US010336246B2

(12) **United States Patent**
Robinson

(10) **Patent No.: US 10,336,246 B2**
(45) **Date of Patent: Jul. 2, 2019**

(54) **INTEGRALLY LIGHTED TOW BAR**

(71) Applicant: **ROADMASTER, INC.**, Vancouver, WA (US)

(72) Inventor: **David Robinson**, Vancouver, WA (US)

(73) Assignee: **Roadmaster, Inc.**, Vancouver, WA (US)

(*) 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.: **15/822,397**

(22) Filed: **Nov. 27, 2017**

(65) **Prior Publication Data**

US 2018/0281667 A1 Oct. 4, 2018

Related U.S. Application Data

(60) Provisional application No. 62/477,561, filed on Mar. 28, 2017.

(51) **Int. Cl.**

B60Q 1/00	(2006.01)
B60Q 1/26	(2006.01)
B60Q 1/50	(2006.01)
B60D 1/167	(2006.01)

(52) **U.S. Cl.**

CPC ***B60Q 1/2661*** (2013.01); ***B60D 1/167*** (2013.01); ***B60Q 1/50*** (2013.01)

(58) **Field of Classification Search**

CPC B60Q 1/305; F21V 21/30; F21V 21/26; F21V 21/116; B60R 1/06

USPC 362/485

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,886,968	B1 *	5/2005	Hamelink	B60D 1/58 280/163
2016/0129742	A1 *	5/2016	Erickson	B60D 1/58 280/400

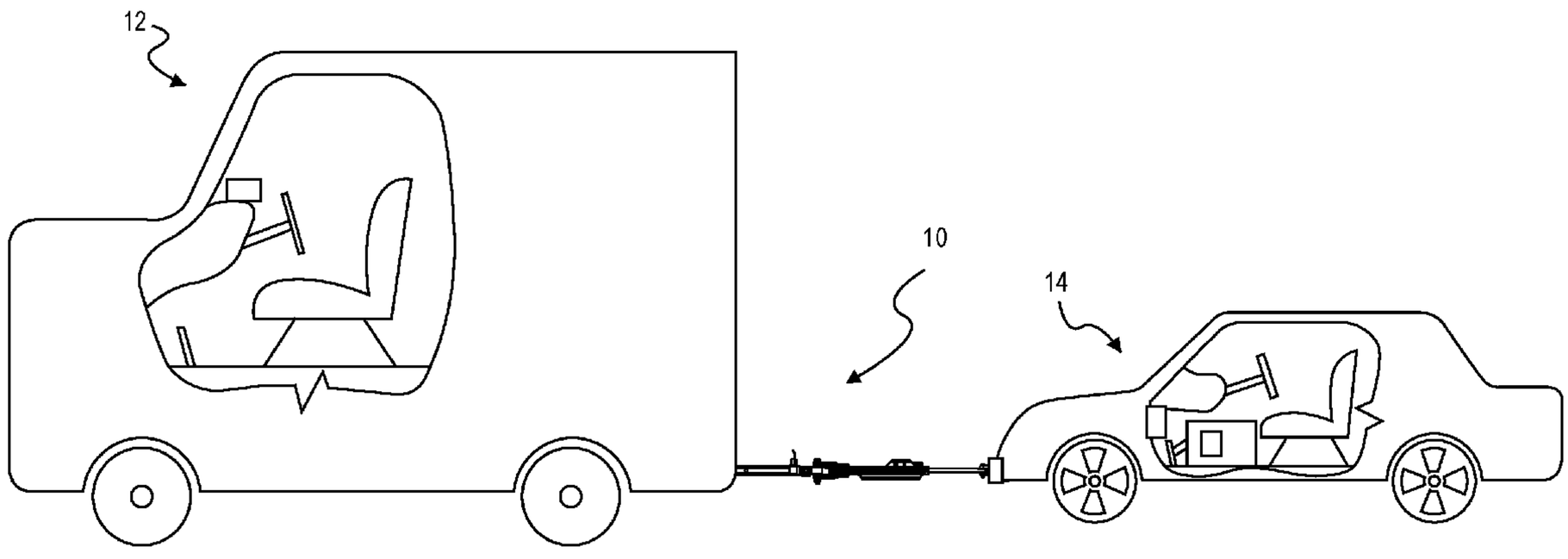
* cited by examiner

Primary Examiner — Jamara A Franklin
(74) *Attorney, Agent, or Firm* — Erise IP, P.A.

(57) **ABSTRACT**

A tow bar assembly for towing a load with a vehicle providing a lighted region to warn other motorists on the road that the load is being towed and provide indications of the mode of operation of the towing vehicle. The integrated lights may be connected to the towing vehicle control signals indicating a turn signal, braking, or reverse. The tow lights also clearly display the tow bar that may otherwise be difficult to see at night and that the tow bar is towing a load.

