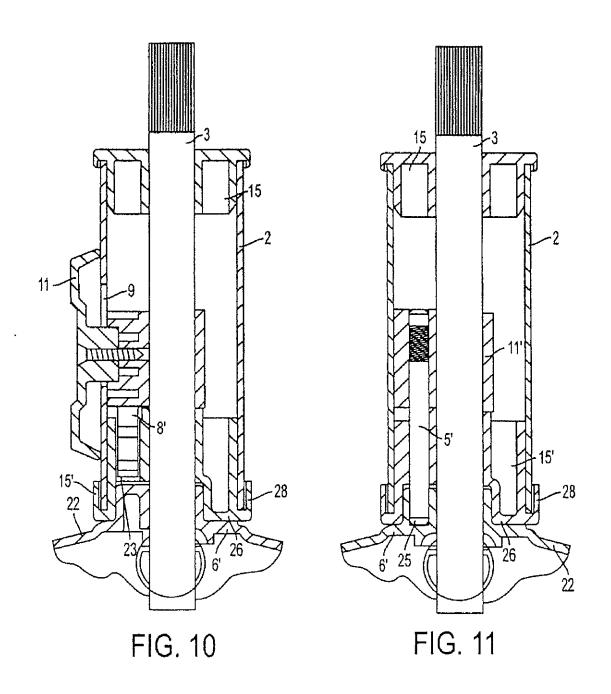
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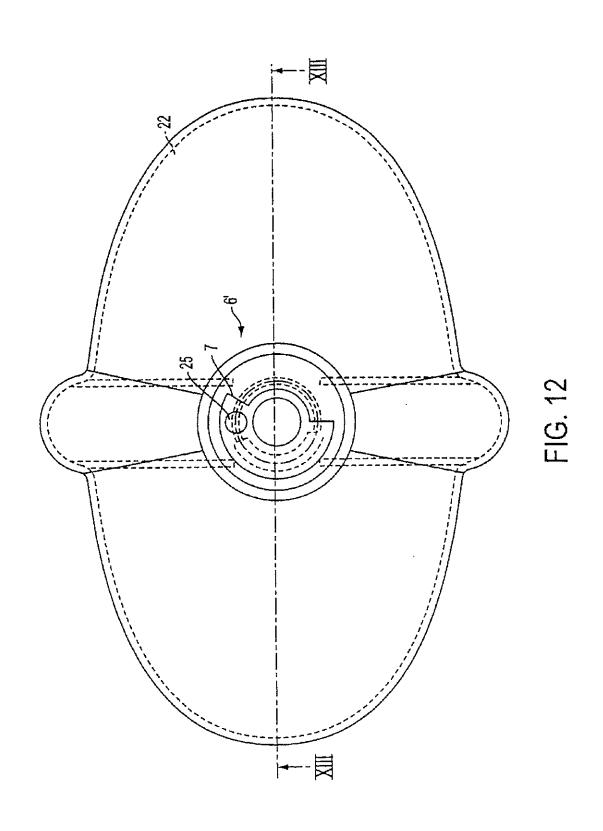
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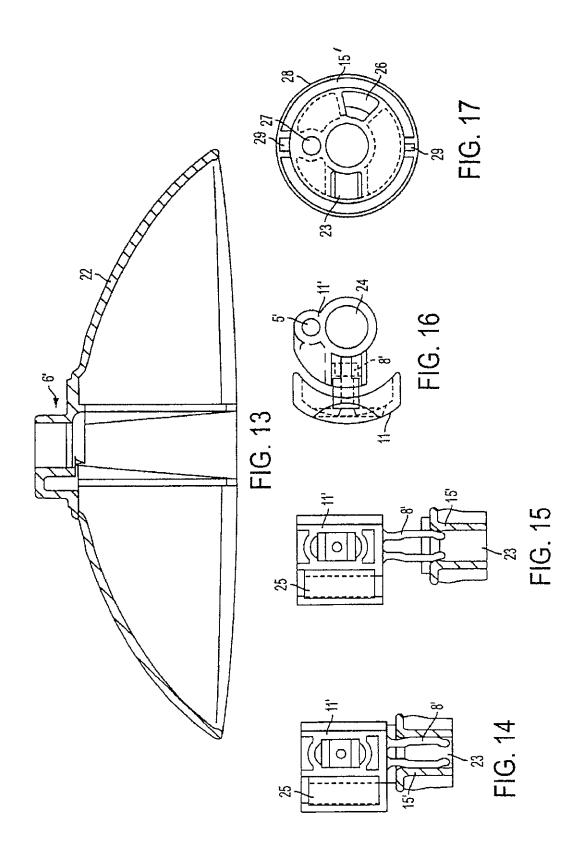
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# 1 VEHICLE STEERING HEAD

# 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. 10 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. 15 5, 1999, the disclosure of which is expressly incorporated by reference herein in its entirety.

# BACKGROUND OF THE INVENTION

### I. 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 <sup>25</sup> 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 55 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, 65 the linkage element comprises at least one locking element which is releasably connectable to the latch element.

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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 40 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

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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 10 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 15 need not be chosen with such a large size. 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 25 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 30 lower bearing may have formed thereon an attachment 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 50 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 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 60 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 65 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 5 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

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 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 40 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 the plane of the latch element, while upon a displacement of 55 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

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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 15 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 <sup>20</sup> 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 35 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 40 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 mem- 45 ber. 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. 50

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 55 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 projec- 60 tion 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 65 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.

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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

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 5 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 10 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 15 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 20 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 25 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, 30 angle) of the arrangement shown in FIG. 2; 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 35 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 40 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 45 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 com- 50 prising 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 55 state; 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 60 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 65 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

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

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

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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 5 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

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 15 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 25 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 30 the description of FIG. 1 to the extent that the same features (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 35 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 40 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 45 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 50 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 55 6 is pushed upwards or into engagement with bolt-like latch

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 60 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 65 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

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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. (not shown) can be secured to the upper end of fork member 10 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 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

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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 5 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 15 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 20 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 30 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 35 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 pro- 40 vided 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 45 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 50 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 55 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;

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- 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.
- 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.
- 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,

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- 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 arcuste 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;

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- 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 5 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 15 movable locking member comprises a pin.
  a handlebar; 26. The vehicle steering head of claim
- 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 20 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 <sup>30</sup> 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 60 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 65 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 10 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;

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- 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 5 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 10 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, 15 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, <sup>25</sup> 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 <sup>30</sup> 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
  - a mechanism that limits rotational movement of the 65 connecting member in each of two directions;
  - the mechanism comprising at least two stop surfaces;

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- 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;

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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 5 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 direc-
  - wherein the movement limiting system comprises an 25 the vehicle steering head comprising: 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 30 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, 35 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 40 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 connect- 50 ing 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 60 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 65 the vehicle steering head comprising: element from rotating in each of the two directions, and wherein, when moved to another position, the locking

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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,
- 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 direc-
- 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,
  - a support tube fixed to the frame of the tricycle; an upper bearing support mounted to the support tube;

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- 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 15 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 30 movable first member moves parallel to an axis of the connecting member and the second member comprises an opening.

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- 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

# (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
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\*) 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 dis-

claimer.

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

Jul. 5, 1999

(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
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(51)	Int. Cl. <sup>7</sup>
(21)	U.S. Cl
(52)	Field of Search
(58)	280/271, 282, 89; 403/354, 83; 74/495

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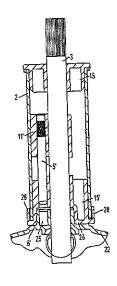
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P.L.C.

# (57) ABSTRACT

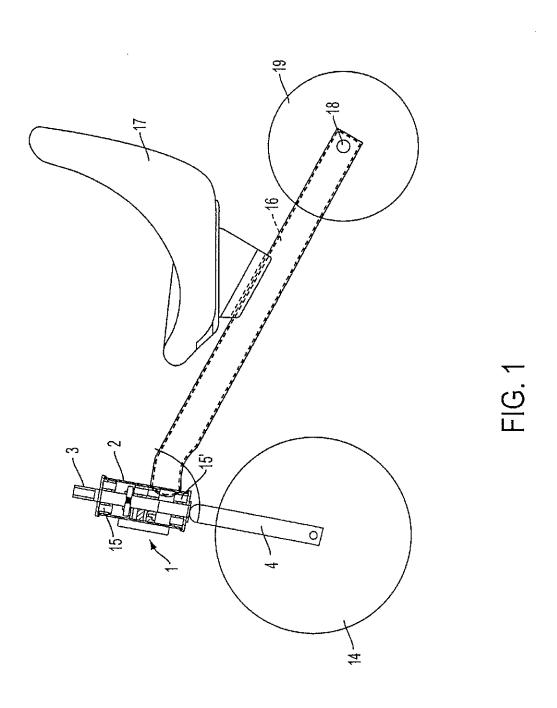
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# 69 Claims, 9 Drawing Sheets



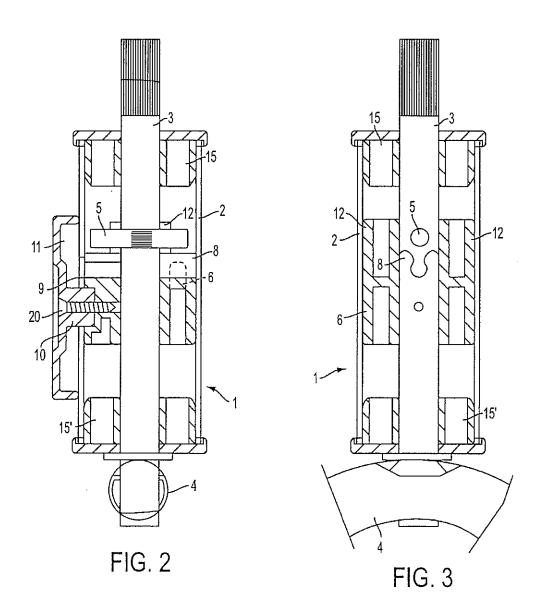
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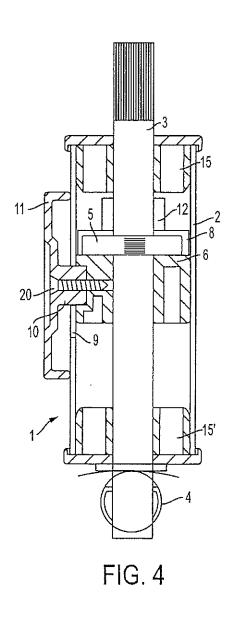
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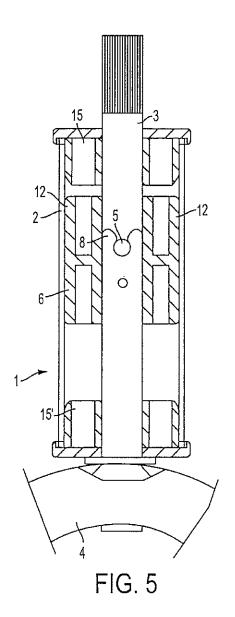
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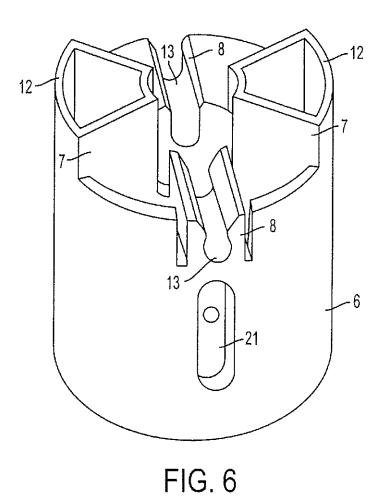
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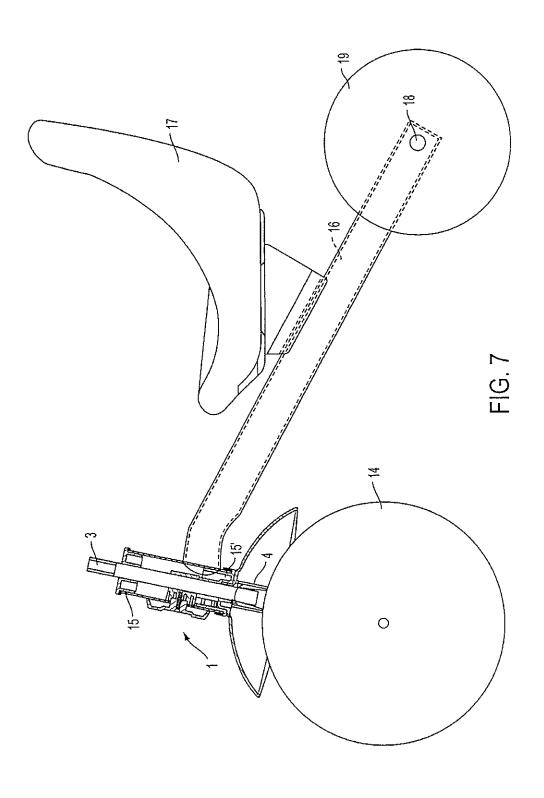


