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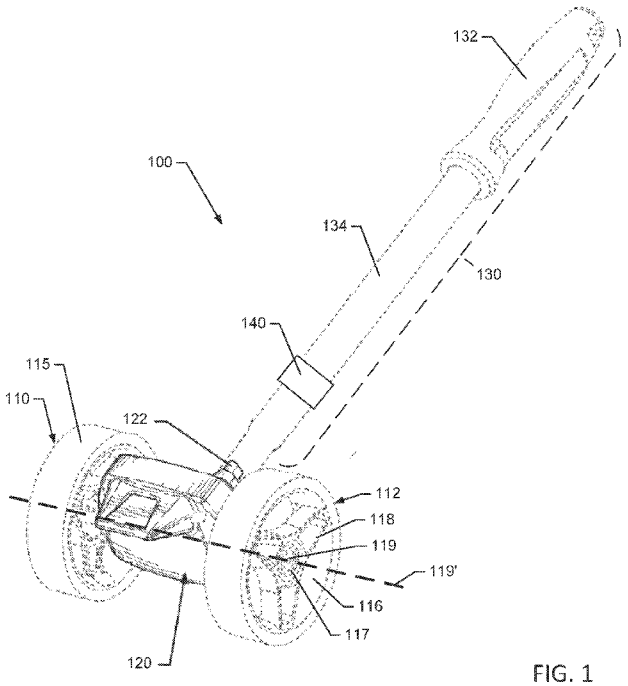


FIG. 1

(57) Abstract: A measuring wheel may include a wheel assembly which may include at least one wheel, a handle assembly which may include a handle and a shaft, and a housing to which the handle assembly and the wheel assembly may be operably coupled. The shaft may include a first tube and a second tube which may be telescopically operably coupled to one another at an extension joint. The extension joint may be operable between a locked position in which the shaft may be fixed in place and an unlocked position in which the shaft may telescope to change a length of the shaft. The extension joint may include a collar, a cam lever and a pin. The collar may extend around an exterior surface of the shaft. The cam lever may be pivotably operably coupled to the collar via the pin.

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MEASURING WHEEL WITH TELESCOPING HANDLE

TECHNICAL FIELD

Example embodiments generally relate to measuring equipment and, in particular, relate to a measuring device having a telescoping handle.

BACKGROUND

Typical measuring tools such as wheeled markers and measuring wheels may be used in surveying, sports, and other activities. Some measuring wheels may have a shaft that extends upwardly from a wheel assembly to allow the operator to control the measuring wheel. Certain capabilities for starting, stopping and resetting measuring functions may be executable at the handle the operator grasps, or at a housing provided proximate to the wheel assembly. Other functions may also be provided at the housing or at the handle. However, when the measuring wheel is under positive control of the operator, the operator may need to adjust the height of the handle in order to operate the measuring wheel effectively. Thus, adjusting the height of the handle should not be an arduous task, and should be doable quickly, anywhere, and without the use of tools.

When the measuring wheel is not under the positive control of the operator, the measuring wheel may be hung for storage or it may include a fixed stand to stand on its own. Therefore, it may be desirable to adjust the handle height for storage of the measuring wheel to ensure that the measuring wheel is not taking up more space than would otherwise be preferred.

Thus, it may be desirable to provide a new design for a telescoping handle for a measuring wheel with an improved latch to allow the handle to be adjusted.

BRIEF SUMMARY OF SOME EXAMPLES

Some example embodiments may provide for a measuring wheel. The measuring wheel may include a wheel assembly which may include at least one wheel, a handle assembly which may include a handle and a shaft, and a housing to which the handle assembly and the wheel assembly may be operably coupled. The shaft may include a first tube and a second tube which may be telescopically operably coupled to one another at an extension joint. The extension joint may be operable between a locked position in which the shaft may be fixed in place and an unlocked position in which the shaft may telescope to

change a length of the shaft. The extension joint may include a collar, a cam lever and a pin. The collar may extend around an exterior surface of the shaft. The cam lever may be pivotably operably coupled to the collar via the pin.