20 Claims, 10 Drawing Sheets



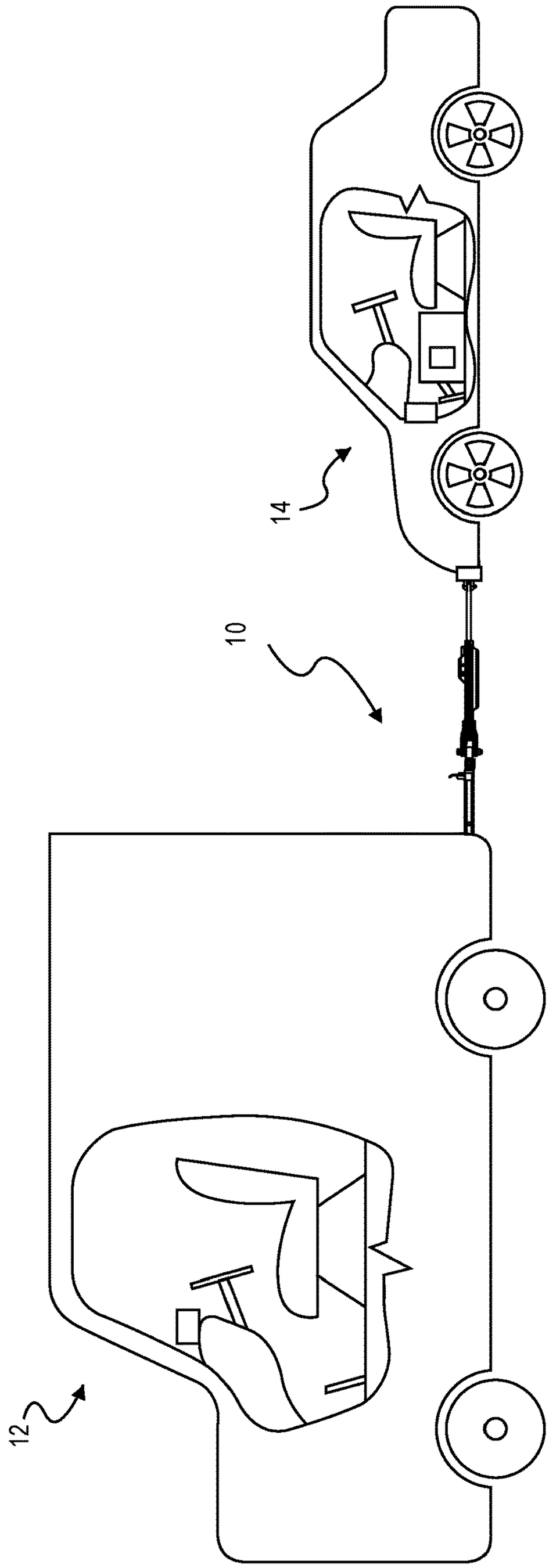


FIG. 1

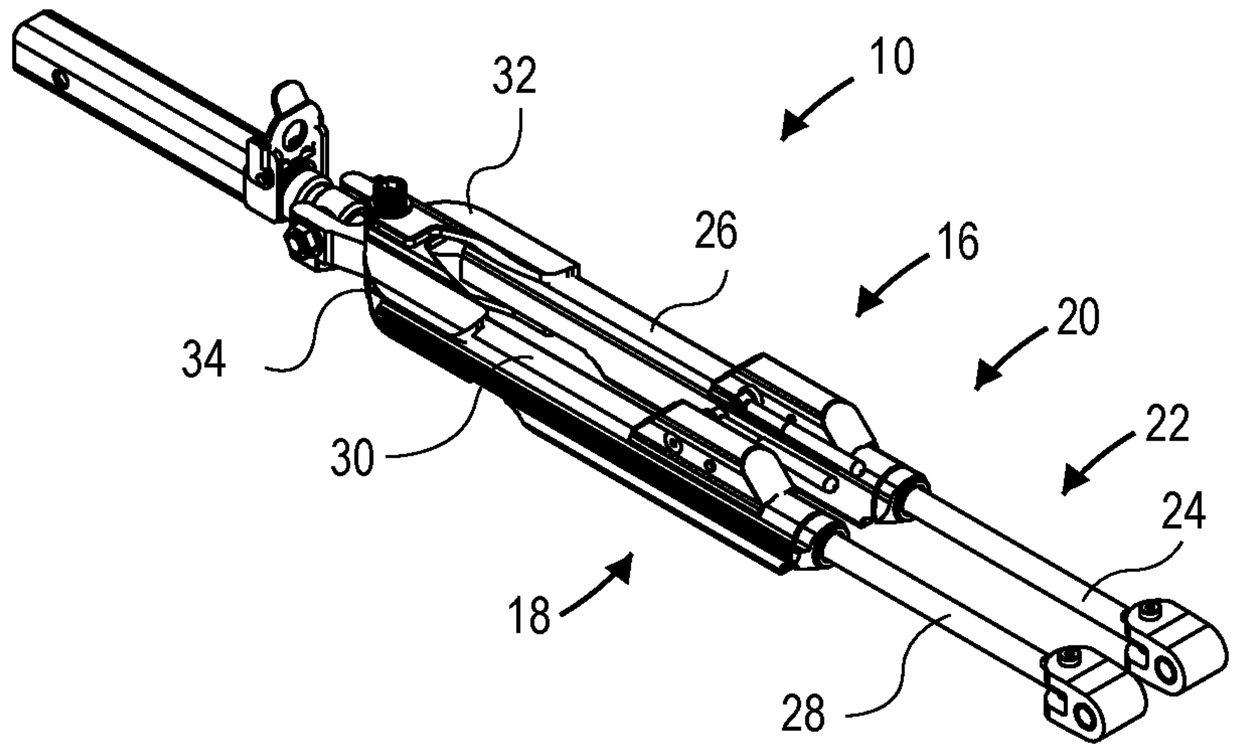


FIG. 2A

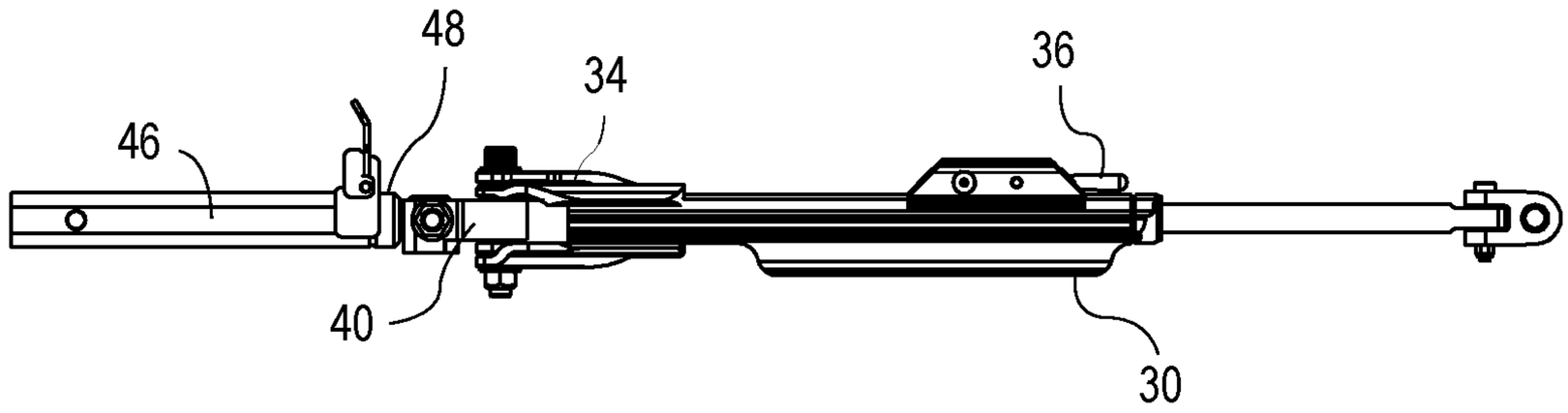


FIG. 2B

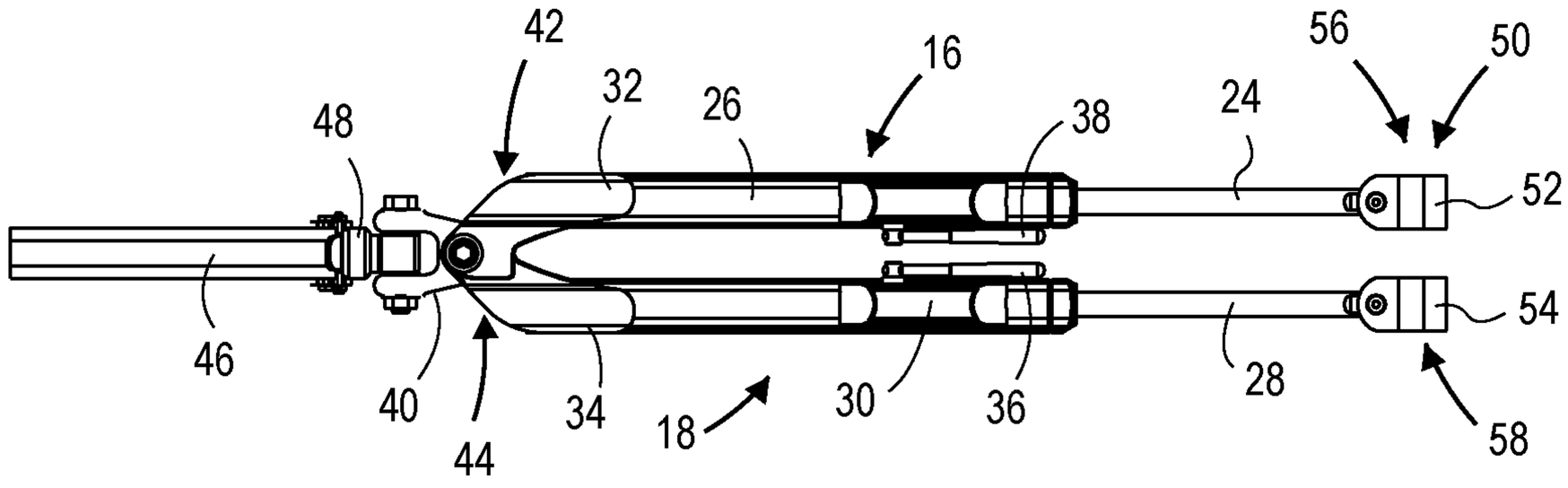


FIG. 2C

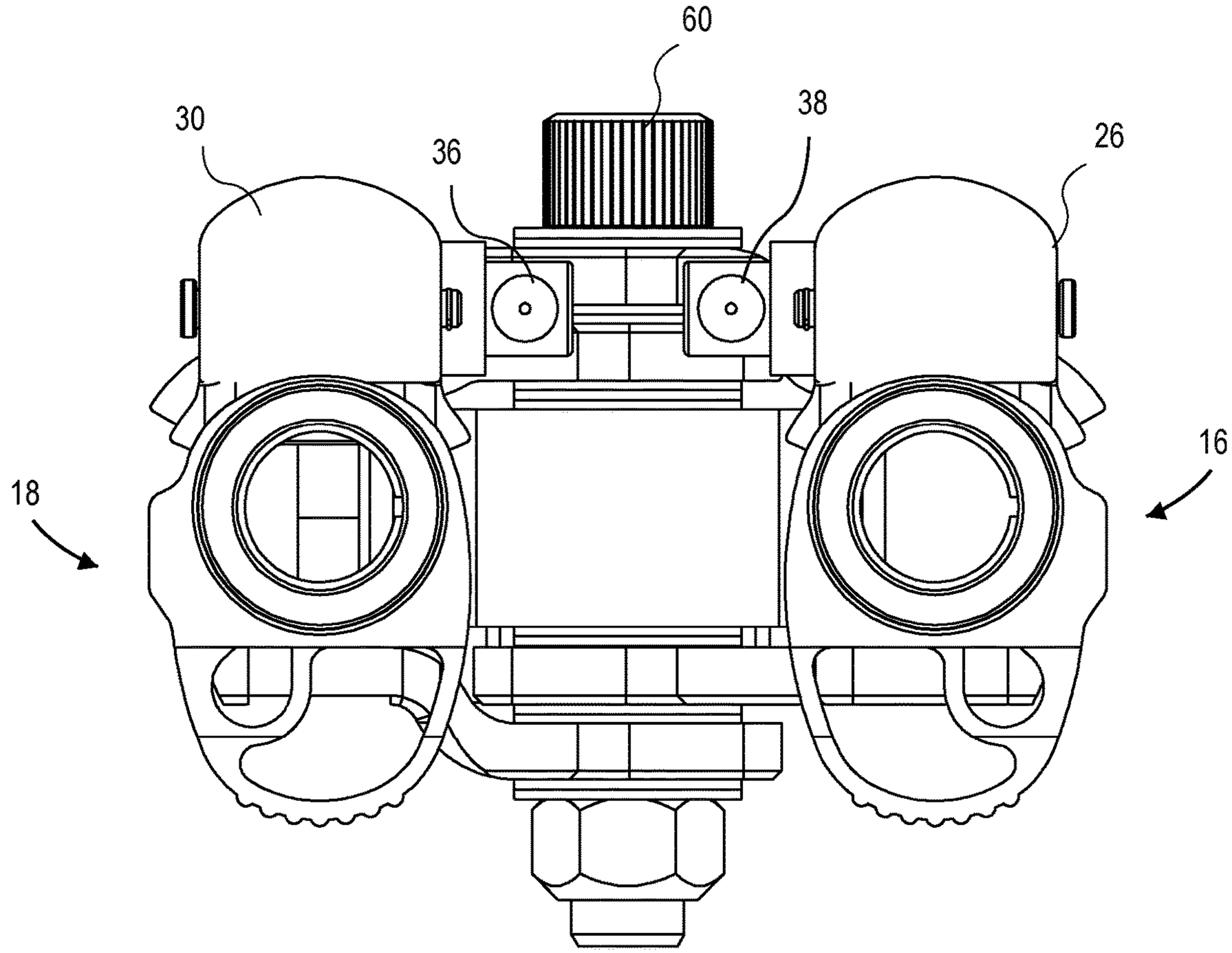


FIG. 2D

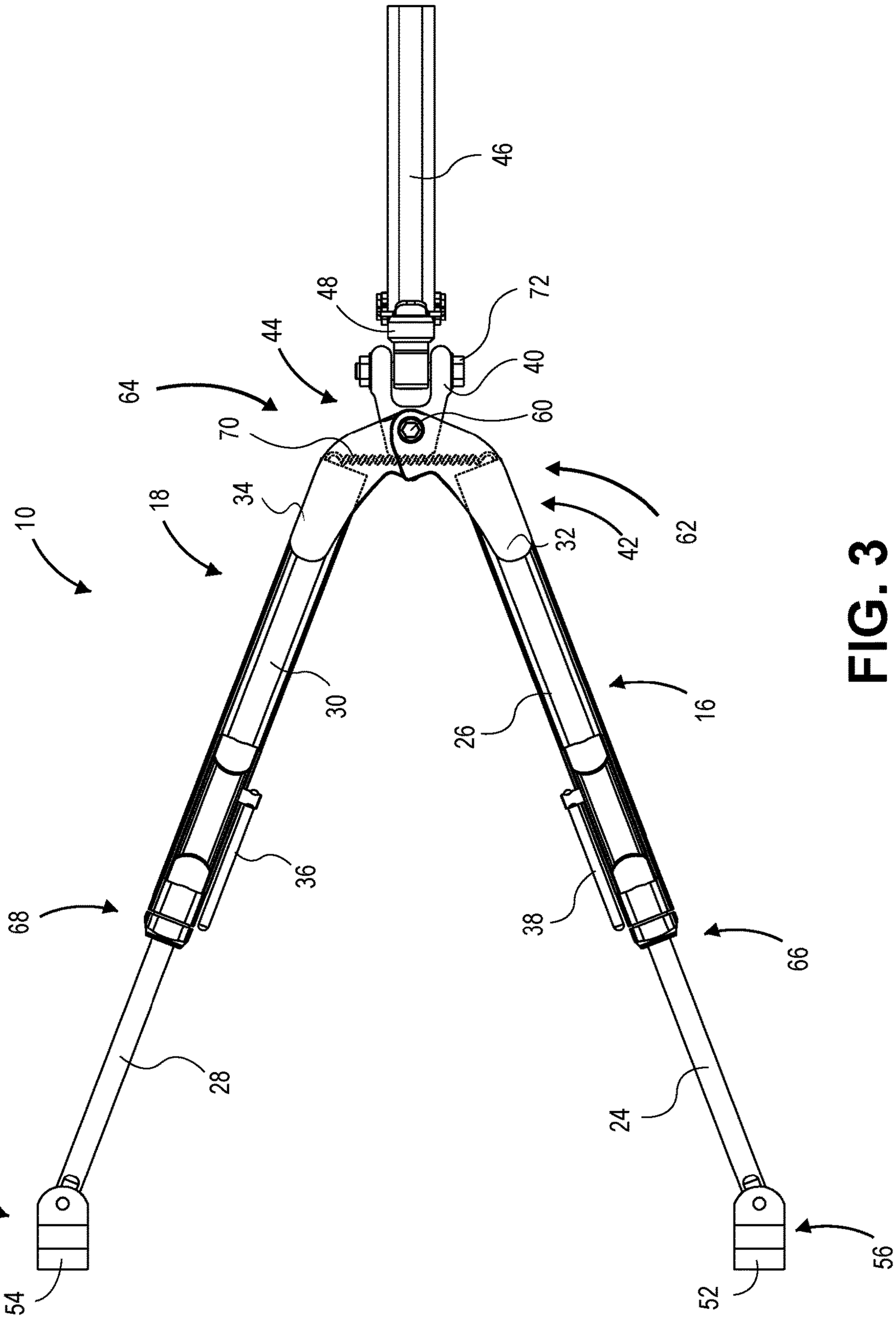

46
48
72
44
64
40
70
60
10
18
34
32
42
62
30
26
16
36
38
68
66
28
24
58
54
52
56

FIG. 3