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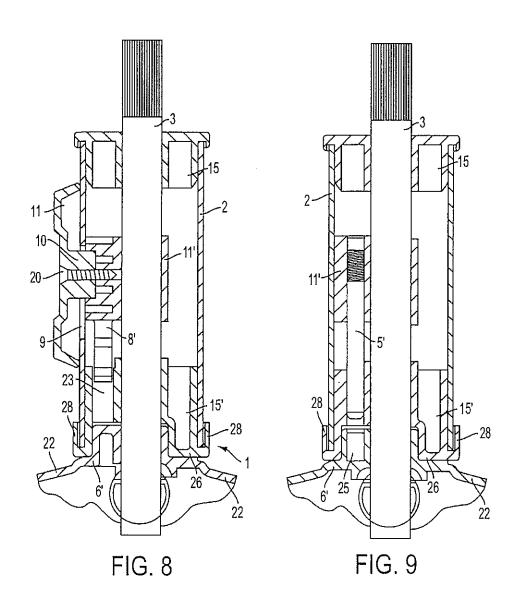


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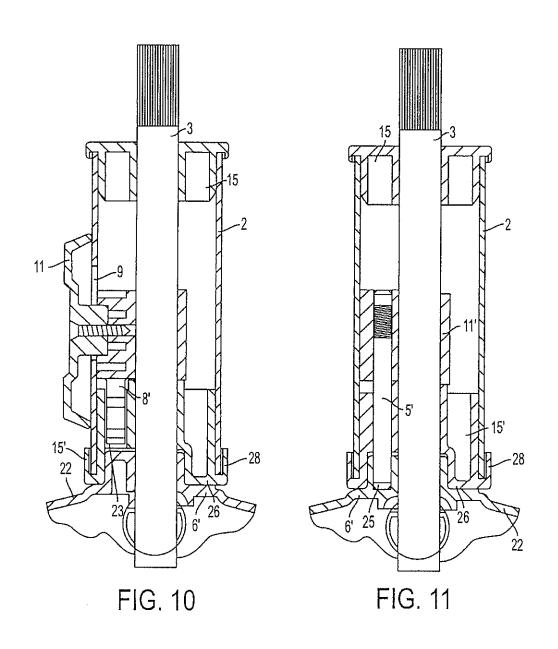
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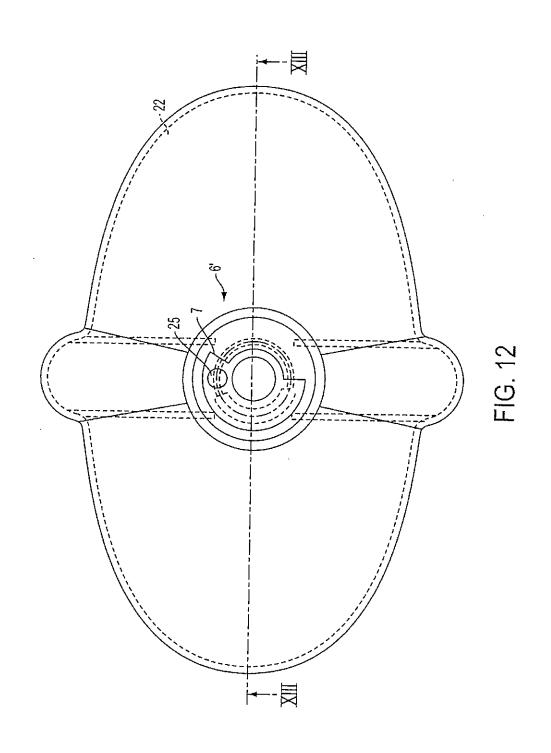
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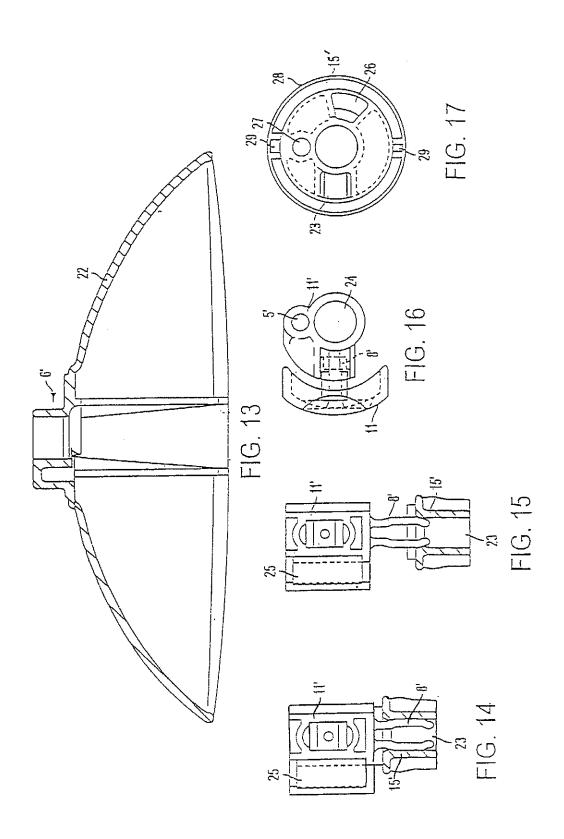
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# VEHICLE STEERING HEAD

# 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 20 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 30 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 35 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 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 55 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 65 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 occurs when they are pushed with a push rod type device. In 40 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.

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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, 60 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

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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 25 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 30 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 35 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 40 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 45 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. 50 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 55 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 60 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 65 rotation between the at least two stops may be approximately 45 degrees.

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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 10 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 15 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 clement.

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 10 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,  $^{15}$ 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 20 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  $^{25}$ 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 35 linkage element according to the invention; 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 50 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 60 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 65 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

### 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

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 55 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

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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 10 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 40 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 45 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 50 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 55 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 60 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 65 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

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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

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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 boll-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;

- 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.
- 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.
- 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 so 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,

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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 15 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 25 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 35 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; 50 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;

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- 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;

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- 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 10 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 nonrotatably 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 35 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 nonrotatably 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 50 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 55 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;

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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 15 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 30 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 45 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. 50

- 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 55 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 60 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 65 fork member can rotate approximately 45 degrees to each side.

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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;

- 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,

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- 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 5 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 10 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 15 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 20 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 45 having a frame, the vehicle steering head comprising: 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 50
  - 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 60 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 65 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
  - 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,

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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 5 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 mov- 10 able 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 15 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 <sup>25</sup> 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 35 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 50 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 60 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; 65
  - a movement limiting system that limits rotational movement of the connecting element;

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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
- 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;

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- 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;
- 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

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- 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,	) ) Civil Action No.: 1:10-ev-708
v.	)
RAZOR USA, LLC	) JURY TRIAL DEMANDED
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

- 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.

# <u>COUNT I</u> (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.

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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:

- I. 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).

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- 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

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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.	ĺ	
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:

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405971v1

# (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 dis-

claimer.

(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)

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

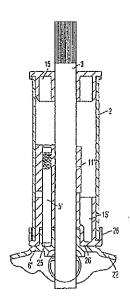
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Primary Examiner—Tony H. Winner (74) Attorney, Agent, or Firm—Greenblum & Bernstein, P.L.C.

#### (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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Page 2

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591.864	A 10/189	7 Mever	
		-	Sheet table in Italian having a stamp entitled "N. CITTON & C,
1 279 540	Δ 9/191		s.a.s.".
			Cover page of Europeo (in color) having page RF12230 and dated
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			Four sheets with page Nos. RF12244-A, -B, -C and -D (in color)
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			Four sheets with page Nos. RF12245-A, -B, -C and -D (in color)
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			A sheet entitled "Product Name: Roll N Ride".
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			Push'n Pedal Trike".
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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.

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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, date

English language Abstract of GB 815456.

English language Abstract of DE 3242863.

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unknown.

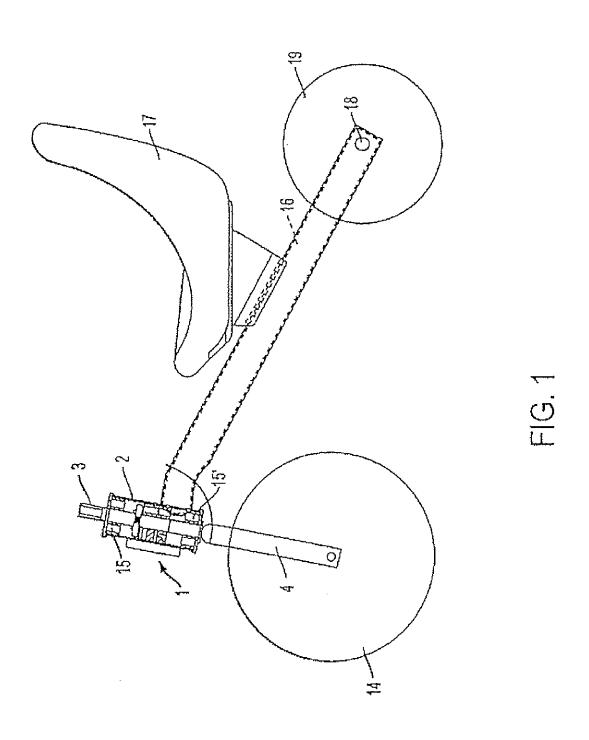
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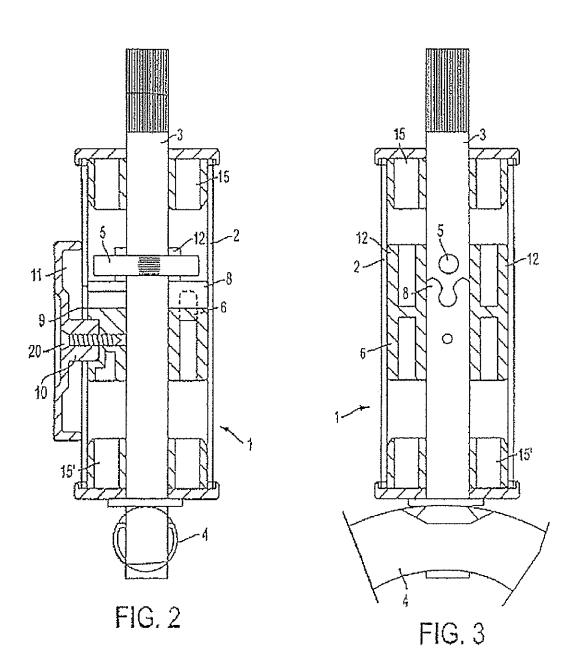
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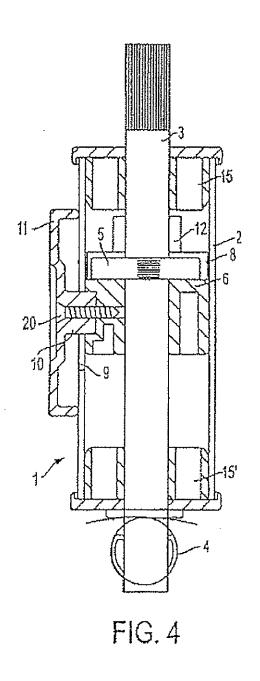