In another example embodiment, a handle assembly for a measuring wheel may be provided. The handle assembly may include a handle which may be disposed at a first end of the handle assembly, a shaft which may operably couple the handle to a housing disposed at a distal end of the shaft, to which a wheel assembly may be operably coupled, and an extension joint which may be disposed on the shaft between the housing and the handle. The shaft may include a first tube and a second tube which may be telescopically operably coupled to one another at the extension joint. The extension joint may be operable between a locked position in which the shaft may be fixed in place and an unlocked position in which the shaft may telescope to change a length of the shaft. The extension joint may include a collar, a cam lever and a pin. The collar may extend around an exterior surface of the shaft. The cam lever may be pivotably operably coupled to the collar via the pin.

In another example embodiment, a measuring wheel may be provided. The measuring wheel may include a wheel assembly which may include at least one wheel, a handle assembly which may include a handle and a shaft, and a housing to which the handle assembly and the wheel assembly may be operably coupled. The shaft may include a first tube and a second tube which may be telescopically operably coupled to one another at an extension joint. The extension joint may be operable between a locked position in which the shaft may be fixed in place and an unlocked position in which the shaft may telescope to change a length of the shaft. The extension joint may consist essentially of a one-piece collar, a one-piece cam lever, and a one-piece pin. The collar may extend around an exterior surface of the shaft. The cam lever is pivotably operably coupled to the collar via the pin.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

Having thus described some example embodiments in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

FIG. 1 illustrates a perspective view of a measuring wheel according to an example embodiment;

FIG. 2 illustrates a perspective view of an extension joint according to an example embodiment;

FIG. 3 illustrates a side perspective view of a collar of the extension joint according to an example embodiment;

FIG. 4 illustrates a perspective view of the cam lever of the extension joint according to an example embodiment;

FIG. 5 illustrates a perspective view of the extension joint according to an example embodiment;

FIG. 6 illustrates a perspective view of the extension joint disposed on a shaft according to an example embodiment; and

FIG. 7 illustrates a section view of the collar disposed on the shaft according to an example embodiment.

DETAILED DESCRIPTION

Some example embodiments now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all example embodiments are shown. Indeed, the examples described and pictured herein should not be construed as being limiting as to the scope, applicability or configuration of the present disclosure. Rather, these example embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like reference numerals refer to like elements throughout. Furthermore, as used herein, the term "or" is to be interpreted as a logical operator that results in true whenever one or more of its operands are true. As used herein, operable coupling should be understood to relate to direct or indirect connection that, in either case, enables functional interconnection of components that are operably coupled to each other.

FIG. 1 illustrates a perspective view of the measuring wheel 100 in accordance with an example embodiment. FIGS. 2-7 illustrate other views of an extension joint 140 to facilitate further discussion of the structures associated with the measuring wheel 100 in accordance with example embodiments. In FIGS. 1-7, some portions of the measuring wheel 100 are shown in dashed lines merely to distinguish various portions of the measuring wheel 100. The dashed lines have no other significance.

The measuring wheel 100 may include a first wheel 110, a housing 120, and a handle assembly 130. In some cases, the measuring wheel 100 may include a second wheel 112 which may combine with the first wheel 110 to define a wheel assembly, while in some other cases, the wheel assembly may only include the first wheel 110. The first and second wheels 110 and 112 may, in some embodiments, each include a tire portion 115 which may surround a rim portion 116. However, the rim portion 116 and the tire portion 115 could be combined in some examples. If a rim portion 116 is included, the rim portion 116 may be operably coupled to a wheel hub 117 via one or more spoke assemblies 118. The spoke assemblies 118

may include individual spoke members that are disposed to form at least three spoke assemblies 118 that are spaced apart from each other. The spoke assemblies 118 may combine to form a Y shape, with three similarly shaped structures extending between the wheel hub 117 and the rim portion 116. In an example embodiment, an axis of rotation 119 may be defined for each of the first and second wheels 110 and 112. The axis of rotation 119 may be defined to extend along or through a wheel axle 119' about which the first and second wheels 110 and 112 turn.