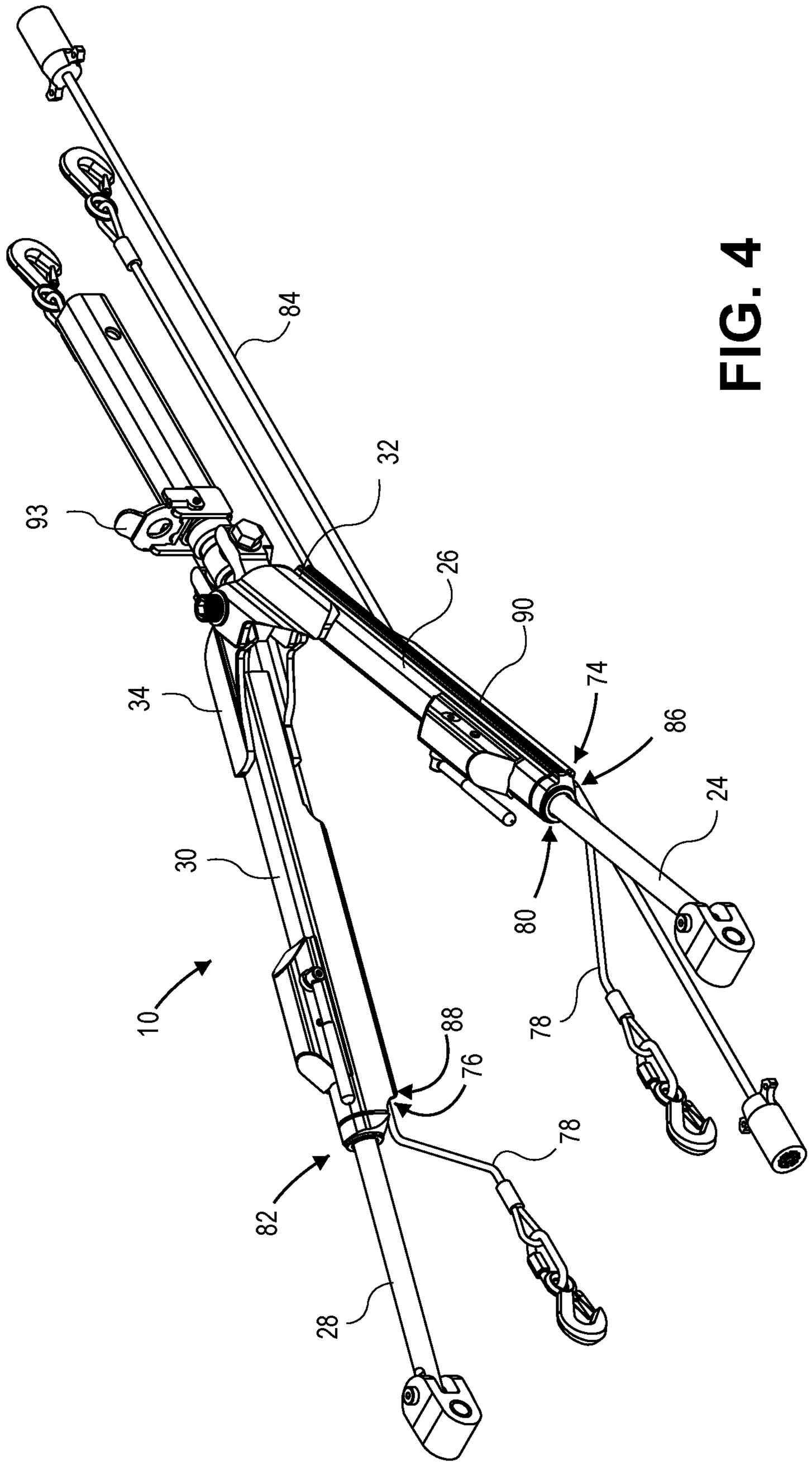


FIG. 4

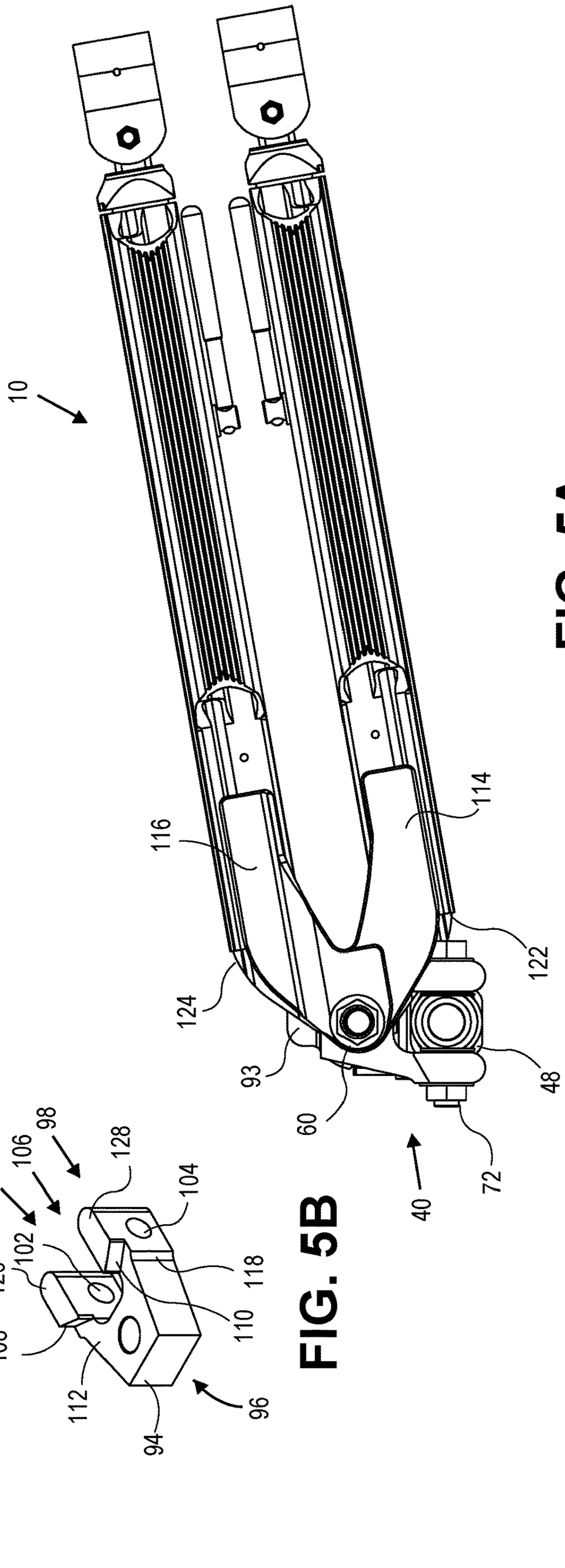

10
116
114
124
122
93
60
48
40
72

FIG. 5A

40
100
106
98
128
104
102
126
118
108
110
112
94
96

FIG. 5B

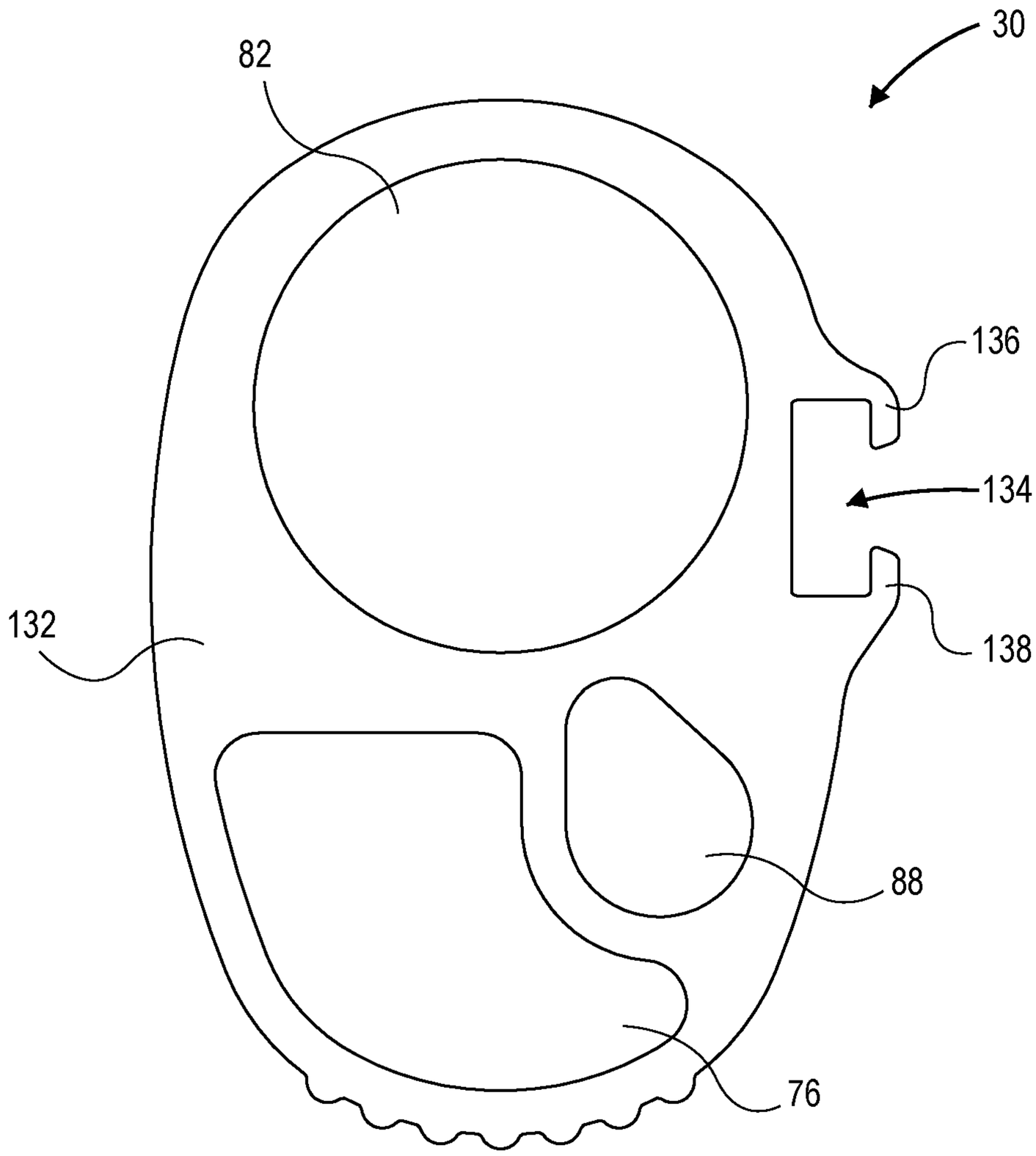


FIG. 6

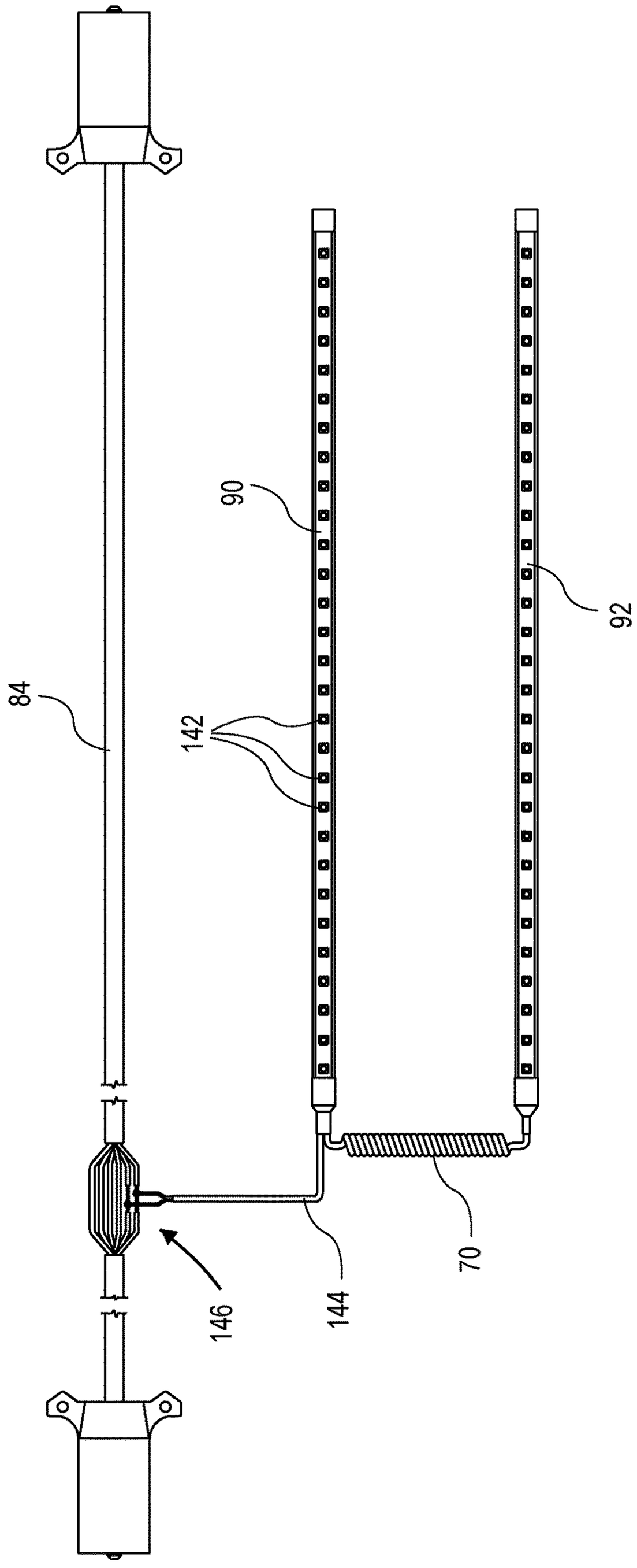


FIG. 7

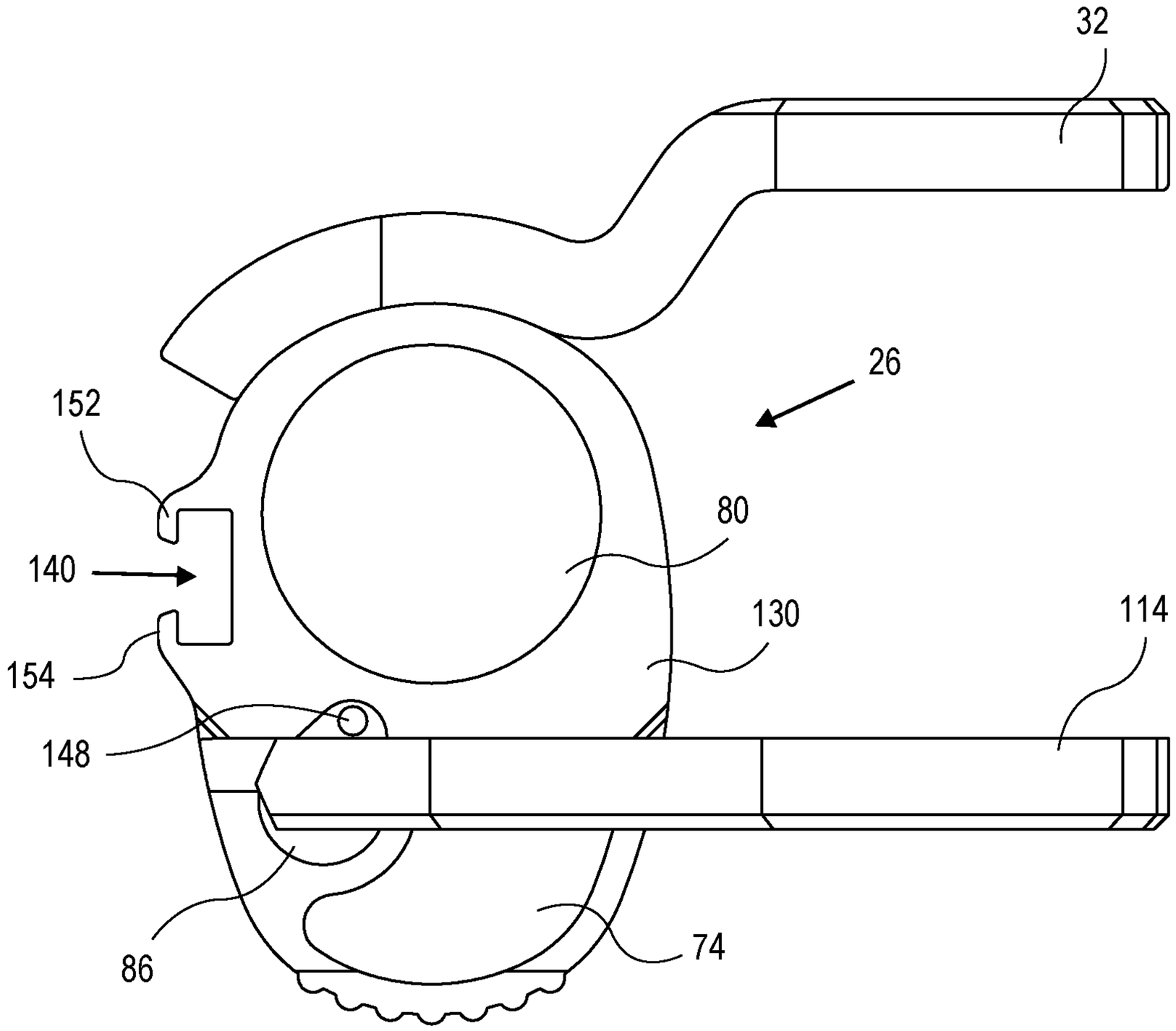


FIG. 8

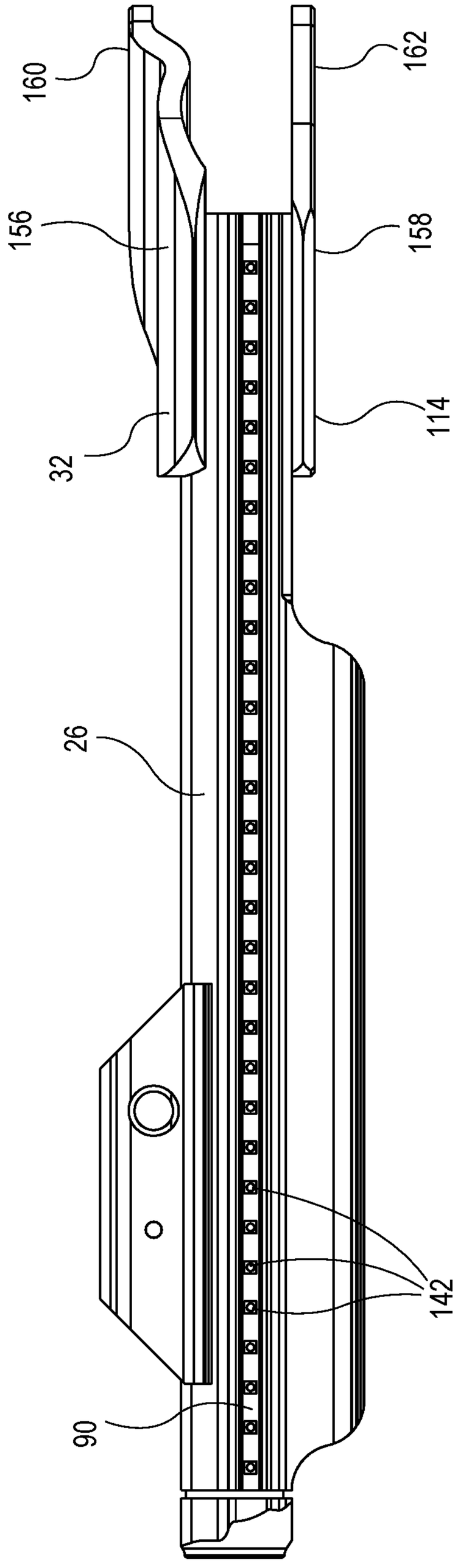


FIG. 9

INTEGRALLY LIGHTED TOW BAR

RELATED APPLICATIONS

This non-provisional patent application claims priority benefit, with regard to all common subject matter, of earlier-filed U.S. Provisional Patent Application No. 62/477,561, filed on Mar. 28, 2017, and entitled "INTEGRALLY LIGHTED TOW BAR." The identified earlier-filed provisional patent application is hereby incorporated by reference in its entirety into the present application.