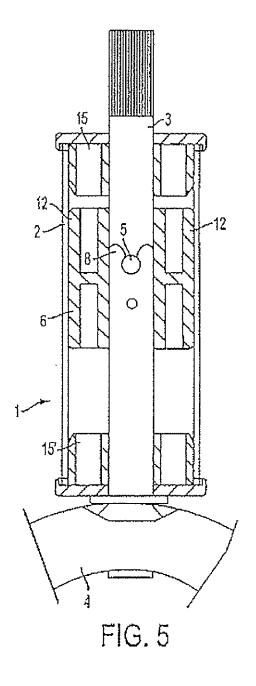
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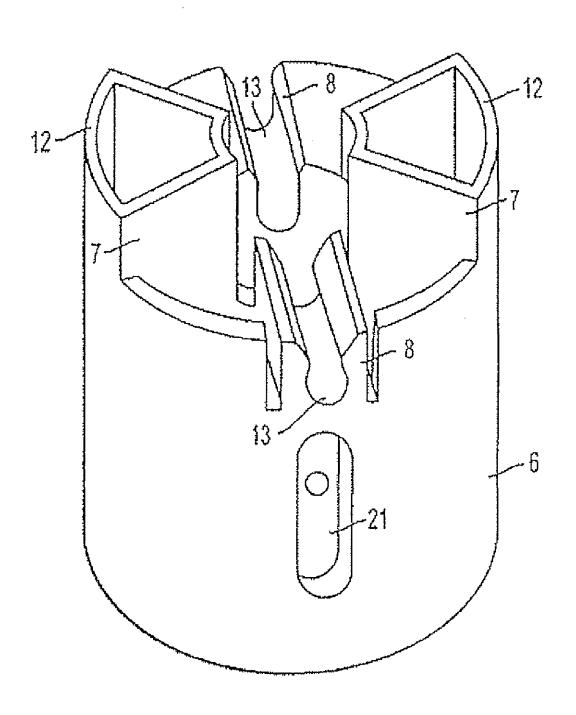


FIG. 6

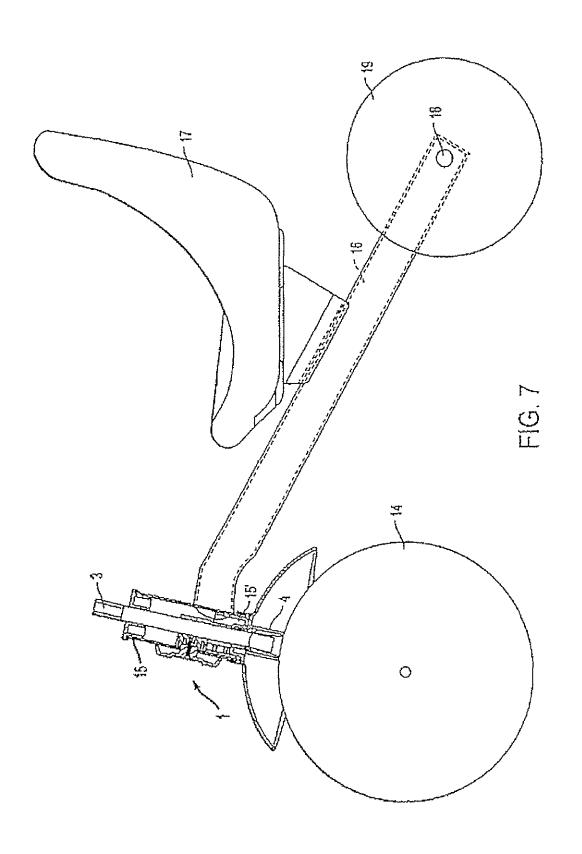
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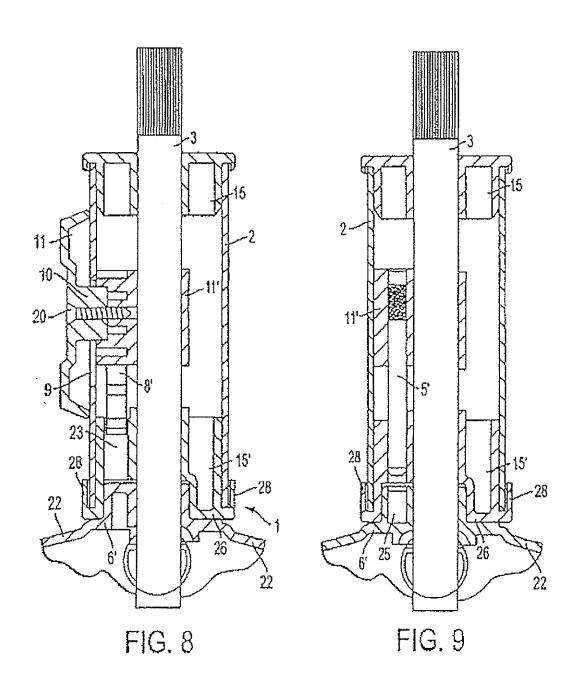
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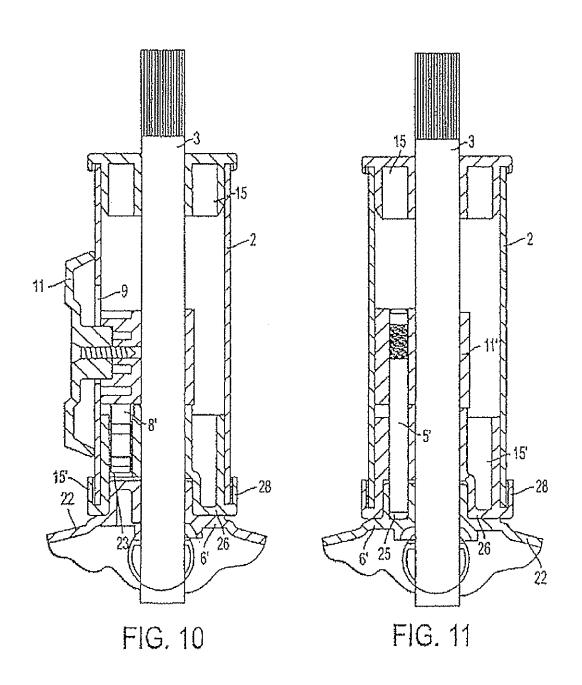


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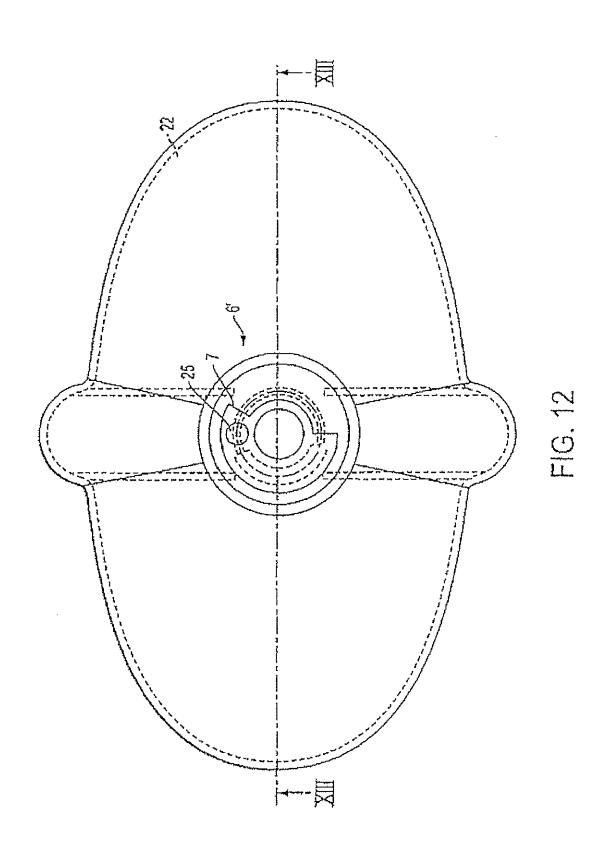
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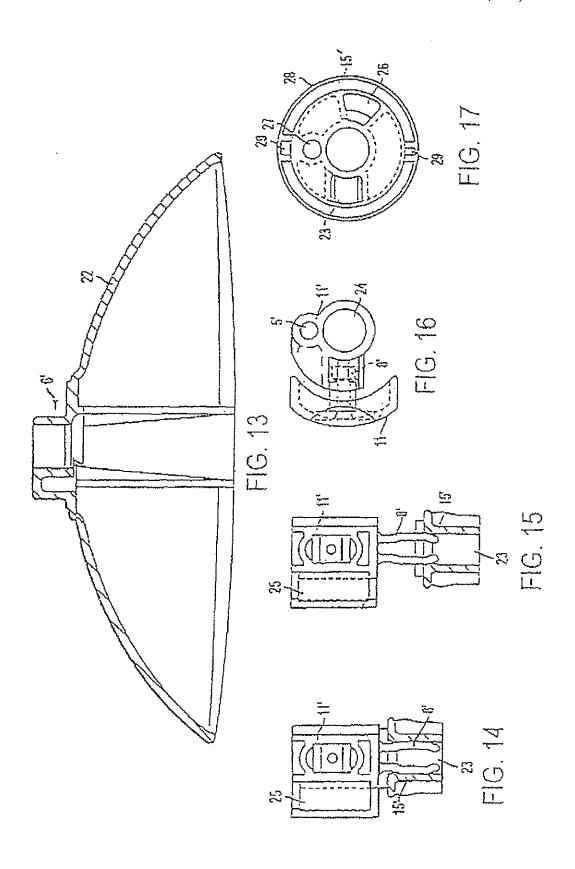
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#### VEHICLE STEERING HEAD

#### 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 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 15 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 25 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 30 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 35 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 40 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 45 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 55 locking element which is releasably connectable to the latch 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 60 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 65 element comprises at least one locking element which is releasably connectable to the latch element.