The wheel axle 119' about which the first and second wheels 110 and 112 turn may extend through a housing 120 that may house one or more functional components of the measuring wheel 100. The functional components may include a function button 122 and/or a display. The function button 122 may be used to control the operation of an accessory that may be housed in or otherwise operably coupled to the housing 120. The accessory may be, for example, a counter, a marking device, a pneumatic tool, a camera, or the like. In an example embodiment in which the accessory is a marking device, the marking device may include chalk, paint and/or the like. In an example embodiment in which the accessory is a pneumatic tool, the accessory may be, for example, a stake driver, nail gun, or the like. The operator may depress the function button 122 to start the performance of a function (e.g., counting, applying a marking, etc.) and release the function button 122 to stop the performance of the function. However, in other instances, the function button 122 may operate to reset a counter or start/stop various other functions of the measuring wheel 100.

In some cases, the function button 122 may energize/de-energize the display and/or reset the information displayed thereon. The display may be a digital display or an analog display that includes numerals mounted to rotating wheels connected to each other by gears.

In some embodiments, the measuring wheel 100 may include a distance counter disposed within the housing 120, and operably coupled to the display. The distance counter may be configured to determine a distance, such as the travel distance of the measuring wheel 100. The distance counter may be gear driven with operable coupling to one or both of the first and second wheels 110 and 112 to provide distance determination based on the number of revolutions made by the one or both of the first and second wheels 110 and 112. In an example embodiment, the measuring wheel 100 may include a wheel lock to inhibit travel of the first and second wheels 110 and 112 when the distance counter is not activated, or when the measuring wheel 100 is in a rest state (i.e., a non-operational state).

The measuring wheel 100 may also include a handle assembly 130 that may be defined by a handle 132 and a shaft 134. The handle 132 may be disposed at a distal end of

the shaft 134 from the housing 120, proximate to an operator of the measuring wheel 100 so that the operator may operate the measuring wheel 100 appropriately. In some cases, the handle assembly 130 may further include one or more extension joints 140, which may allow the shaft 134 to be extended or contracted in length. In this regard, the shaft 134 may, in examples that employ the extension joint 140, include two or more tubes that may telescope relative to each other to change the length of the shaft 134 via one or more extension joints 140. Accordingly, each extension joint 140 may be operable between a locked position and an unlocked position to fix and release the shaft 134, respectively. In an example embodiment, the direction of extension of the shaft 134 may be substantially perpendicular to the wheel axle 129' about which the first and second wheels 110 and 112 turn.

FIGS. 2-7 depict various views of the extension joint 140, according to an example embodiment. In the embodiment of FIGS. 2-7, the extension joint 140 may include a collar 150, a cam lever 160 and a pin 170. In an example embodiment, the collar 150 may be disposed around an exterior surface of the shaft 134. In an example embodiment, the shaft 134 may be cylindrical and thus its exterior surface may accordingly be circular. In some other cases, the shaft 134 may be substantially rounded rectangular, and in still some other cases, the shaft 134 could be rectangular, hexagonal or any other suitable cross sectional shape. In any case, the collar 150 may be shaped to extend around, and operably couple to, the exterior surface of the shaft 134. In an example embodiment, the extension joint 140 consists only of or consists essentially of a one-piece collar 150, a one-piece cam lever 160, and a one-piece pin 170, resulting in advantages of lower cost and/or improved ease of manufacture compared to conventional measuring wheel 100 adjustable handle 132 designs.

In particular, FIG. 2 depicts a perspective view of the extension joint 140, in accordance with an example embodiment. The cam lever 160 may be operably coupled to the collar 150 via the pin 170. In this regard, the cam lever 160 may be pivotable relative to the collar 150 about a pivot axis 175 that may extend axially through the pin 170. The pin 170 may operably couple the cam lever 160 to the collar 150 in a hinge-like fashion. For example, in some cases, the collar 150 may include a first projection 152 and a second projection 154 which may each be disposed on an outer surface of the collar 150. The first and second projections (152, 154) may each include a bore 155 to receive the pin 170 there through. The first and second projections (152, 154) may be spaced apart so that the cam lever 160 may fit between the first and second projections (152, 154), perhaps like knuckles on a hinge. In this regard, the cam lever 160 may also include a bore 165 disposed therein proximate to a first end of the cam lever 160 that may operably couple to the collar 150. Accordingly, the cam