Embodiments and/or features of the invention described in the present document may be used with the subject matter disclosed in commonly assigned and concurrently filed U.S. Pat. No. 15/822,410, and entitled "SUPPLEMENTAL BRAKE MONITORING SYSTEM." The concurrently filed patent application claims priority to earlier-filed U.S. Provisional Patent Application No. 62/426,753, filed on Nov. 28, 2016, and entitled "PROXIMITY SENSOR BASED SUPPLEMENTAL BRAKE MONITORING SYSTEM." The concurrently filed patent application and the previously filed provisional patent application are each hereby incorporated by reference in their entirety into the present application.

Embodiments and/or features of the invention described in the present document may be used with the subject matter disclosed in U.S. Pat. No. 6,619,686 issued Sep. 16, 2003, and entitled "FOLDING TOWBAR LOCK MECHANISM", U.S. Pat. No. 6,957,824 issued Oct. 25, 2005, and entitled "INTERLOCKING DEVICE", and U.S. Pat. No. 7,461,855 issued Dec. 9, 2008, and entitle "INTERLOCKING DEVICE FOR TELESCOPIC TOW BAR LEGS".

BACKGROUND

1. Field

Embodiments of the invention generally relate to a lighted tow bar. More specifically a lighted tow bar for coupling a towing vehicle to a car, trailer, or any other load for use on public roads.

2. Related Art

Generally, tow bars couple a towing vehicle to a load. A common example is a recreational vehicle ("RV") towing an automobile. This creates safety concerns. Other motorists, or pedestrians, may not notice the tow bar spanning between the towing vehicle and the towed vehicle as tow bars may be difficult to see. As such, the other motorists or pedestrians may not be able to see that the automobile is being towed instead of independently driven or may not see the vehicle at all. Typically, between the rear bumper of the towing vehicle and the rear bumper of the towed vehicle there are no lights. A vehicle driving next to the towing vehicle may change lanes directly behind the towing vehicle not realizing that a vehicle is being towed.

Providing a tow bar with an integral lighting system which can be tied into the tail lights, turn signals and/or brake lights of the towing vehicle may greatly enhance visibility and awareness. Existing solutions include mounting a set of large auxiliary lights to a towed vehicle or load, however the tow bar itself may be without light indicators. Additionally, tow bars often create pinch points and sharp bends which fray cables, creating electrical grounds and shorts for cable connectors. Wireless slave lights are also problematic, as they rely on batteries rather than the towing vehicle's power and suffer the same limitations regarding illuminating the span of the tow bar itself. Slave lights are typically magnetic but also could be connected to a tow bar by tape, wire, or other after-market method, but this leaves the lights vulnerable to separation from vibration, bumps, or bad weather. Existing solutions also utilize lighting element which consume excessive power. These lighting elements may be hardwired but in the event that the elements are battery powered, the life of the batteries is limited. Also, the existing solutions do not provide for side marker lights. Without being effectively positioned to indicate the presence and outline of the tow bar, the existing solutions may be disorienting to other motorists or pedestrians.

SUMMARY

Embodiments of the invention solve the above mention problems by providing an integrally lighted tow bar. Light strips may be connected to tow arms of the tow bar. The lights may be disposed within channels and may indicate the towing vehicle's mode of operation. The lighted tow bar indicates to other drivers that a load is being towed and may indicate the towing vehicle's mode of operation such as lighting, reverse, braking, turning, or when the hazard lights are on. The lights may be connected to the towing vehicle in a manner such that any indicator from the towing vehicle may be represented by the lighted two bar. The lighted tow bar illuminates the area near the side of the tow bar providing better visibility for the other motorists and pedestrians.

A first embodiment of the invention provides for a tow bar assembly comprising an outer tow arm connected to a linkage on a first end and telescopically connected to an inner tow arm on a second end. The linkage configured to attach to a towing vehicle and the inner tow arm is configured to attach to a load for towing. The outer tow arm comprises an exterior channel for housing a lighting strip, the lighting strip comprising lighting elements. The lighting elements illuminate indicative of a mode of operation of the towing vehicle.

A second embodiment of the invention provides for a tow bar assembly comprising an outer tow arm connected to a linkage on a first end and telescopically connected to an inner tow arm on a second end. The linkage configured to attach to a towing vehicle and the inner tow arm is configured to attach to a load for towing. A lighting element may be disposed on the tow arm. The outer tow arm further comprising a first interior channel for housing electrical cables and further comprising a second interior channel for housing tow cables.

A third embodiment of the invention addresses the above-described need by providing a tow bar assembly comprising an outer tow arm connected to a linkage on a first end and telescopically connected to an inner tow arm on a second end. The linkage configured to attach to a towing vehicle and the inner tow arm configured to attach to a load for towing. At least one lighting element disposed on the outer tow arm.

This summary is provided to introduce a selection of concepts in a simplified form that are further described below in the detailed description. This summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used to limit the scope of the claimed subject matter. Other aspects and advantages of the current invention will be apparent from the following detailed description of the embodiments and the accompanying drawing figures.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

Embodiments of the invention are described in detail below with reference to the attached drawing figures, wherein:

FIG. **1** depicts on embodiment of an integrally lighted tow bar attached to a towing vehicle and a towed vehicle.

FIGS. **2**A-D depict embodiments of an integrally lighted tow bar;

FIG. **3** depicts an embodiment of a top view of an integrally lighted tow bar in a deployed position;

FIG. **4** depicts a perspective view of an embodiment of an integrally lighted tow bar in a deployed position;

FIGS. **5**A-B depicts a bottom view of an embodiment of an integrally lighted tow bar and a perspective view of a yoke coupling;

FIG. **6** depicts a cross section view of an embodiment of an outer tow arm;

FIG. **7** depicts an embodiment of electrical cables and light strips;

FIG. **8** depicts a cross section view of an embodiment of an outer tow arm; and

FIG. **9** depicts a side view of an embodiment of an outer tow arm;

The drawing figures do not limit the invention to the specific embodiments disclosed and described herein. The drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the invention.

DETAILED DESCRIPTION

The following detailed description of embodiments of the invention references the accompanying drawings that illustrate specific embodiments in which the invention can be practiced. The embodiments are intended to describe aspects of the invention in sufficient detail to enable those skilled in the art to practice the invention. Other embodiments can be utilized and changes can be made without departing from the scope of the invention. The following detailed description is, therefore, not to be taken in a limiting sense. The scope of embodiments of the invention is defined only by the appended claims, along with the full scope of equivalents to which such claims are entitled.

In this description, references to "one embodiment," "an embodiment," or "embodiments" mean that the feature or features being referred to are included in at least one embodiment of the technology. Separate reference to "one embodiment" "an embodiment", or "embodiments" in this description do not necessarily refer to the same embodiment and are also not mutually exclusive unless so stated and/or except as will be readily apparent to those skilled in the art from the description. For example, a feature, structure, or act described in one embodiment may also be included in other embodiments, but is not necessarily included. Thus, the technology can include a variety of combinations and/or integrations of the embodiments described herein.

Use of directional terms such as "upper," "lower,", "top", "bottom", "above," "below", "front", "forward", "aft", "left" or "right", and etc. are intended merely for orientation, to describe the positions and/or orientations of various components of the invention relative to one another as the apparatus would be installed between a towing vehicle and a load vehicle, and are not intended to impose limitations on any position and/or orientation of any embodiment of the invention relative to any reference point external to the reference. It should also be noted that the terms tow object, vehicle to be towed, and load may be used interchangeably.

An integrally lighted tow bar as described in embodiments below may have two adjustable arms that, on one end, connect to a towing vehicle and on the other end connect to an object to be towed. The tow arms may be adjustable by pivoting about one, two, or three axes simultaneously. The tow arms may also have multiple telescoping parts. The wide variety of configurations allowed by the adjustability enable the tow bar to adjust to the towing vehicle as well as the object to be towed.

Referring to the figures, an integrally lighted tow bar is provided which incorporates lighting elements along the lateral regions of a vehicle tow bar. An integrally lighted tow bar may include movable towing arms, or a fixed tow bar geometry. The embodiments described below include left and right tow arms, which are similar and may or may not be exact mirror images. Though the lighting elements depicted are on the outer lateral regions, or sides, of the tow arm, the lighting elements may be on the top, bottom, sides, or there may be a plurality of lighting elements contained in lighting strips on all or any combination of top, bottom, or sides of the tow bar. Though the lighting elements depicted are in lighting strips, the lighting elements may be freely independent and there may be one, two, three, or any number of lighting elements. The lighting elements may be integral, or attached by magnets, screws, bolts, clamps, adhesives, or any other method that may be used to attach the lights.

FIG. **1** depicts an embodiment of an integrally lighted tow bar **10** disposed between a towing vehicle **12** and a towed vehicle **14**. Though the towing vehicle **12** in FIG. **1** is a truck. However, the towing vehicle **12** may be a car, bicycle, snow mobile, or any vehicle capable of towing a load. Though the towed vehicle **14** depicted in FIG. **1** is a car, the towed vehicle **14** may be a truck, motorcycle, trailer, sled, or any object that may be towed. The towed vehicle **14** may also be referred to as a towed object, or load.