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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 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 #:217 Case 1:10-cv-00708-\ \_\_-JFA Document 34-1 Filed 09/0-\_\_J Page 13 of 18

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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 10 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 15 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 20 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 25 the steering angle to be accomplished by a lower bearing 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 30 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 35 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 45 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 50 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 55 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 60 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 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. Case 1:10-cv-00708-\ \_\_-JFA Document 34-1 Filed 09/0 \_\_. J Page 14 of 18

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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 5 substantially equal to the range of motion in the counterclockwise 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 10 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 25 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 30 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 35 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 40 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 50 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 55 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-clock- 60 wise direction. The at least two stop surfaces may define a limited range of rotation in each of a clockwise and a counterclockwise 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 6

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.

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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 5 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 10 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 rota- 15 tional 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 20 angle) of the arrangement shown in FIG. 2; 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 bear- 25 ing 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 30 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 35 locked state; 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 compris- 45 state; ing 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 55 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 60 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, 65 the fork member being rotatable with respect to the support tube, and a system which limits the rotational movement of

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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

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

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

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

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.

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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 10 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 25 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 30 designed in a manner of a segment of a partial circle (pic 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 35 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 40 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 clement 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 60 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 65 and 5, a steering movement thus becomes impossible since the handlebar or fork member 3 is locked in a single direction.

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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

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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 10 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 25 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 30 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 35 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;

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

  15 A valida eterring head for
- 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; 50
- a mudguard comprising an integrally formed projection;
- 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 65 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.

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- 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;

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- 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.

\* \* \* \* \*



# (12) United States Patent Kettler

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

(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.		
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Jul. 5, 1999 (DE)				

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(22)	Filed:	Jun. 1, 2000
(30)	For	eign Application Priority Data
Ju	1. 5, 1999	(DE) 299 11 65
1511	T-4 CL7	DC2V 5/0

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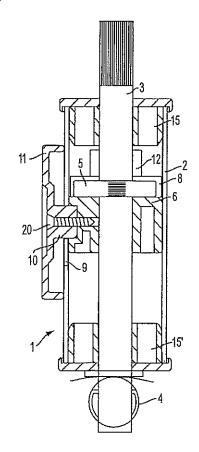
<sup>\*</sup> cited by examiner

Primary Examiner-Avraham Lerner Assistant Examiner-Tony Winner (74) Attorney, Agent, or Firm-Greenblum & Bernstein

(57)ABSTRACT

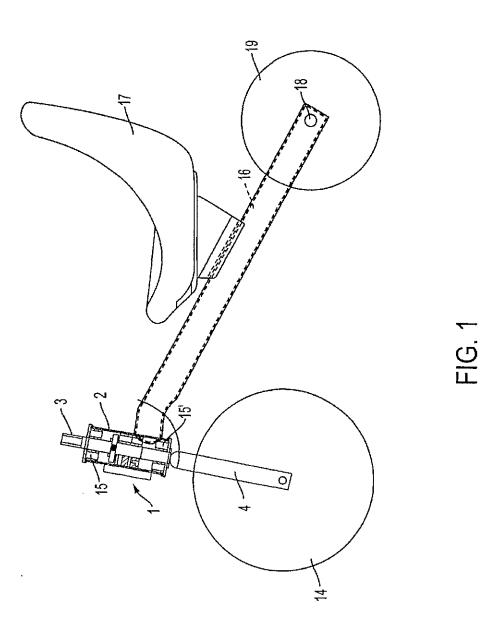
A vehicle steering head including a fork tube adapted to engage a handlebar, a support tube which rotatably supports the fork tube, a latch element disposed within the support tube, and a slide which is moveable with respect to the support tube, wherein the slide is moveable from at least one position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

58 Claims, 9 Drawing Sheets



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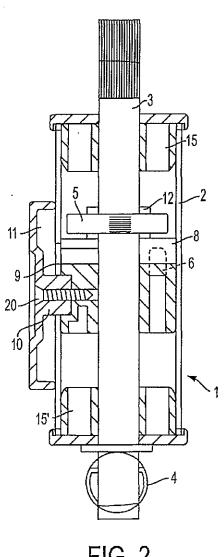


FIG. 2

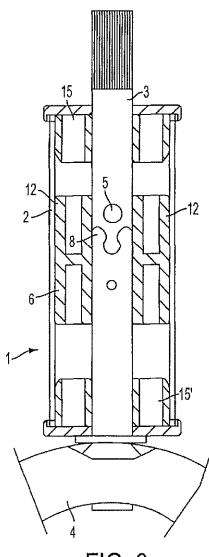


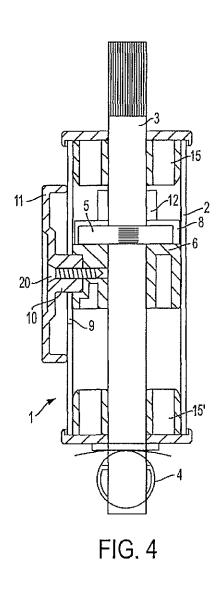
FIG. 3

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12 8 6 FIG. 5

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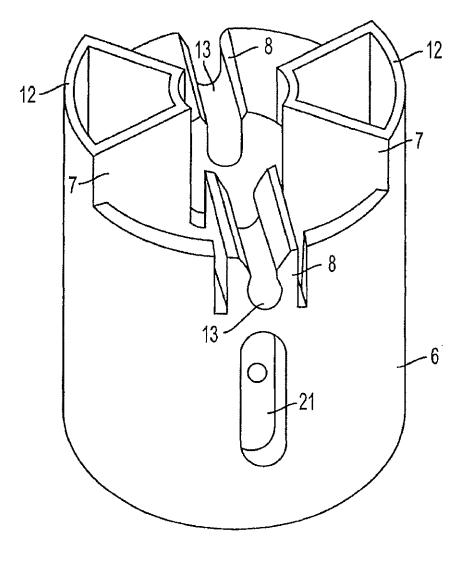
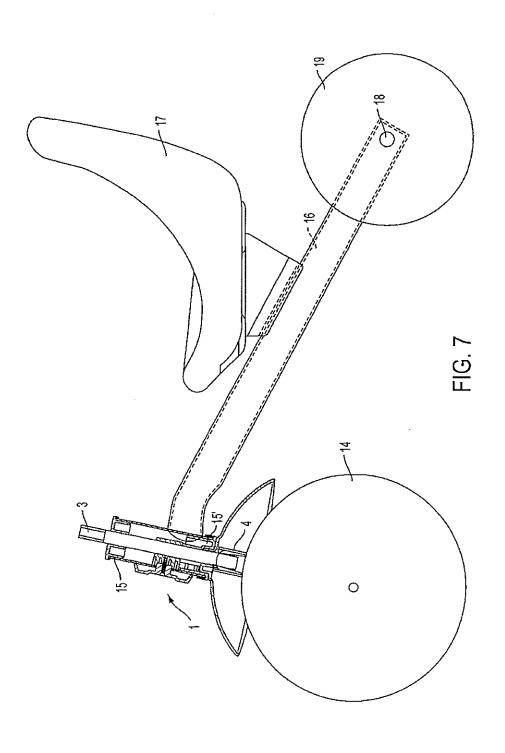


FIG. 6

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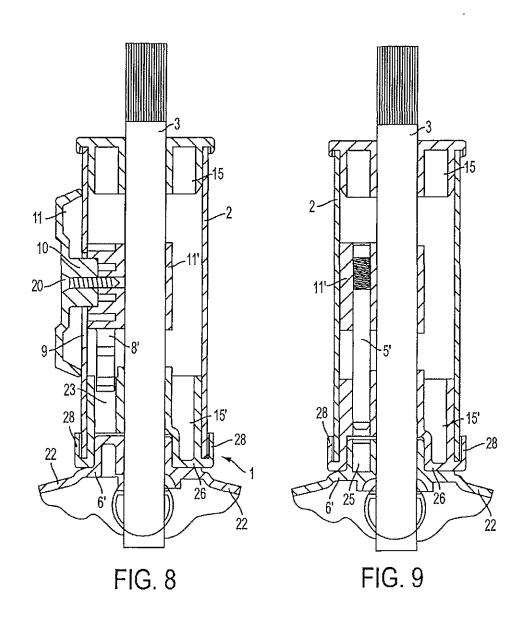
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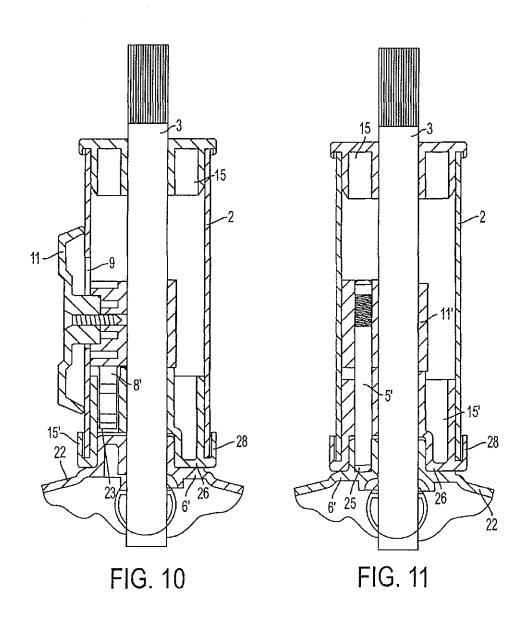
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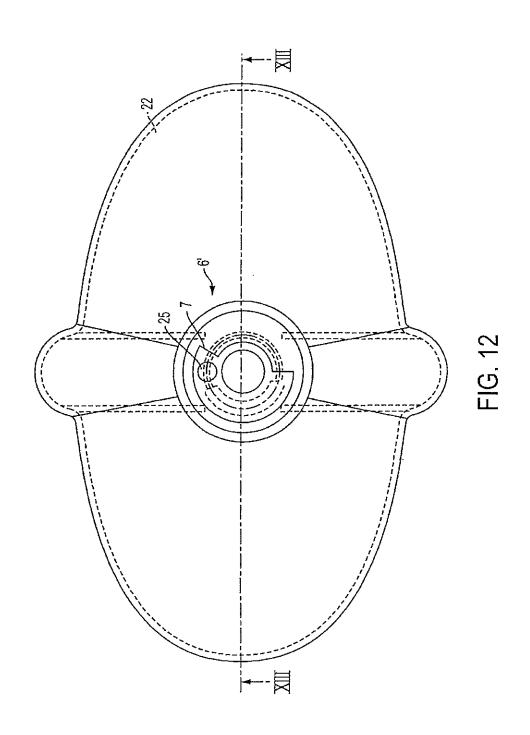


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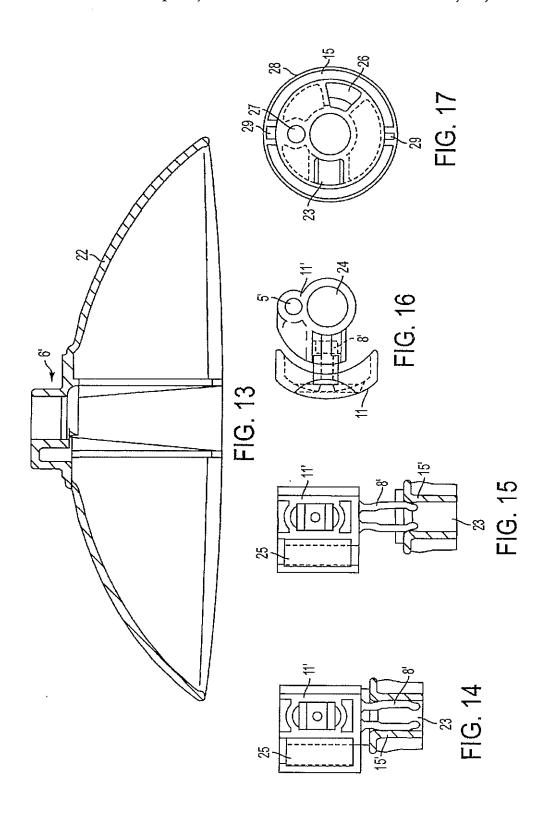
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# VEHICLE STEERING HEAD

#### 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 15 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 25 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

## 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 which is releasably connectable to the latch element.

According to another aspect of the invention a latch clement 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 60 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.