lever 160 may be inserted between the first and second projections (152, 154) and aligned with the first and second projections (152, 154) along their respective bores (155, 165) so that the pin 170 may be inserted into the aligned bores (155, 165) to operably couple the cam lever 160 to the collar 150. Accordingly, the cam lever 160 may pivot with respect to the collar 150 about the pivot axis 175 disposed axially along the pin 170.

Thus the first end of the cam lever 160 may be proximate to the collar 150. At a second end of the cam lever 160, distal from the first end, the cam lever 160 may include a contact point 162 at which the operator of the measuring wheel 100 may grasp the cam lever 160 to pivot the cam lever 160 relative to the collar 150. As such, the contact point 162 may allow the operator to pivot the cam lever 160 with ease due to the contact point 162 providing increased leverage on the cam lever 160 as a result of the arcuate shape of the cam lever 160. In this regard, the cam lever 160 may be pivotable relative to the collar 150 with relative ease by the operator requiring only their hand and no additional tools.

The extension joint 140, as described above, may be operable between locked and unlocked positions. In other words, the cam lever 160 may be pivoted between the locked and unlocked positions. In this regard, when the cam lever 160 is pivoted proximate to the collar 150, the extension joint 140 may be in the locked position. With the cam lever 160 in the locked position, the shaft 134 may be fixed in place by the extension joint 140, and may not be adjustable. On the other hand, with the cam lever 160 pivoted out away from the collar 150, the extension joint 140 may be in the unlocked position. With the cam lever 160 in the unlocked position, the shaft 134 may be adjustable, and may not be fixed in place by the extension joint 140.

FIG. 3 depicts a side view of the collar 150, according to an example embodiment, and FIG. 4 depicts a perspective view of the cam lever 160, according to an example embodiment. As seen in FIG. 3, the collar 150 may include a locking tab 156 and as seen in FIG. 4, the cam lever 160 may include a cam lobe 164. In an example embodiment, the locking tab 156 may be formed from the same material as the collar 150 and may be rectangular in shape. In this regard, the locking tab 156 may be integrally connected to the collar 150 at a single side of the rectangular shape. The three other sides of the locking tab 156 may therefore be free. As such, the locking tab 156 can be thought of as a cantilevered beam, with the locking tab 156 being depressible towards the interior of the collar 150 at a distal end of the locking tab 156 from its fixed connection to the collar 150. In this regard, for example, the locking tab 156 may behave with spring-like properties. In some cases, however, the locking tab 156 may not be rectangular. The locking tab 156 may be any

suitable shape for behaving in a similar manner and being depressible in towards the shaft 134 which may be disposed at an interior region of the collar 150.

The cam lever 160, as depicted in FIG. 4, may include a cam lobe 164. The cam lobe 164 may simply be a protrusion on the cam lever 160 proximate to the bore 165. As such, as the cam lever 160 pivots about the pivot axis 175 (that extends through the bore 165) the cam lobe 164 may come into contact with the locking tab 156 at a threshold angle of the cam lever 160 relative to the collar 150. This threshold angle may define the transition point between the locked and unlocked positions of the cam lever 160. In this regard, responsive to the cam lever 160 being pivoted into the locked position, the cam lobe 164 may contact the locking tab 156 and accordingly apply a force to the locking tab 156 as a result. The force from the cam lobe 164 pushing on the locking tab 156 may bias the locking tab 156 into the collar 150 and thus into contact with the shaft 134 disposed therein. Thus, the locking tab 156 may force the shaft 134 into an opposing inner wall of the collar 150, which may generate a friction force between the shaft 134, the collar 150, and the locking tab 156. The friction generated between the locking tab 156 and the shaft 134 due to the biasing force of the cam lobe 164 may accordingly fix the shaft 134 in place and prohibit the shaft 134 from being adjusted. On the other hand, with the cam lever 160 in the unlocked position, the cam lobe 164 may not contact the locking tab 156 and thus the locking tab 156 may not be biased into the shaft 134 to fix the shaft 134 in place. Thus, the shaft 134 may be adjusted accordingly with the extension joint 140 in the unlocked position. In order to maximize the contact area between the shaft 134 and the locking tab 156, and thus maximize the coefficient of friction between the shaft 134 and the locking tab 156, the locking tab 156 may be shaped to conform to the exterior shape of the shaft 134. Thus, in the example embodiment shown in FIGS. 2, 5, and 7 herein, the locking tab 156 may be arcuate.