Referring to FIGS. **2**A-**2**D, an exemplary embodiment of the integrally lighted tow bar **10** is shown. FIG. **2**A depicts a perspective view of the lighted tow bar **10**. Included is a left tow arm **16** and a right tow arm **18**. Though two tow arms are depicted it should be noted that one, two, three, or any number of tow arms may be necessary to tow the towed object, or load, may be used. The left tow arm **16** and the right tow arm **18**, as depicted in FIGS. **2**A-**2**D, are in a position wherein the left tow arm **16** and the right tow arm **18** are parallel to one another. Generally, a tow arm may be configured with an outer tow arm **20** and an inner tow arm **22**. A left inner tow arm **24** may be partially disposed within a left outer tow arm **26**. Based on the length of the tow arm needed for attaching to the tow vehicle or for storage purposes, the length of disposition may be selected as the left inner tow arm **24** moves in a telescoping manner relative to the left outer tow arm **26**. When the towing vehicle begins moving the left inner tow arm **24** may telescope to a fully extended position automatically engaging a locking mechanism. The locking mechanism may lock the left inner tow arm **24** in place relative the left outer tow arm **26**. A right inner tow arm **28** and a right outer tow arm **30** may have the same or similar configuration and function to the left inner tow arm **24** and the left outer tow arm **26**. The left outer tow arm **26** is configured with a left upper flange **32** and the right outer tow arm **30** is configured with a right upper flange **34**.

In FIG. **2**B a right cylinder lock handle **36** can be seen disposed on the right outer tow arm **30**. In FIG. **2**C a left cylinder lock handle **38** is disposed on the left tow arm **16**

and the right cylinder lock handle **36** is disposed on the right tow arm **18**. The left cylinder lock handle **38** and the right cylinder lock handle **36** are rotated to selectively disengage the automatic locking mechanism causing the left inner tow arm **24** and the right inner tow arm **28**, respectively, to be released from the automatic locking mechanism. In general, the left cylinder lock handle **38** or the right cylinder lock handle **36** may be a lever, a knob, a push button, or any other mechanism that may be used to disengage the locking mechanism.

In embodiments, as depicted in FIGS. **2**B-C, the left tow arm **16** may be rotatably coupled to the right tow arm **18** and to a yoke coupling **40** at a respective first left tow bar terminal end **42** and a first right tow bar terminal end **44**. The yoke coupling **40** is rotatably coupled to a stinger bar **46** by a two-axis rotatable coupling **48**. The two-axis rotatable coupling **48** provides a rotatable coupling to the towing vehicle **12** which makes hookup easier and reduces risk of binding and/or warping when traveling over uneven ground or while turning. The multi-axis system also allows the vehicles to be disengaged easily without binding while stopped on uneven ground, or in a non-level, non-parallel position.

In embodiments, the stinger bar **46** couples to a tow hitch on a towing vehicle. Load couplings **50** comprising a left load coupling **52** and a right load coupling **54** which are provided at a respective second left tow bar terminal end **56** and a second right tow bar terminal end **58**. The load couplings **50** are configured to selectively couple the tow bar **10** to the towed vehicle **14** or trailer, or load, either by a cross bar (not shown) or directly to the load.

FIG. **2**D is a front side view of the tow bar **10**. In the embodiment depicted, the left tow arm **16** comprising the left outer tow arm **26** is visible. The upper protrusion of the left outer tow arm **26** houses the left automatic locking mechanism and the left cylinder lock handle **38** may be used to release the left automatic lock. The right tow arm **18** comprising the right outer tow arm **30** is also visible. The upper protrusion of the right outer tow arm **30** houses the right automatic locking mechanism and the right cylinder lock handle **36** may be used to release the right automatic lock. In the embodiment depicted in FIG. **2**D, the left tow arm **16** and the right tow arm **18** are parallel. The left tow arm **16** and the right tow arm **18** may pivot around the pivot pin **60**.

An exemplary embodiment of the invention in FIG. **3** depicts the tow bar **10** in operating position presenting a Y-shaped configuration. The left tow arm **16** and the right tow arm **18** may be adjustable such that the angle between the two is selectively changeable. The tow left tow arm **16** and right tow arm **18** may be adjusted to meet the requirements to tow a load of a particular width. The left load coupling **52** and the right load coupling **54** may also be adjusted to remain parallel with each other or to be angled to attach to the load to be towed at an angle dictated by a load attachment. The left load coupling **52** and the right load coupling **54** are provided at the respective second left tow bar terminal end **56** and the second right tow bar terminal end **58** to selectively couple tow bar **10** to the towed vehicle, trailer, or load, either by a cross bar (not shown) or directly to the load.

The left inner tow arm **24** and the right inner tow arm **28** may also be adjusted to provide a length exposed from the left outer tow arm **26** and the right outer tow arm **30** to allow another level of freedom while attaching the towed vehicle. When the towing vehicle moves forward, the left inner tow arm **24** and the right inner tow arm **28** may extend to a fully extended position thereby engaging the automatic locking mechanisms and locking the left inner tow arm **24** and the right inner tow arm **28** into place relative left outer tow arm **26** and right outer tow arm **30**. In embodiments, the left inner tow arm **24** and the right inner tow arm **28** may be rotatable in relation to the left outer tow arm **26** and the right outer tow arm **30** around their respective longitudinal axes. The left outer tow arm **26** and the right outer tow arm **30** extend from a respective left front outer tow arm end **62** and a front right outer tow arm end **64** to a respective aft left outer tow arm end **66** and an aft right outer tow bar end **68**.

In embodiments, lights may be mounted on or in the left outer tow arm **26** and the right outer tow arm **30**. The lights are connected using a spiral-wound flex cable **70**. Although a spiral-wound flex wire is depicted in the embodiments, a strait wire, or any other wire may be used. In embodiments, the left tow arm **16** and the right tow arm **18** are rotatably coupled to each other and to the yoke coupling **40** at a respective first left tow bar terminal end **42** and a first right tow bar terminal ends **44**. The yoke coupling **40** provides rotation of the left tow arm **16** and the right tow arm **18** about an axis defined by the pivot bolt **60**. Under standard operating procedure the axis defined by the pivot bolt **60** may be substantially vertical. The yoke coupling **40** also provides rotation of the two-axis rotatable coupling **48**, relative to the yoke coupling **40**, about an axis defined by a rotational coupling **72**. Under standard operating conditions the axis defined by the rotational coupling **72** may be substantially perpendicular to the axis defined by the pivot bolt **60**. The tow bar pivot bolt **60** and the rotational coupling **72** may be bolts, pins, bearings or any other attachment or combination of attachments that may allow free rotation or may be locked into place. The two-axis rotatable coupling **48** provides an axis of rotation that may be substantially perpendicular to the axes defined by the pivot bolt **60** and the rotational coupling **72** under normal operating procedure. The rotatable devices may be rotated about all axes simultaneously, two axes simultaneously, or each axis independently while one or two of the other couplings are locked.

Although a multi-axis linkage is used in embodiments it is not limiting. The lighting elements and the lighting strips along with any embodiments may be used with a fixed frame tow bar. A ball and coupler hitching mechanism, a one rotation axis, two rotation axes, or any other mechanism or combination of mechanisms may be used. The lighting elements and lighting strips may also be used with hitch extensions, electrical cable extensions, or any other combination of tow bars, hitches, and extensions that may be used.

In another exemplary embodiment depicted in FIG. **4**, each of the left outer tow arm **26** and the right outer tow arm **30** include a left interior support channel **74** and a right interior support channels **76**, respectively. The left interior support channel **74** and the right interior support channel **76** provide a shielded routing channel for safety cables **78** spanning between the towing vehicle **12** and the towed vehicle **14**, in case the primary towing couplings fail. It should be noted that the safety cables **78**, in embodiments, may or may not be necessary depending on the load, and/or regulations. The tow bar **10** may be fully operational with or without the safety cables **78**. The left interior support channel **74** and the right interior support channel **76**, respectively, also provide additional longitudinal/bending strength to the left outer tow arm **26** and the right outer tow arm **30**. A left interior channel **80** and a right interior channel **82** act as sleeve guides to receive and support the left inner tow arm **24** and the right inner tow arm **30**. Along with the safety cables **78**, also depicted in FIG. **4** is a multi-wire electrical

cable **84**. The multi-wire electrical cable carries electricity from the towing vehicle to the load. This provides the load with the necessary power and signals to operate lights, blinker, reverse lights, signals, cameras, reverse noise signals, or any other audio or visual indicators that may be necessary while towing a load. The multi-wire electrical cable may also be compatible with a Controller Area Network (CAN) bus. The multi-wire electrical cable **84** may run through a left interior electrical channel **86** in the left outer tow arm **26** and a right interior electrical channel **88** in the right outer tow arm left outer tow arm **26** most easily viewable in FIG. **6**. As depicted in the embodiment presented in FIG. **4**, the multi-wire electrical cable is running through the left interior electrical channel **86**. The left interior electrical channel **86** and the right interior electrical channel **88** may best be viewed in FIGS. **6** and **8**. The multi-wire electrical cable provides power and signals to a left light strip **90** on the left outer tow arm **26** and a right light strip **92** (not shown) on the right outer tow arm **30** left outer tow arm **26**. Also, depicted in FIG. **4**, is the left upper flange **32** overlapping the right upper flange **34**, and a stored locking mechanism **93**.

An exemplary embodiment depicted in FIG. **5**A presents the tow bar **10** in a stored position and an embodiment depicted in FIG. **5**B presents the yoke coupling **40**. The yoke coupling **40** includes an aft face **94** at an aft portion **96** for coupling to the tow bar **10** by way of the tow bar pivot bolt **60** providing a rotational connection for yaw, and to facilitate compact stowage. The rotational adjustability also provides for variation in the size and shape of loads that may be towed. A left projection **98** and a right projection **100**, with corresponding left and right horizontal through channels **102** and **104**, respectively, is configured to receive the rotational coupling **72** therethrough at a forward portion **106** of the yoke coupling **40**. The rotational coupling **72** rotatably couples the yoke coupling **40** to the two-axis rotatable coupling **48** as seen best in FIGS. **2**A-C and FIG. **3**. The two-axis rotatable coupling **48** may be coupled to the stinger bar **46** at the forward portion **106** further providing a pitch rotation relative to the yaw rotation provided by the pivot bolt **60**. The rotational coupling **72** may define the pitch rotation axis under ordinary use. Each of the left and the right projections **98** and **100** include a left lower shoulder projection **108** and a right lower shoulder projection **110**, respectively, projecting nominal to a bottom surface **112** and oriented at an angle to engage flush against the forward edge of a left lower flange arm **114** and a right lower flange arm **116**, respectively, depicted in FIG. **5**A, when fully rotated left or right. Each of the left projection **98** and the right projection **100** further include a side shoulder, a left side shoulder **118** and a right side shoulder **120** (not shown), projecting at an angle to engage flush against a respective left forward end **122** and a right forward end **124** of left outer tow arm **26** and the right outer tow arm **30**, respectively, when fully rotated left or right. The fully rotated position may facilitate a stowed configuration in which the tow bar is also raised into a vertical locked position perpendicular to the roadway. The stored locking mechanism **93** may interact with pivot bolt **60** to lock the tow bar in the stored vertical position.