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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 10 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 45 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 linkage element comprises at least one locking element 55 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 65 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 #:234 Case 1:10-cv-00708-\ \_-JFA Document 34-2 Filed 09/0\_\_J Page 12 of 24

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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 5 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 10 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 25 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 35 stop surface. The linkage element may further comprise at 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 45 connecting element to pass therethrough. The opening may 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 55 extends from the linkage element. The at least one stop may 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 60 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.

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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 30 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 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 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 50 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 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 65 in the counter-clockwise direction. The limited range of motion in one of the clockwise and counter-clockwise direction may be approximately 45 degrees.

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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 5 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 10 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 clement 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. 40 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 50 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 60 may comprise a rod-like member. 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 65 the fork tube between the fork end and the handlebar end, the latch element being disposed within the support tube, a

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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 elcment 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 35 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 55 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

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

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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 5 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 10 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 25 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 50 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 65 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.

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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

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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, 5 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 10 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 15 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 35 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 40 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 45 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, 50 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 55 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 60 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 65 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.

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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

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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 5 locking the fork tube in a single position.
- 3. The steering head of claim  $\hat{2}$ , 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 10 comprises a pin.
- 5. The steering head of claim 4, wherein the pin projects substantially perpendicular to the axis of the fork tube.
- 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.
- The steering head of claim 1, wherein the support tube comprises an opening which allows a connecting element to 20 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 30 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 35 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 40 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 50 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 counterclockwise 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 60 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 65 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. Avehicle 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

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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 10 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 20 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 30 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 40 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 45 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 <sup>55</sup> 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 65 from a first position, wherein the latch element and the at least one stop cooperate to limit the rotational

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- 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 rube 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 clida
- 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;

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- 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 <sup>20</sup> least one stop surface;

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- 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.

\* \* \* \* \*

Case 1:10-cv-00708-\ \_ -JFA Document 34-2 Filed 09/0. J Page 19 of 24

# UNITED STATES PATENT AND TRADEMARK OFFICE

# CERTIFICATE OF CORRECTION

PATENT NO. : 6,378,884 B1

78,884 B1 Page 1 of 1

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

Case 2:10-cv-06877-R -FEM Document 1 Filed 09/15/10 Page 235 of 287 Page ID #:242 Case 1:10-cv-00708-\\_2 -JFA Document 34-2 Filed 09/0...0 Page 20 of 24

# 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)	VEHICLI	E 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)	
Reex	nmination l No. 90/007	Request: 7,243, Oct. 8, 2004	
Reex	amination (	Certificate for:	
	Patent No.	: 6,378,884	
	Issued:	Apr. 30, 2002	
	Appl. No.:	09/584,497	
	Filed:	Jun. 1, 2000	
Certif	icate of Cor	rection issued Feb. 25, 2003.	
Certif	icate of Coa	rection issued Apr. 3, 2007.	c

(30)	Foreign Application Priority L	ata

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)

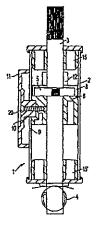
**ABSTRACT** 

Primary Examiner-David O. Reip

(57)

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.



Page 2

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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.

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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.

Case 2:10-cv-06877-R -FFM Document 1 Filed 09/15/10 Page 238 of 287 Page ID

#:245 Case 1:10-cv-00708-\ \( \perp \) -JFA Document 34-2 Filed 09/0...\( \partial \) Page 23 of 24

# US 6,378,884 C1

Page 3

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.

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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

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.

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Case 1:10-cv-00708-\\_\_\_-JFA Document 34-2 Filed 09/0 J Page 24 of 24

US 6,378,884 C1

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 con-

Claims 1-25 and 46-49 are cancelled.

\* \* \* \*

Case 1:10-cv-00708

£-JFA Document 34-3



# (12) United States Patent Kettler et al.

(10) Patent No.:

US 6,799,772 B2

(45) Date of Patent:

\*Oct. 5, 2004

(54) VEHICLE ST	EEKING	HLAD
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(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 dis-

claimer.

(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	Dulauter	Date
(-30)	LOUSIBR	Auditation	PERDELLA	113111

Jul. 5, 1999	(DE)	 299 11 (	52 U	
(51) Int. Cl. <sup>7</sup>		R62K	5/02	

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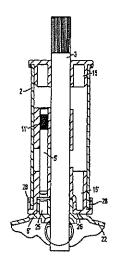
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Primary Examiner—Lesley D. Morris
Assistant Examiner—Tony Winner
(74) Attorney, Agent, or Firm—Greenblum & Bernstein,
P. C.

## (57) ABSTRACT

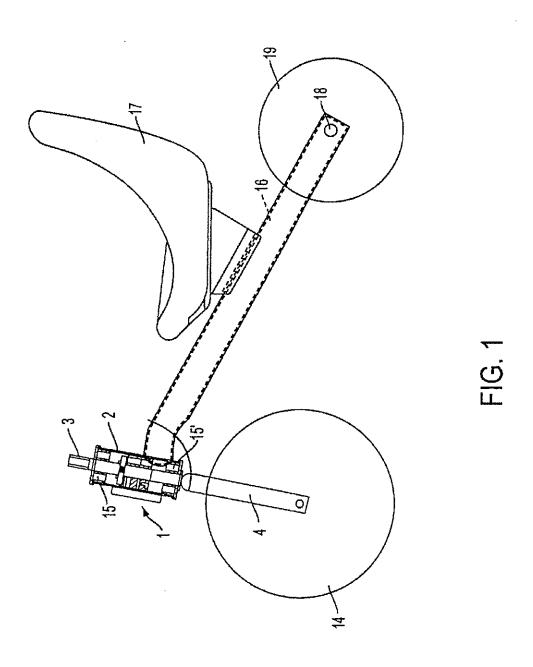
Vehicle steering head including a connecting element adapted to engage a handlebar. A support tube rotatably supports the connecting element. A fork member adapted to connect a wheel fork to a handlebar. The fork member is rotatable with respect to the support tube. A mechanism limits the rotational 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



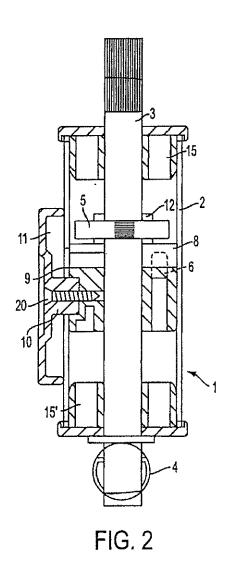
U.S. Patent Oct. 5, 2004 Sheet 1 of 9

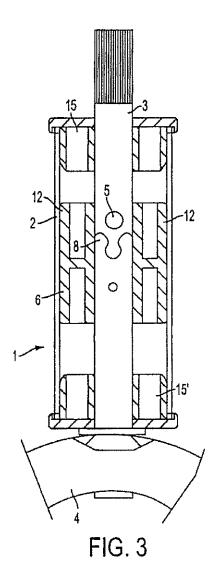
US 6,799,772 B2



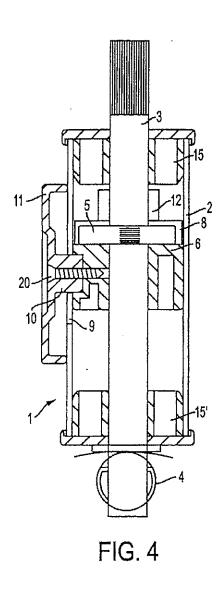
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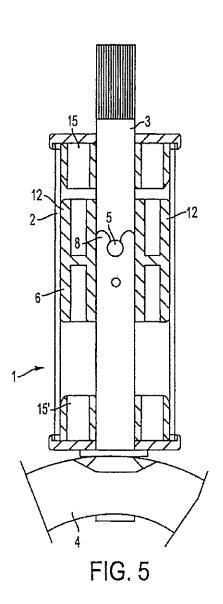
Sheet 2 of 9 US 6,799,772 B2





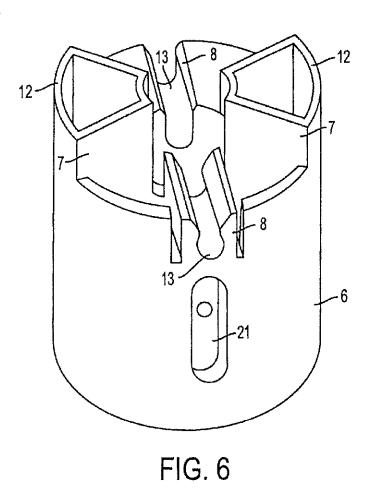
U.S. Patent Oct. 5, 2004 Sheet 3 of 9 US 6,799,772 B2