FIG. 5 shows perspective view of the extension joint 140, from which the interior of the collar 150 may be visible, according to an example embodiment. In the embodiment of FIG. 5, the collar 150 may include an engagement assembly 180 to operably couple the collar 150 to the shaft 134. In this regard, the collar 150 may operably couple a first tube 190 and a second tube 200 of the shaft 134 together in a telescopic manner. In an example embodiment, the first tube 190 may be operably coupled to the collar 150 at a first end and operably coupled to the handle 132 at a second end, and the second tube 200 may be operably coupled to the housing 120 at a first end and operably coupled to the collar 150 at a second end. In some cases, the first tube 190 may be operably coupled to the collar 150 via the engagement assembly 180.

The engagement assembly 180 may include a first clip 182 and a second clip 184 that may operably couple with a first indentation and a second indentation disposed on the first tube 190 of the shaft 134. Accordingly, the first and second clips (182, 184) of the engagement assembly 180 at the collar 150 may operably couple to the first and second indentations or apertures on the first tube 190 with a snap fit. In an example embodiment, the first and second clips (182, 184) may be disposed on opposite sides of the collar 150 from each other. In this regard, the first tube 190 may be installed into the engagement assembly 180 of the collar 150 simply by sliding the first tube into place, but the first tube 190 may not be removed from the engagement assembly 180 of the collar 150 without deliberately opening the first and second clips (182, 184) to free the first tube 190. Therefore, the first tube 190 may be fixed relative to the collar 150, and the second tube 200 may telescope into an interior region of the first tube 190 accordingly. As such, the locking tab 156 may bias into contact with the second tube 200, since the second tube 200 moves relative to the first tube 190 and the first tube 190 may remain fixed in the engagement assembly 180. In example embodiments, the first and second clips (182, 184) may be integrally formed with other portions of the collar 150 and may be made of a resilient material allowing them to bend slightly and snap back into the indentations or apertures to couple to the first tube 190 via a snap fit. In example embodiments, the engagement assembly 180 may be operably coupled to the first tube 190 via one or more of the clips (182, 184) only, and no glues or other fasteners may be used to couple the engagement assembly 180 to the first tube 190. It will be appreciated that such embodiments may have a significant advantage in reduced cost and ease of manufacturing relative to conventional designs.

FIG. 6 depicts a perspective view of the extension joint 140 shown attached to the shaft 134, in accordance with an example embodiment. As mentioned above, the extension joint 140, but more particularly the collar 150, may operably couple a first tube 190 and a second tube 200 of the shaft 134 together in a telescopic manner. In this regard, the first tube 190 may accommodate the second tube 200 inside of the first tube 190 responsive to the shaft 134 being shortened. The collar 150 may retain the second tube 200 proximate to the first tube 190 responsive to the shaft 134 being extended. The second tube 200 may have an enlarged outer diameter 205 at the second end of the second tube 200 to keep the second tube 200 operably coupled to the collar 150 and prevent the second tube 200 from sliding out of the collar 150.