The provision of a single-piece solid yoke, having at least two sets of shoulders arranged along the lateral sides and the bottom or top side which simultaneously impinge against the tow arms more evenly distributes the force transmitted during minimum radius turns, reducing torque forces around the longitudinal axes, and reducing the tendency of overlapping flanges to bow or buckle as the force is distributed between the outer flange edge faces and interior cylinder faces. In embodiments, the forward portion **106** includes a substantially parallel a left bottom surface **126** and a substantially parallel a right bottom surface **128**, respectively, to insert between and act as bearing surfaces against the left upper flange **32** and the right upper flange **34** as seen best in FIG. **2**A and the left lower flange arms **114** and the right lower flange arm **116**.

In embodiments, the right outer tow arm **30** includes an expanded left cross section **130**, depicted in an embodiment in FIG. **8**, and an expanded right cross section **132**, depicted in an embodiment in FIG. **6**, extending part of the length of the left outer tow arm **26** and the right outer tow arm **30**. In general, as depicted in FIGS. **6** and **8**, the expanded left cross section **130** and the expanded right cross section **132** provide increased strength, and include the interior channels **80**, **82**, and **74**, **76** and **86**, **88**. The left Interior channel **80** and the right interior channel **82** act as sleeve guides to receive and support the left inner tow arm **24** and the right inner tow arm **28** respectively. The left interior support channel **74** and the right interior support channel **76** provide a shielded routing channel for the safety cables **78** spanning between the towing vehicle **12** and the towed vehicle **14**. The left interior electrical channel **86** and the right interior electrical channel **88** provide a through channel for the multi-wire electrical cable **84**.

Turning now to an embodiment depicted in FIG. **6** featuring the expanded right cross section **132** of the right outer tow arm **30**. The right Interior electrical channel **88** may provide a shielded cableway for the multi-wire electrical cable **84**. In embodiments, the multi-wire electrical cable **84** may provide control communication between the lights, hazard lights, brake, tail, and turn signal light circuit in the towing vehicle and the lights, hazard lights, brake, tail, and turn signal lights in the load vehicle or between any electrical mechanism in the load and towing vehicles. The right interior channel **82** acts as sleeve guide to receive and support the right inner tow arm **28**. The right interior support channel **76** provides a shielded routing channel for the safety cables **78** spanning between the towing vehicle **12** and the towed vehicle **14**, in case the primary towing couplings fail. The right interior support channel **76** also provides additional longitudinal/bending strength to the left outer tow arm **26**. A right exterior channel **134** extends longitudinally along the exterior of the right outer tow arm **30**. The right exterior channel **134** may be partially enclosed by a right upper lip **136** and a right lower lip **138**. In embodiments, there may be one lip, either the right upper lip **136** or the right lower lip **138**. The right upper lip **136** and the right lower lip **138** may be adjustable by rotation or telescoping. The right upper lip **136** and the right lower lip **138** may span the full length of the right outer tow arm **30** or may only span the partial length of the right outer tow arm **30**. In embodiments, the right exterior channel **134** may house the right light strip **92**. The right upper lip **136** and the right lower lip **138** may aid in securing the right light strip **92** in the right exterior channel **134**. In embodiments, there may be no lips and the right light strip **92** may be held in place by an adhesive such as glue, tape, surface area adhesive, or any other such adhesive that may hold the right light strip **92** in the right exterior channel **134**. The right light strip **92** may also be held in the right exterior channel **134** and protected by a cover. The cover may be plastic, glass, decorative, customizable, or any other transparent or translucent cover. In alternative embodiments, there may be flange arms attached to the right outer tow arm **30**.

In embodiments, the lighting elements **142** may not be disposed within lighting strips **90** and **92**. The light elements **142** also may be added on to the tow bar **10** rather than being disposed within a channel. The lighting elements **142** may be independently displayed or may be one, two, three, or any amount of lighting elements displayed on any one or any combination of sides of the tow bar **10**. The lighting elements **142** may be LED, incandescent, halogen, helium, lithium, neon, laser, or any kind of bulb, gas, or filament that may be visible and attached to the tow bar **10**. The lighting elements may be attached by bolts, screw, claps, wires, adhesives, or any other method that may securely attach the lighting elements **142** to the tow bar **10**.

Referring to the exemplary embodiment depicted in FIG. **7**. The right exterior channel **134** and a left exterior channel **140** extend longitudinally along the exterior of respective left outer tow arm **26** and the right outer tow arm **30**, may be configured to receive the left light strip **90** and the right light strip **92**. In embodiments, the left light strip **90** and the right light strip **92** are low-voltage LED light strips which include a plurality of LED lighting elements **142**. In embodiments, the left exterior channel **140** and the right exterior channel **134** may be angled downward, at approximately 45 degrees, thereby angling the left light strip **90** and the right light strip **92** downward. The right exterior channel **134** and the left exterior channel **140** may be angle downward at any other angle or may not be angle and yet further may be angled upward. Display of the left light strip **90** and the right light strip **92** to passengers of other vehicles may be performed in any way that enables the passengers to best view the lights.

The left exterior channel **140** and the right exterior channel **134** may be disposed on any side of the left outer tow arm **26** and the right outer tow arm **30**, respectively. The left exterior channel **140** and the right exterior channel **134** housing the left light strip **90** and the right lighting strip **92** may be on the top, bottom, or either the inside or the outside of the left outer tow arms **26** and right outer tow arm **30**, respectively. Channels may also be on any combination of sides or there may be multiple channels allowing for light strips to be on multiple sides, or combination of top, bottom, and sides, including all top, bottom, and sides, simultaneously.

The lighting elements **142** may be LED, incandescent, halogen, helium, lithium, neon, laser, or any kind of bulb, gas, or filament that may be visible and small enough for the intended purpose. The lighting elements may be any color of light or may be a tinted cover or film providing a colored display of the light. The lights may be indicative of the mode of operation of the vehicle such as lighting, braking, turning, reversing, engaging hazard lights, or any other mode that may be indicated. The lighting elements may illuminate in sequence or may be preprogrammed.

Continuing with the exemplary embodiment depicted in FIG. **7**, alternative control schemes could also be utilized. The individual lighting elements **142**, or groups thereof, could be independently controlled, with some elements mimicking the condition of the towing car tail lights, some mimicking the brake lights, some mimicking the turn signals, and/or emitting a different pattern depending on conditions, such as a cascading sequence, blinking or lighting according to a preprogrammed pattern. The lighting elements **142** could emit different color light under specified conditions, such as red for braking and amber for turn signals. Such control can be provided directly from an auxiliary brake system controller by spliced cables, or by an intelligent signal to an LED strip controller mounted coextensively with the left and right light strips **90** and **92**. The multi-wire electrical cable **84** couple the brake, tail and signal light circuits in the towing vehicle to auxiliary indicators attached to the load and/or to an auxiliary/remote braking system installed in a load vehicle.

Though the lighting elements **142** depicted in FIG. **7** are disposed within the left and right lighting strips **90** and **92**, the lighting elements **142** may be disposed on the tow bar **10** not in a strip. The lighting elements may be independent and may have multiple lights disposed on the left and right outer tow arms **26** and **30**. The lighting elements **142** may be independently displayed or may be one, two, three, or any amount of lighting elements displayed on any one or any combination of sides of the tow bar **10**. The lighting elements **142** may be LED, incandescent, halogen, helium, lithium, neon, laser, or any kind of bulb, gas, or filament that may be visible and attached to the tow bar **10**. The lighting elements may be attached by bolts, screw, claps, wires, adhesives, or any other method that may securely attach the lighting elements **142** to the tow bar **10**.

A spliced cable **144** may be spliced into the multi-wire electrical cable **84** and electrically connects to the light strips **90** and **92**, such that the left and right light strips **90** and **92** mimic the condition of the tail lights of the towing vehicle **12** (i.e. on, off, blinking). In embodiments, the spiral-wound flex, or straight cable **70** couples the left and right light strips **90** and **92**, which may be light emitting diodes. In embodiments, the spiral-wound flex cable **70** is routed between the left upper flange **32** and the left lower flange arms **114**. A splice region **146** may be located in a protected region of either, or both, the left and the right interior electrical channels **86** and **88**.

Turning now to FIG. **8** depicting an embodiment of the left outer tow arm **26**, the left cross section **130**, the left upper flange **32**, and the left lower flange **114**. In embodiments, each of the left and the right outer tow arms **26** and **30** include left upper flange **32** and the right upper flange **34** and opposed the left and the right lower flange arms **114** and **116** extending from the left and right outer tow arms **26** and **30** proximate first left tow bar terminal end **42** and the first right tow bar terminal end **44**. Though the left outer tow arm **26** is depicted in FIG. **8**, it should be noted that the right outer tow arm **30** may have corresponding features as those described herein, and may be similar to, or a mirror image of, the left outer tow arm **26** with the left upper flange **32** and the right upper flange **34** overlapping in the region of the yoke coupling **40** and the left lower flange arm **114** and the right lower flange arm **116** overlapping in the region of yoke coupling **40**. Overlapping of the left lower flange arm **114** and the right lower flange arm **116** can be seen in FIG. **5**A and the overlapping of the left upper flange **32** and the right upper flange **34** can be seen in FIGS. **2**A-D.