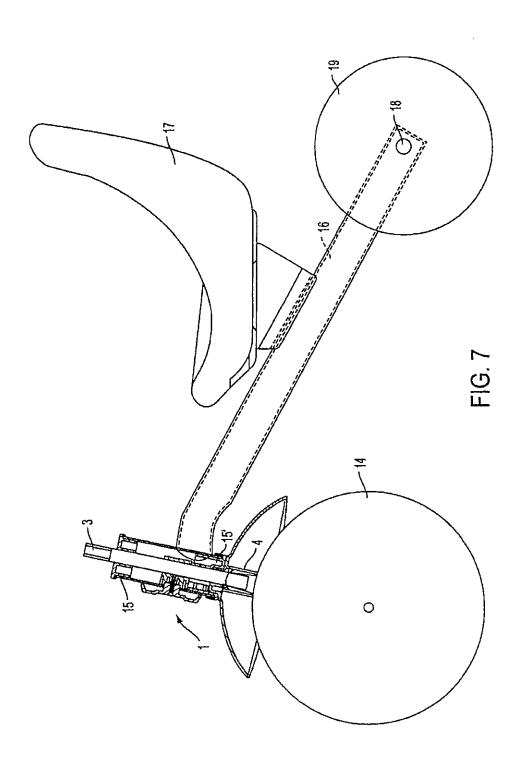


U.S. Patent Oct. 5, 2004 Sheet 4 of 9

US 6,799,772 B2

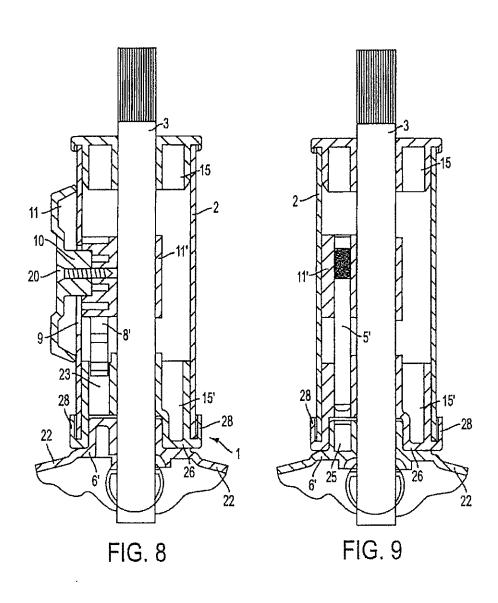


**U.S. Patent** Oct. 5, 2004 Sheet 5 of 9 US 6,799,772 B2



Case 1:10-cv-00708 = -JFA Document 34-3 Filed 09/L .0 Page 7 of 22

U.S. Patent Oct. 5, 2004 Sheet 6 of 9 US 6,799,772 B2

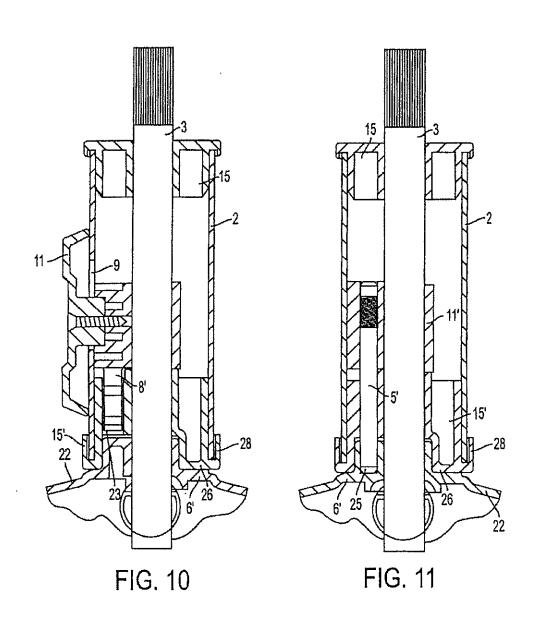


# Case 2:10-cv-06877-R -FEM Document 1 Filed 09/15/10 Page 247 of 287 Page ID

U.S. Patent Oct. 5, 2004

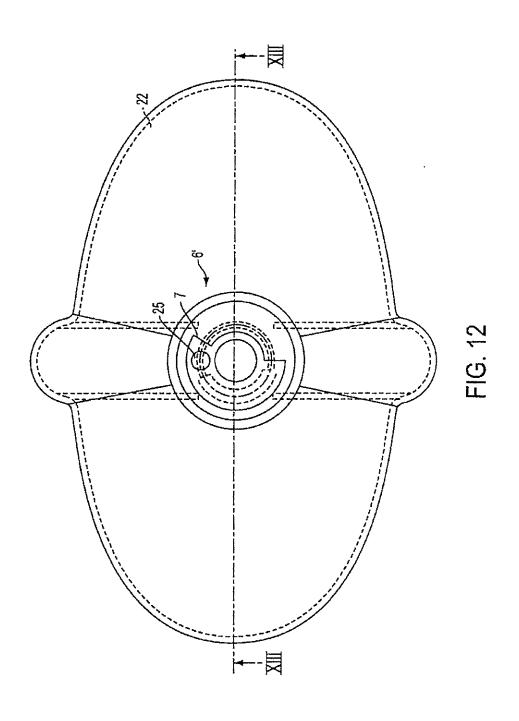
Sheet 7 of 9

US 6,799,772 B2



Case 1:10-cv-00708 £-JFA Document 34-3 Filed 09 0 Page 9 of 22

U.S. Patent Oct. 5, 2004 Sheet 8 of 9 US 6,799,772 B2

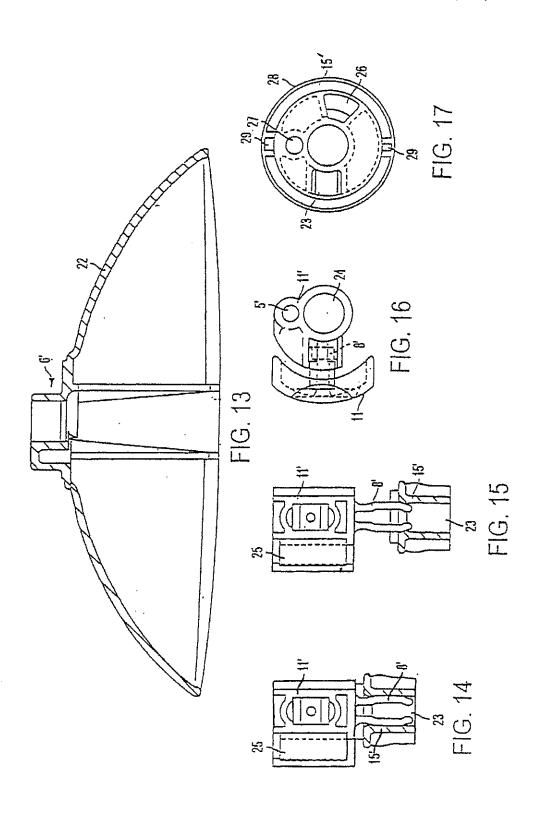


Case 2:10-cv-06877-R -FFM Document 1 Filed 09/15/10 Page 249 of 287 Page ID

Case 1:10-cv-00708- 2-JFA Document 34-3 Filed 09/6 .0 Page 10 of 22

U.S. Patent Oct. 5, 2004 Sheet 9 of 9

of 9 US 6,799,772 B2



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## 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 30 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 40 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 65 element is supported on the support tube. A linkage element is arranged on the fork member and connected to the tube for

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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 45 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. This design ensures that when a push rod is used for pushing the device, i.e., a tricycle, the front wheel secured to a fork member on a portion provided inside the

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.

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# US 6,799,772 B2

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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 statachment, 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, 60 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 Case 1:10-cv-00708- = JFA Document 34-3 Filed 09/6 0 Page 13 of 22

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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 5 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 10 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 15 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 20 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 25 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 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 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 40 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 45 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. 50 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 55 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 60 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 65 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 clement.

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 axis of the fork member, and a linkage element connected to 30 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 further comprise a slide, wherein the slide is disposed within 35 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

> 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 10 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, 15 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 20 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 25 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 30 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 35 linkage element according to the invention; 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

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 50 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 55 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 60 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 65 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.

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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

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

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 5

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 10

in practice.

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 15 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 25 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, 35 respectively, are illustrations showing the vehicle steering 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 40 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 45 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 50 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 55 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 60 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 65 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.

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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, 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

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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 55 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.
- 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.
- 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 50 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,

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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 15 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 25 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 35 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;
  40
- 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; 50 and
- a device that engages the mechanism to prevent movement thereof,
- wherein the device that engages the mechanism comprises a pin, and 55
- 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:

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- 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 10 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 nonrotatably 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 35 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 nonrotatably 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 55 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;

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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, 5 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 15 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 30 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 45 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. 50
- 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 55 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 60 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 65 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,

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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 5 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 10 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 15 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 20 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:
  - support tube;
  - a lower bearing support mounted to a lower end of the
  - a connecting element having one end connected to a wheel fork and another end adapted to be connected to 50 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
  - the recess comprising two stop surfaces and being 60 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 65 connecting element in one direction when the projecting portion engages one of the two stop surfaces; and

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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
- 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 sur-
- 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 an upper bearing support mounted to an upper end of the 45 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
  - 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.

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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 5 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 mov- 10 able 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 15 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 25 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 move- 30 ment 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 35 the lower bearing support;

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

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 45 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 50

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 60 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; 65

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

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

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;

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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;

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 24

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.

\* \* \* \* \*



# (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	

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(\*) 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

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#### 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

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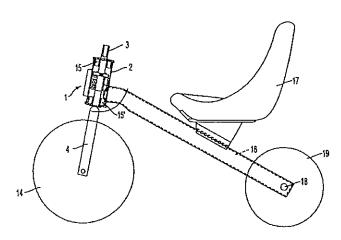
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Primary Examiner—Tony Winner (74) Attorney, Agent, or Firm—Greenblum & Bernstein, P.I. C.

### (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.

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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.

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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. Italtrike "Kids on wheels" catalog (in color) pp. KET2818-

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Radio Flyer catalog (in color) entitled "Specialty Collection Catalog 1999" pp. RF01350-RF01357. Case 2:10-cv-06877-R -FFM Document 1 Filed 09/15/10 Page 264 of 287 Page ID

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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. 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.

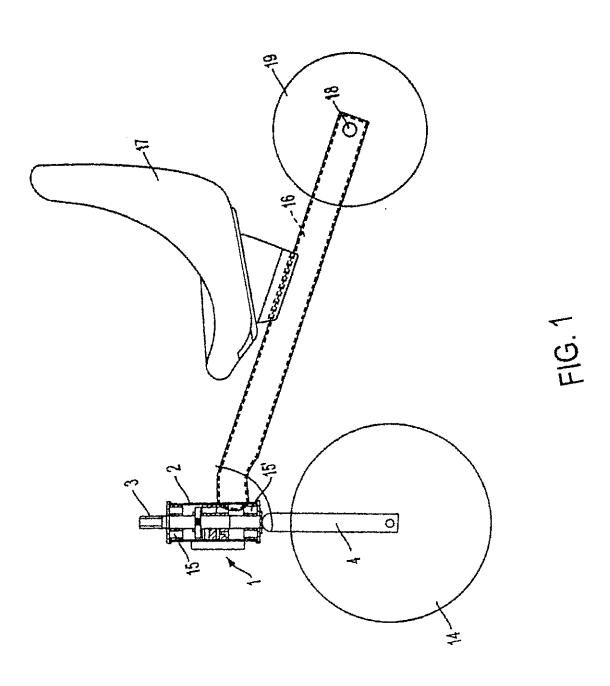
\* cited by examiner

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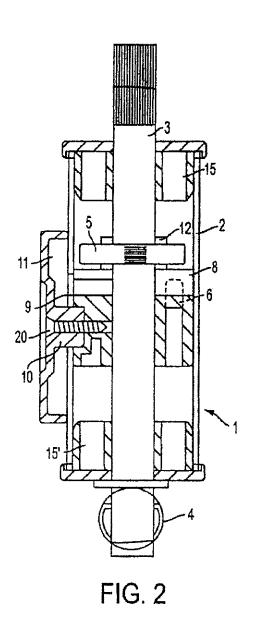


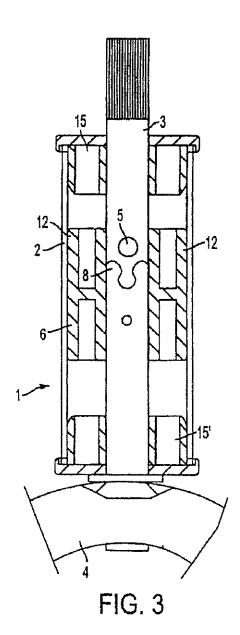
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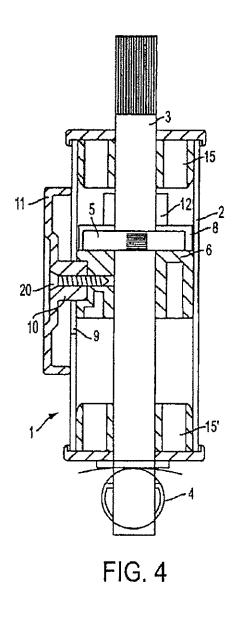
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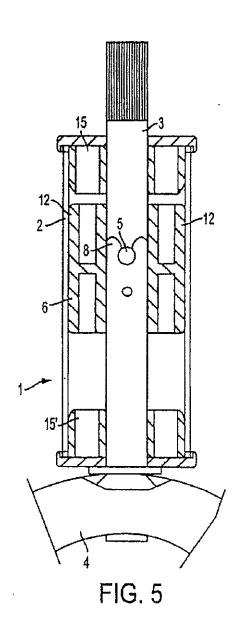