FIG. 7 depicts a section view of the extension joint 140 according to an example embodiment. In FIG. 7, the enlarged outer diameter 205 of the second tube 200 may be

disposed above the first and second retention lips (210, 212). The first and second retention lips (210, 212) may support the first end of the first tube 190 and the second end of the second tube 200. In this regard, the first and second retention lips (210, 212) may act as a stop for the second tube 200, and may define a point of maximum extension for the shaft 134. In other words, the collar 150 may include a first inner diameter surrounding the second tube 200, and a second inner diameter surrounding the first tube 190. The first and second retention lips (210, 212) may be disposed at a transition between the first and second inner diameters of the collar 150. In this regard, the first inner diameter may be less than (i.e. smaller than) the second inner diameter. The enlarged diameter 205 may be greater than (i.e. larger than) the first inner diameter and smaller than the second inner diameter.

Thus, as described above, the locking tab 156 may be depressible by the cam lobe 164 in a direction towards the second tube 200, as indicated by arrow 220. The locking tab 156 may thereby reduce the effective first inner diameter and may apply a pinching force to the second tube 200 between the locking tab 156 and the collar 150 to fix the second tube 200 in place. By fixing the second tube 200 in place, the locking tab 156 may prevent the second tube 200 from telescoping into or out of the first tube 190 to adjust the length of the handle assembly 130. In an example embodiment, the enlarged outer diameter of the second tube 200 may have a 90° transition as shown in FIG. 7. In some other cases, the enlarged outer diameter of the second tube 200 may be more flared and gradually increase in diameter from the main portion of the second tube 200. In still some other cases, the second tube 200 may simply include a pair of projections on opposing sides of the second tube 200 that may catch on the first and second retention lips (210, 212) in a similar manner as described herein.

Some example embodiments may provide for a measuring wheel. The measuring wheel may include a wheel assembly which may include at least one wheel, a handle assembly which may include a handle and a shaft, and a housing to which the handle assembly and the wheel assembly may be operably coupled. The shaft may include a first tube and a second tube which may be telescopically operably coupled to one another at an extension joint. The extension joint may be operable between a locked position in which the shaft may be fixed in place and an unlocked position in which the shaft may telescope to change a length of the shaft. The extension joint may include a collar, a cam lever and a pin. The collar may extend around an exterior surface of the shaft. The cam lever may be pivotably operably coupled to the collar via the pin.

The measuring wheel of some embodiments may include additional features, modifications, augmentations and/or the like to achieve further objectives or enhance

performance of the measuring wheel. The additional features, modifications, augmentations and/or the like may be added in any combination with each other. Below is a list of various additional features, modifications, and augmentations that can each be added individually or in any combination with each other. For example, the collar may include a locking tab and the cam lever may include a cam lobe proximate to the locking tab. In an example embodiment, the locking tab may fix the shaft in place when the extension joint may be in the locked position. In some cases, responsive to the cam lever pivoting into the locked position, the cam lobe may apply a force onto the locking tab which may bias the locking tab into contact with the shaft to fix the shaft in place. In an example embodiment, responsive to the cam lever pivoting into the unlocked position, the cam lobe may pivot away from the locking tab and may thereby release the force on the locking tab which may thereby disengage contact with the shaft to allow the shaft to telescope. In some cases, the collar may include an engagement assembly which may operably couple to the shaft. In an example embodiment, the engagement assembly may include a first clip and a second clip. In some cases, the first clip and the second clip may be disposed opposite each other on the collar. In an example embodiment, the first clip and the second clip may each operably couple to indentations that may be disposed at the first tube. In some cases, the first tube may be operably coupled to the collar at a first end of the first tube and operably coupled to the handle at a second end of the first tube. In an example embodiment, the second tube may be operably coupled to the housing at a first end of the second tube and operably coupled to the collar at a second end of the second tube. In some cases, the second tube may telescope inside of the first tube. In an example embodiment, the second end of the second tube may have an enlarged diameter to keep the second tube operably coupled to the collar. In some cases, the collar may include a first inner diameter and a second inner diameter. In an example embodiment, the first inner diameter may be smaller than the second inner diameter. In some cases, the enlarged diameter of the second tube may be larger than the first inner diameter and smaller than the second inner diameter. In an example embodiment, the extension joint may be operable by hand and without the use of any tools. In some cases, the collar may include an integrally-formed clip. In an example embodiment, the clip may operably couple to an indentation or aperture disposed in the first tube to fix the extension joint to an end of the first tube. In some cases, the second tube may telescope inside of the first tube. In an example embodiment, the second end of the second tube may have an enlarged diameter to keep the second tube from sliding through the extension joint. In some cases, the shaft may include a third tube and a second extension joint.