A cross section view of an embodiment of the left outer tow arm **26** is depicted in FIG. **8**. In embodiments, the left interior electrical channel **86** provides a protected cableway for the multi-wire electrical cable **84**. The cross section of left interior electrical channel **86** may be ovoid, roughly egg-shaped, with the narrow portion continuing beyond the expanded left cross section **130** to form a left cable recess channel **148** extending along the bottom of the left outer tow arm **26**. A right cable recess channel **150** may extend along the right outer tow arm **30**. The left interior channel **80** acts as sleeve guide to receive and support the inner tow arm **22**. The left interior support channel **74** provides a shielded routing channel for the safety cables **78** spanning between the towing vehicle **12** and the load **14**, in case the primary tow couplings fail. The left interior support channel **74** also

provides additional longitudinal/bending strength to the outer tow arm **20**. The left exterior channel **140** extends longitudinally along the exterior of the left outer tow arm **26** to receive the light strip **90**. The left exterior channel **140** may be partially enclosed by a left upper lip **152** and a left lower lip **154**. In embodiments, there may be one left upper lip **152** or one left lower lip **154**. The lips left upper lip **152** and the left lower lip **154** may be adjustable by rotation or telescoping. The left upper lip **152** and the left lower lip **154** may span the full length of the left outer tow arm **26** or may only span a partial length of the left outer tow arm **26**. In other embodiments, there may be no lips and the light strip **90** may be held in place by an adhesive such as glue, tape, surface area adhesive, or any other such adhesive that may hold the light strip **90** in the left exterior channel **140**. The light strip **90** may also be held in the left exterior channel **140** and protected by a cover. The cover may be plastic, glass, decorative, customizable, or any other transparent or translucent cover.

Referring to FIGS. **4**, **5**A-B, **6** and **8**, in embodiments, the left outer tow arm **26** includes the left cable recess channel **148** extending from proximate the left front outer tow arm forward end **62** to proximate the aft left outer tow arm end **66**. The right outer tow arm **30** includes the right cable recess channel **150** extending from proximate right front outer tow arm end **64** to proximate the aft right outer tow arm end **68** as depicted in FIG. **5**A, which routes and protects the spliced cable **144** providing electrical connection from the spiral-wound flexible cable **70** to the left light strip **90** and the right light strip **92**. A cutaway notch (not shown) is provided at the forward end of the left cable recess channel **148** as depicted in FIG. **8**, to prevent cables being crushed between the left front outer tow arm end **62** and the right front outer tow arm end **64**. The yoke coupling **40** contacts surfaces lower shoulder projections **97** and **99** (not shown) and the left lower shoulder projection **108** and the right lower shoulder projection **110** in FIG. **5**B. A cutaway notch may be provided at the forward end of each the left exterior channel **140** and the right exterior channel **134**. In embodiments, the left lower flange arm **114** and the right lower flange arm **116** overlap the forward portion of the left cable recess channel **148** as shown in FIG. **8**, and the right cable recess channel **150** (not shown).

In embodiments, each and every feature of the left outer tow arm **26** may have similar corresponding components on the opposing right outer tow arm **30**. The left outer tow arm **26** and the right outer tow arm **30** may be similar, or mirror images of each other, or the left outer tow arm **26** may have components that the right outer tow arm **30** does not have, or vice versa.

In embodiments, the multi-wire electrical cables **84** couples the brake, tail and signal light circuits and ground wires in the towing vehicle to auxiliary indicators attached to the load and/or to an auxiliary/remote braking system installed in a load vehicle. In embodiments, the left interior electrical channel **86** and right interior electrical channel **88** incorporate and expand from the left cable recess channel **148** and the right cable recess channel **150**, creating ovoid-shaped cross sections. The ovoid-shaped cross sections provide a snug fitting channel to route the multi-wire cable **84** with the spliced cable **144** alongside, and with the splice region **146** in a protected location within the left interior electrical channel **86** and the right interior electrical channel **88**. In embodiments, pressure-relieving grommet seals (not shown) are provided at the forward and aft outlets of the left interior electrical channel **86** and the right interior electric channel **88**. The grommet seals may be rubber, plastic, silicone or any other type seal that provides protection to electrical cables. The grommet seals may wrap around the cables and be cinched or may be connected to the wall of the channel. Further, the multi-wire electrical cable **84** and the spliced cable **144** may be wrapped together or separate in a heat shrink wrap or seal. Tinning may be performed on the wires before sealing to add yet a further layer of water protection. Silicone or other sealant may be injected into heat shrink seal around the spliced cable **144**, where the multi-wire electrical cable **84** is spliced into the spliced cable **144**, for further protection.

FIG. **9** depicts a side view of an embodiment of the left outer tow arm **26**. The left light strip **90** presenting the lighting elements **142** are visible. The left outer tow arm **26** comprises the left upper flange **32** and the left lower flange arm **114**, a first upper left portion **156** and a first lower left portion **158**, and a second upper left portion **160** and a second lower left portion **162**. It should be noted that, though not shown, the right outer tow arm **30** may have similar corresponding components, namely: the upper right flange arm **34** and the right lower flange arm **116** extend from a respective first upper right portion **164** and a second upper right portion **168**, respectively, connected to the right outer tow arm **30**, to a respective first lower right portion **166** and a second lower right portion **170**.

The left flange arm second upper left portion **160** and the corresponding second upper right portion **168** from the right outer tow arm **30** overlap in the region that they couple to the yoke coupling **40**. The right lower flange arm **116** second lower right portion **170** and corresponding structure from the left lower flange arm **114**, the second upper left portion **160**, overlap in the region where they couple to the yoke coupling **40**. The overlapping regions are received between the overlapping the left upper flange **32** and the right upper flange **34** and between the left lower flange arm **114** and the right lower flange arm **116**.

Those skilled in the art will recognize that numerous modifications and changes may be made to the preferred embodiment without departing from the scope of the claimed invention. It will, of course, be understood that modifications of the invention, in its various aspects, will be apparent to those skilled in the art, some being apparent only after study, others being matters of routine mechanical, chemical and electronic design. No single feature, function or property of the preferred embodiment is essential. Other embodiments are possible, their specific designs depending upon the particular application. As such, the scope of the invention should not be limited by the particular embodiments herein described but should be defined only by the appended claims and equivalents thereof.

Many different arrangements of the various components depicted, as well as components not shown, are possible without departing from the scope of the claims below. Embodiments of the invention have been described with the intent to be illustrative rather than restrictive. Alternative embodiments will become apparent to readers of this disclosure after and because of reading it. Alternative means of implementing the aforementioned can be completed without departing from the scope of the claims below. Certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations and are contemplated within the scope of the claims. Although the invention has been described with reference to the embodiments illustrated in the attached drawing figures, it is noted that equivalents may be employed and substitutions made herein without departing from the scope of the invention as recited in the claims.

Having thus described various embodiments of the invention, what is claimed as new and desired to be protected by Letters Patent includes the following:

1. A tow bar assembly, comprising:
an outer tow arm having a proximal end and a distal end,
wherein the proximal end of the outer tow arm is configured to attach to a linkage,
wherein the linkage is configured to attach to a towing vehicle;
an inner tow arm having a proximal end of the inner tow arm and a distal end of the inner tow arm,
wherein the proximal end of the inner tow arm is telescopically disposed within the outer tow arm at the distal end of the outer tow arm,
wherein the distal end of the inner tow arm is configured to attach to a load;
an exterior channel spanning a length of the outer tow arm on at least one side; and
a light strip disposed within the exterior channel comprising lighting elements,
wherein the lighting elements illuminate indicative of a mode of operation of the towing vehicle.

2. The tow bar assembly of claim **1**, wherein the lighting elements are Light Emitting Diodes.

3. The tow bar assembly of claim **1**, wherein the mode of operation of the towing vehicle is turning.

4. The tow bar assembly of claim **1**, wherein the outer tow arm comprises an upper flange and a lower flange configured to couple to the linkage.

5. The tow bar assembly of claim **4**,
wherein the linkage comprises a yoke coupled to the upper and lower flanges by a first coupling,
wherein the first coupling provides a first axis of rotation.

6. The tow bar assembly of claim **5**,
wherein the yoke is coupled to a two-axis coupling by a second coupling,
wherein the second coupling provides a second axis of rotation perpendicular to the first axis of rotation,
wherein the two-axis coupling provides a third axis of rotation perpendicular to the first axis of rotation and the second axis of rotation.

7. The tow bar assembly of claim **5**, wherein the flanges contact the yoke to stop the rotation of the tow bar relative to the tow during sharp turns.

8. The tow bar assembly of claim **1**, wherein the light strip is covered with a transparent cover.

9. A tow bar assembly, comprising:
a tow arm having a proximal end and a distal end,
wherein the proximal end of the tow arm is configured to attach to a linkage,
wherein the linkage is configured to attach to a towing vehicle,
wherein the distal end of the tow arm is configured to attach to a load;
a lighting element disposed on the tow arm;
a first interior channel disposed within the tow arm for housing electrical cables; and
a second interior channel disposed within the tow arm for housing tow cables.

10. The tow bar assembly of claim **9**, wherein the linkage comprises at least two rotatable couplings configured to separate the towing vehicle and the tow bar by at least two axes of rotation.

11. The tow bar assembly of claim **9**,
wherein an illumination of the lighting elements is indicative of a mode of operation of the vehicle;
wherein the mode of operation of the vehicle is braking.

12. The tow bar assembly of claim **9**, wherein the electrical cables provide power to the lighting element.

13. The tow bar assembly of claim **9**, wherein the lighting element illuminates according to a preprogrammed sequence.

14. A tow bar assembly, comprising:
an outer tow arm having a proximal end and a distal end,
wherein the proximal end of the outer tow arm is configured to attach to a linkage,
wherein the linkage is configured to attach to a towing vehicle;
an inner tow arm having a proximal end of the inner tow arm and a distal end of the inner tow arm,
wherein the proximal end of the inner tow arm is telescopically disposed within the outer tow arm at the distal end of the outer tow arm,
wherein the distal end of the inner tow arm is configured to attach to a load;
at least one lighting element disposed on the outer tow arm.

15. The tow bar assembly of claim **14**, wherein the at least one lighting element illuminates indicative of a mode of operation of the towing vehicle.

16. The tow bar assembly of claim **14**, wherein the mode of operation is reversing.

17. The tow bar assembly of claim **14**, wherein the at least one lighting element is disposed within a lighting strip.

18. The tow bar assembly of claim **17**, wherein the light strip is partially enclosed by at least one lip protruding from an edge of the exterior channel.

19. The tow bar assembly of claim **14**, wherein the outer tow arm further comprises a first channel configured to house electrical wiring providing power and signals for the light strip and the load.

20. The tow bar assembly of claim **19**, wherein the outer tow arm further comprises a second channel configured to house safety cables spanning from the towing vehicle to the load.

* * * * *