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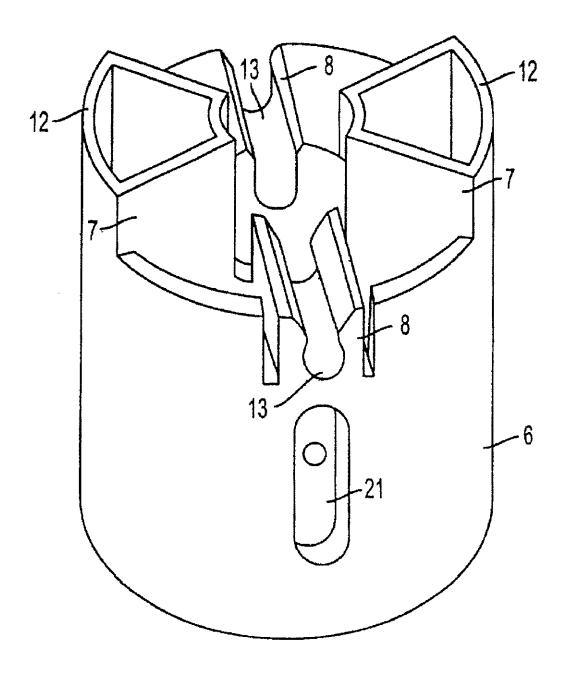
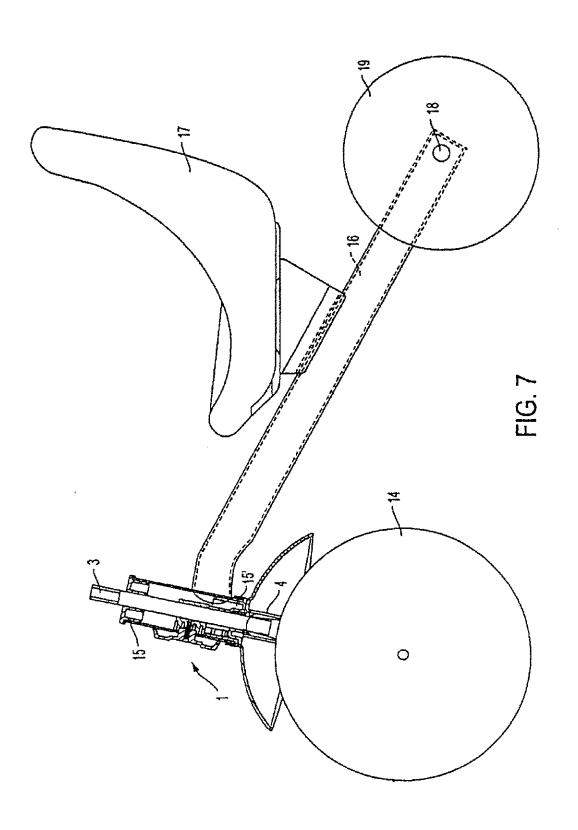


FIG. 6

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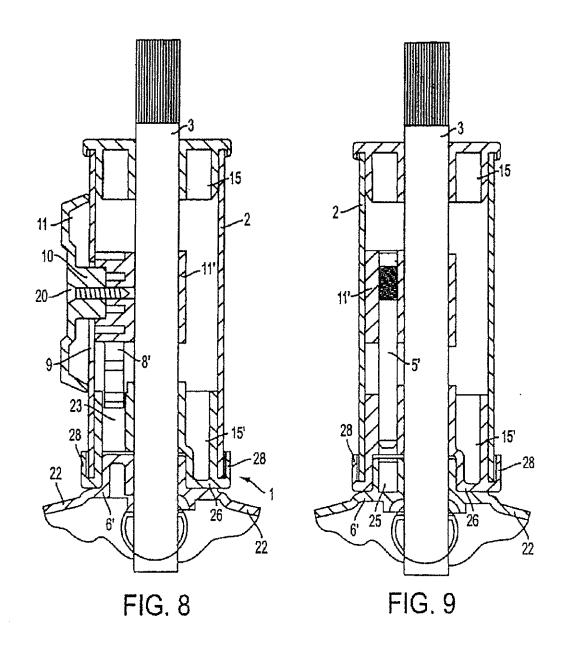
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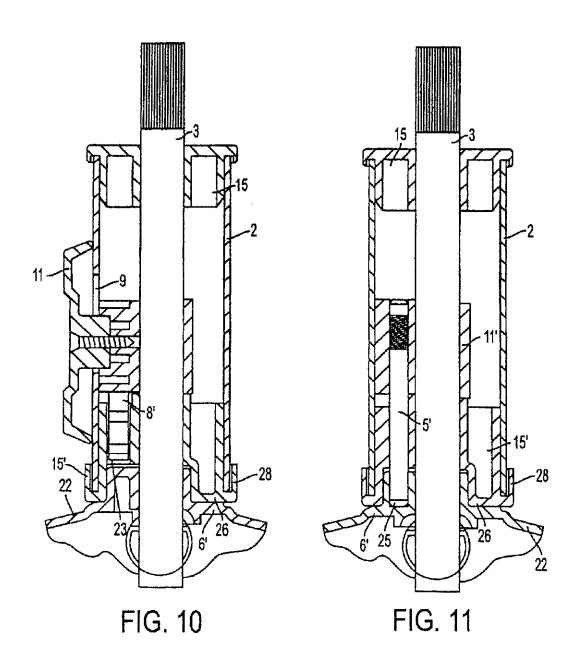
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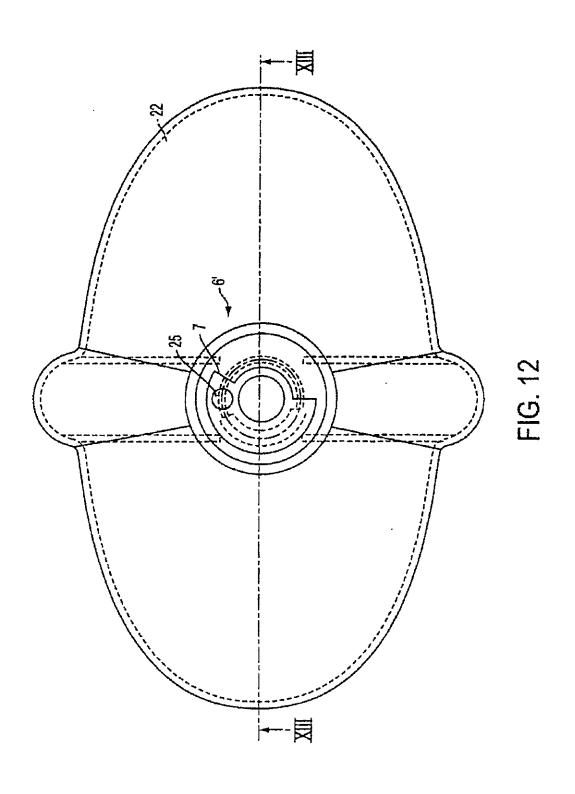
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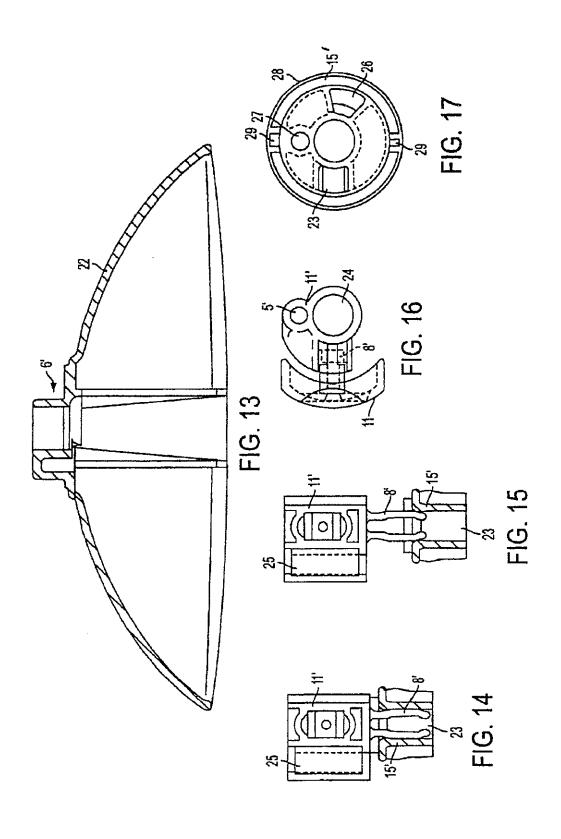
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#### VEHICLE STEERING HEAD

#### 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. 10 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. 15 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 bead 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 25 secured.

#### 2. Discussion of Background Information

Vehicle steering heads of the above-described type are in

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 35 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 unconbe 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 55 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 60 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, 65 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 20 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 particular used in bicycles or tricycles, and in particular in 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 trolled steering movements of the front wheel which cannot 45 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

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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 65 manufacture all functional parts separately in a very simple manner. As a result, advantageous on costs can be achieved.

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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

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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 5 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 15 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 20 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 dis- 30 posed 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 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 mem- 45 ber. 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. 50

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 55 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 65 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.

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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 element comprising at least one stop surface, wherein the at 35 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

> 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

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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 slinkage 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 10 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 15 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 20 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 25 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, 30 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 35 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 40 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 45 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 60 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 65 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

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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 5 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 10 Recesses 13 also utilize inclined inlet surfaces because they

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 15 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 25 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 30 (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 35 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 40 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 45 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 50 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 55 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 60 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 65 exterior knurl which is press fit into a fork member as is shown. In its working position, latch element 5 rotates with

10 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. 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 20 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

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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 5 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 15 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 20 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 30 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 35 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 pro- 40 vided 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 45 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 50 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 55 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.
- 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 coanect 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 5 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 15 movable locking member comprises a pin. 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 20 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 30 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 45 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 60 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 65 element and which disengages from the opening to allow rotational movement of the connecting element;

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- 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 10 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
  - 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.

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- 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 5 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 10 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 composition and lower bearing supports. prising a device that engages the mechanism to prevent movement thereof.

  41. The vehicle steering mechanism moves when the
- 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, 25 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 <sup>30</sup> 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 <sup>35</sup> 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
  - a mechanism that limits rotational movement of the 65 connecting member in each of two directions;
  - the mechanism comprising at least two stop surfaces;

16 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;

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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 5 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 ∞mprising:
  - 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 25 the vehicle steering head comprising: arcuate recess and an arcuate projection, the arcuate projection having an arc length between two stop
  - greater and an arc length of a space defined by the two stop surfaces of the arcuate projection, whereby the 30 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 arcuste projection.
- 52. A vehicle steering head for a tricycle having a frame, 35 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 40 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 connect- 50 ing 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 60 an end of the pin to pass therethrough. 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 65 element from rotating in each of the two directions, and wherein, when moved to another position, the locking

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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,
- 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
- 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;

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- 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 10 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 30 movable first member moves parallel to an axis of the connecting member and the second member comprises an opening.