Some example embodiments may provide for a handle assembly for a measuring wheel. The handle assembly may include a handle which may be disposed at a first end of the handle assembly, a shaft which may operably couple the handle to a housing disposed at a distal end of the shaft, to which a wheel assembly may be operably coupled, and an extension joint which may be disposed on the shaft between the housing and the handle. The shaft may include a first tube and a second tube which may be telescopically operably coupled to one another at the extension joint. The extension joint may be operable between a locked position in which the shaft may be fixed in place and an unlocked position in which the shaft may telescope to change a length of the shaft. The extension joint may include a collar, a cam lever and a pin. The collar may extend around an exterior surface of the shaft. The cam lever may be pivotably operably coupled to the collar via the pin.

Some example embodiments may provide for a measuring wheel. The measuring wheel may include a wheel assembly which may include at least one wheel, a handle assembly which may include a handle and a shaft, and a housing to which the handle assembly and the wheel assembly may be operably coupled. The shaft may include a first tube and a second tube which may be telescopically operably coupled to one another at an extension joint. The extension joint may be operable between a locked position in which the shaft may be fixed in place and an unlocked position in which the shaft may telescope to change a length of the shaft. The extension joint may consist essentially of a one-piece collar, a one-piece cam lever, and a one-piece pin. The collar may extend around an exterior surface of the shaft. The cam lever is pivotably operably coupled to the collar via the pin.

Many modifications and other embodiments of the inventions set forth herein will come to mind to one skilled in the art to which these inventions pertain having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the inventions are not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Moreover, although the foregoing descriptions and the associated drawings describe exemplary embodiments in the context of certain exemplary combinations of elements and/or functions, it should be appreciated that different combinations of elements and/or functions may be provided by alternative embodiments without departing from the scope of the appended claims. In this regard, for example, different combinations of elements and/or functions than those explicitly described above are also contemplated as may be set forth in some of the appended claims. In cases where advantages, benefits or solutions to problems are described herein, it should be appreciated that such advantages, benefits and/or solutions

may be applicable to some example embodiments, but not necessarily all example embodiments. Thus, any advantages, benefits or solutions described herein should not be thought of as being critical, required or essential to all embodiments or to that which is claimed herein. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

THAT WHICH IS CLAIMED:

1. A measuring wheel comprising:

a wheel assembly comprising at least one wheel;

a handle assembly comprising a handle and a shaft; and

a housing to which the handle assembly and the wheel assembly are operably coupled,

wherein the shaft comprises a first tube and a second tube telescopically operably coupled to one another at an extension joint,

wherein the extension joint is operable between a locked position in which the shaft is fixed in place and an unlocked position in which the shaft telescopes to change a length of the shaft,

wherein the extension joint comprises a collar, a cam lever and a pin,

wherein the collar extends around an exterior surface of the shaft, and

wherein the cam lever is pivotably operably coupled to the collar via the pin.

2. The measuring wheel of claim 1, wherein the collar comprises a locking tab and the cam lever comprises a cam lobe proximate to the locking tab, and

wherein the locking tab fixes the shaft in place when the extension joint is in the locked position.

3. The measuring wheel of claim 2, wherein responsive to the cam lever pivoting into the locked position, the cam lobe applies a force onto the locking tab to bias the locking tab into contact with the shaft to fix the shaft in place, and

wherein responsive to the cam lever pivoting into the unlocked position, the cam lobe pivots away from the locking tab thereby releasing the force on the locking tab which thereby disengages contact with the shaft to allow the shaft to telescope.

4. The measuring wheel of claim 1, wherein the collar comprises an engagement assembly to operably couple to the shaft, and

wherein the engagement assembly comprises a first clip and a second clip.

5. The measuring wheel of claim 4, wherein the first clip and the second clip are disposed opposite each other on the collar, and

wherein the first clip and the second clip each operably couple to indentations disposed at the first tube.