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- 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.

	erwise ordered, the etermine all discov		ed States District Judge assig lated motions.	ned to	o this case will
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			NOTICE TO COUNSEL		
	otice must be served w this notice must be ser		summons and complaint on all dea all plaintiffs).	fendar	nts (if a removal action is
Subsequent do	cuments must be filed	at the f	ollowing location:		
	Division ring St., Rm. G-8 les, CA 90012	L1	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 th	e proper location will resu	ılt in vot	ur documents being returned to you.		

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## UNITED STATES DISTRICT COURT CENTRAL DISTRICT OF CALIFORNIA

CENTRAL DISTRIC	T OF CALIFORNIA
RAZOR USA LLC	CASE NUMBER
PLAINTIFF(S) V.	CV10 6877-R(FFM)
HEINZ KETTLER GMBH & CO., KG and KETTLER INTERNATIONAL, INC.,	SUMMONS
DEFENDANT(S).	
TO: DEFENDANT(S):  A lawsuit has been filed against you.  Within 21 days after service of this summor must serve on the plaintiff an answer to the attached of counterclaim cross-claim or a motion under Rule 1	ns on you (not counting the day you received it), you complaint
or motion must be served on the plaintiff's attorney, Ale 333 South Hope Street, Los Angeles, CA 90071 judgment by default will be entered against you for the ryour answer or motion with the court.	exander F. MacKinnon , whose address is . If you fail to do so,
Dated: <b>1 5 SEP 2010</b>	By:  MARIPY 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)].

CV-01A (12/07) SUMMONS

## Case 2:10-cv-06877-R -FFM Document 1 Filed 09/15/10 Page 286 of 287 Page ID #:293

## UNITED STATES DISTRICT COURT, CENTRAL DISTRICT OF CALIFORNIA CIVIL COVER SHEET

I (a) PLAINTIFFS (Check box RAZOR USA LLC,		FENDANTS HEINZ KETTLE ( INC.	Эмвн &	€ CO., F	G AND KETTLE	R INTERNAT	IONAL,	's		
(b) Attorneys (Firm Name, Adyourself, provide same.)  Alexander F. MacKinnon-Kirkland & Ellis LLP, 33: Telephone: 213-680-8400	JBN 253102 7	orneys (If Known) John C. Lynch, Liz Troutman Sanders I 222 Central Park A Telephone: 757-68	z S. Flow LLP, ve, Suite	·		· 23462				
II. BASIS OF JURISDICTION	III. CITIZENSHI (Place an X in	P OF PRINCIPAL one box for plainti				Only				
□ 1 U.S. Government Plaintiff 2 3 Federal Question (U.S. Government Not a Party)			Citizen of This State	e	PTF □ 1	DEF	Incorporated or P		<b>PTF</b> □ 4	DEF □ 4
☐ 2 U.S. Government Defendan	☐ 2 U.S. Government Defendant ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)				□2	□2	Incorporated and of Business in Ar		; □5	□ 5
		~	Citizen or Subject o	of a Foreign Countr	y □3	□ 3	Foreign Nation		□6	□6
IV. ORIGIN (Place an X in on	e box only.)									
Original 2 Remove State Co			einstated or	ransferred from and	other dist	rict (spe	Distr	ict Juc	peal to I lge from gistrate	n
V. REQUESTED IN COMPL	AINT: JURY DEMAND: 😿	Yes 🗆	No (Check 'Yes' on	nly if demanded in o	complain	ıt.)				
CLASS ACTION under F.R.C	.P. 23: □ Yes 14.No		□мо	NEY DEMANDE	D IN CO	OMPLA	INT: S			
	e the U.S. Civil Statute under whi	ch vou						ntuter unless di	vercity )	
<del>-</del>	suant to 28 U.S.C. §§ 2201, 2202	cn you a	ne ming and write a	orier statement or	cause. L	o not c	ne jurisulctional sia	Rutes uniess ut	versity.	)
VII. NATURE OF SUIT (Place										
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☐ 450 Commerce/ICC	☐ 140 Negotiable Instrument		Liability	371 Truth in L			Habeas Corpus	Relati		
Rates/etc.	☐ 150 Recovery of	□ 320	Assault, Libel &	☐ 380 Other Pen	sonal		General	☐ 730 Labor.		
☐ 460 Deportation	Overpayment &		Slander				Death Penalty	Repor	ting &	
☐ 470 Racketeer Influenced	Enforcement of	1330	Fed. Employers' Liability	☐ 385 Property I		□ 540		Disclo		
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<ul> <li>□ 810 Selective Service</li> <li>□ 850 Securities/Commodities/Exchange</li> <li>□ 875 Customer Challenge 12 USC 3410</li> <li>□ 890 Other Statutory Actions</li> <li>□ 891 Agricultural Act</li> <li>□ 892 Economic Stabilization Act</li> <li>□ 893 Environmental Matters</li> <li>□ 894 Energy Allocation Act</li> <li>□ 895 Freedom of Info. Act</li> <li>□ 900 Appeal of Fee Determination Under Equal Access to Justice</li> <li>□ 950 Constitutionality of</li> </ul>	□ 152 Recovery of Defaulted Student Loan (Excl. Veterans) □ 153 Recovery of Overpayment of Veteran's Benefits □ 160 Stockholders' Suits □ 190 Other Contract  Liability □ 196 Franchise REAL PROPERTY □ 210 Land Condemnation □ 220 Foreclosure □ 230 Rent Lease & Ejectment □ 240 Torts to Land □ 245 Tort Product Liability	☐ 350 ☐ 355 ☐ 360 ☐ 362 ☐ 365 ☐ 368 ☐ 462 ☐ 463	Marine Product Liability Motor Vehicle Motor Vehicle Product Liability Other Personal Injury Personal Injury- Med Malpractice Personal Injury- Product Liability Asbestos Personal Injury Product Liability VIMIGRATION Naturalization Application Habeas Corpus- Alien Detainee	BANKRUPT  □ 422 Appeal 28	GY 3 USC val 28  ITS  ent Acco- ons  with est ent with ess-	□ 555 FC □ 610 □ 620 □ 625 □ 630 □ 640 □ 650 □ 660	Civil Rights Prison Condition ORFEITURE / PENALTY Agriculture Other Food & Drug Drug Related Seizure of Property 21 USC 881 Liquor Laws R.R. & Truck Airline Regs Occupational Safety /Health	□ 740 Railw □ 790 Other	ay Labo Labor tion Ret. Inc ity Act Y RIGI rights t mark SECURI 1395ff) Lung (9 C/DIWW g)) Title XV 105(g)) TAX SI (U.S. Pl fendant) chird Par	C.  HTS  P223) V  VI  UITS  laintiff
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<ul> <li>□ 810 Selective Service</li> <li>□ 850 Securities/Commodities/Exchange</li> <li>□ 875 Customer Challenge 12 USC 3410</li> <li>□ 890 Other Statutory Actions</li> <li>□ 891 Agricultural Act</li> <li>□ 892 Economic Stabilization Act</li> <li>□ 893 Environmental Matters</li> <li>□ 894 Energy Allocation Act</li> <li>□ 895 Freedom of Info. Act</li> <li>□ 900 Appeal of Fee Determination Under Equal Access to Justice</li> <li>□ 950 Constitutionality of</li> </ul>	□ 152 Recovery of Defaulted Student Loan (Excl. Veterans) □ 153 Recovery of Overpayment of Veteran's Benefits □ 160 Stockholders' Suits □ 190 Other Contract  Liability □ 196 Franchise REAL PROPERTY □ 210 Land Condemnation □ 220 Foreclosure □ 230 Rent Lease & Ejectment □ 240 Torts to Land □ 245 Tort Product Liability	350	Marine Product Liability Motor Vehicle Motor Vehicle Product Liability Other Personal Injury Personal Injury- Med Malpractice Personal Injury- Product Liability Asbestos Personal Injury Product Liability MMIGRATION Naturalization Application Habeas Corpus- Alien Detainee Other Immigration	BANKRUPT  422 Appeal 28 158  423 Withdraw USC 157  CIVIL RIGH  441 Voting  442 Employm  443 Housing/ mmodatic  444 Welfare  445 American Disabilitie Employm  446 American Other  440 Other Civ Rights	GY 3 USC val 28  ITS  ent Acco- ons  with est ent with ess-	□ 555 FC □ 610 □ 620 □ 625 □ 630 □ 640 □ 650 □ 660	Civil Rights Prison Condition ORFEITURE / PENALTY Agriculture Other Food & Drug Drug Related Seizure of Property 21 USC 881 Liquor Laws R.R. & Truck Airline Regs Occupational Safety /Health	□ 740 Railw □ 790 Other	ay Labo Labor tion Ret. Inc ity Act Y RIGI rights t mark SECURI 1395ff) Lung (9 C/DIWW g)) Title XV 105(g)) TAX SI (U.S. Pl fendant) chird Par	C.  HTS  P223) V  VI  UITS  laintiff

AFTER COMPLETING THE FRONT SIDE OF FORM CV-71, COMPLETE THE INFORMATION REQUESTED BELOW.

FOR OFFICE USE ONLY: Case Number:

CV-71 (05/08) CIVIL COVER SHEET Page 1 of 2

## Case 2:10-cv-06877-R -FFM Document 1 Filed 09/15/10 Page 287 of 287 Page ID #:294

## UNITED STATES DISTRICT COURT, CENTRAL DISTRICT OF CALIFORNIA CIVIL COVER SHEET

VIII(a). IDENTICAL CASES If yes, list case number(s):	S: Has this action been pre	viously filed in this court and	d dismissed, remanded or closed? ☑ No □ Yes			
VIII(b). RELATED CASES: If yes, list case number(s):	Have any cases been prev	riously filed in this court that	t are related to the present case? Mo □ Yes			
[	☐ A. Arise from the same☐ B. Call for determinatio☐ C. For other reasons wo	or closely related transaction on of the same or substantiall ould entail substantial duplica	ns, happenings, or events; or y related or similar questions of law and fact; or ation of labor if heard by different judges; or <u>and</u> one of the factors identified above in a, b or c also is present.			
IX. VENUE: (When completing	ng the following information	on, use an additional sheet if	necessary.)			
			f other than California; or Foreign Country, in which EACH named plaintiff resides. 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 Dis  Check here if the government	trict; California County ou ent, its agencies or employ	ntside of this District; State if	f other than California; or Foreign Country, in which EACH named defendant resides. f 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			
		ntside of this District; State if	f other than California; or Foreign Country, in which EACH claim arose.			
County in this District:*			California County outside of this District; State, if other than California; or Foreign Country			
Los Angeles						
* Los Angeles, Orange, San B Note: In land condemnation cas	ernardino, Riverside, Ve	ntura, Santa Barbara, or S tract of land involved	San Luis Obispo Counties			
X. SIGNATURE OF ATTORN			MCMM Date 9/15/2010			
or other papers as required	by law. This form, approve	ed by the Judicial Conference	mation contained herein neither replace nor supplement the filing and service of pleadings e of the United States in September 1974, is required pursuant to Local Rule 3-1 is not filed ing the civil docket sheet. (For more detailed instructions, see separate instructions sheet.)			
Key to Statistical codes relating	to Social Security Cases:					
Nature of Suit C	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 amende 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 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 widow. Act, as amended. (42 U.S.	s or widowers insurance benefits based on disability under Title 2 of the Social Security .C. 405(g))			
864	SSID	All claims for supplementa Act, as amended.	al security income payments based upon disability filed under Title 16 of the Social Security			
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))				

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