6. The measuring wheel of claim 1, wherein the first tube is operably coupled to the extension joint at a first end of the first tube and operably coupled to the handle at a second end of the first tube, and

wherein the second tube is operably coupled to the housing at a first end of the second tube and operably coupled to the extension joint at a second end of the second tube.

7. The measuring wheel of claim 6, wherein the second tube telescopes inside of the first tube.

8. The measuring wheel of claim 6, wherein the second end of the second tube has an enlarged diameter to keep the second tube operably coupled to the extension joint.

9. The measuring wheel of claim 8, wherein the collar comprises a first inner diameter and a second inner diameter,

wherein the first inner diameter is smaller than the second inner diameter, and

wherein the enlarged diameter of the second tube is larger than the first inner diameter and smaller than the second inner diameter.

10. A handle assembly for a measuring wheel, the handle assembly comprising:

a handle disposed at a first end of the handle assembly;

a shaft operably coupling the handle to a housing disposed at a distal end of the shaft, to which a wheel assembly is operably coupled; and

an extension joint disposed on the shaft between the housing and the handle,

wherein the shaft comprises a first tube and a second tube telescopically operably coupled to one another at the extension joint,

wherein the extension joint is operable between a locked position in which the shaft is fixed in place and an unlocked position in which the shaft telescopes to change a length of the shaft,

wherein the extension joint comprises a collar, a cam lever and a pin,

wherein the collar extends around an exterior surface of the shaft, and

wherein the cam lever is pivotably operably coupled to the collar via the pin.

11. The handle assembly of claim 10, wherein the collar comprises a locking tab and the cam lever comprises a cam lobe proximate to the locking tab, and

wherein the locking tab fixes the shaft in place when the extension joint is in the locked position.

12. The handle assembly of claim 11, wherein responsive to the cam lever pivoting into the locked position, the cam lobe applies a force onto the locking tab to bias the locking tab into contact with the shaft to fix the shaft in place, and

wherein responsive to the cam lever pivoting into the unlocked position, the cam lobe pivots away from the locking tab thereby releasing the force on the locking tab which thereby disengages contact with the shaft to allow the shaft to telescope.

13. The handle assembly of claim 10, wherein the collar comprises an engagement assembly to operably couple to the shaft, and

wherein the engagement assembly comprises a first clip and a second clip.

14. The handle assembly of claim 13, wherein the first clip and the second clip are disposed opposite each other on the collar, and

wherein the first clip and the second clip each operably couple to indentations disposed at the first tube.

15. The handle assembly of claim 10, wherein the first tube is operably coupled to the extension joint at a first end of the first tube and operably coupled to the handle at a second end of the first tube, and

wherein the second tube is operably coupled to the housing at a first end of the second tube and operably coupled to the extension joint at a second end of the second tube.

16. The handle assembly of claim 15, wherein the second end of the second tube has an enlarged diameter to keep the second tube operably coupled to the extension joint.

17. A measuring wheel comprising:

a wheel assembly comprising at least one wheel;

a handle assembly comprising a handle and a shaft; and

wherein the shaft comprises a first tube and a second tube telescopically operably coupled to one another at an extension joint,

wherein the extension joint is operable between a locked position in which the shaft is fixed in place and an unlocked position in which the first tube and second tube telescope relative to each other to change a length of the shaft,

wherein the extension joint consists essentially of a one-piece collar, a one-piece cam lever, and a one-piece pin,

wherein the collar extends around an exterior surface of the shaft, and

wherein the cam lever is pivotably operably coupled to the collar via the pin.

18. The measuring wheel of claim 17, wherein the collar comprises an integrally-formed clip, wherein the clip operably couples to an indentation or aperture disposed in the first tube to fix the extension joint to an end of the first tube.

19. The measuring wheel of claim 18, wherein the second tube telescopes inside of the first tube; and wherein the second end of the second tube has an enlarged diameter to keep the second tube from sliding through the extension joint.

20. The measuring wheel of claim 17, wherein the shaft comprises a third tube and a second extension joint.

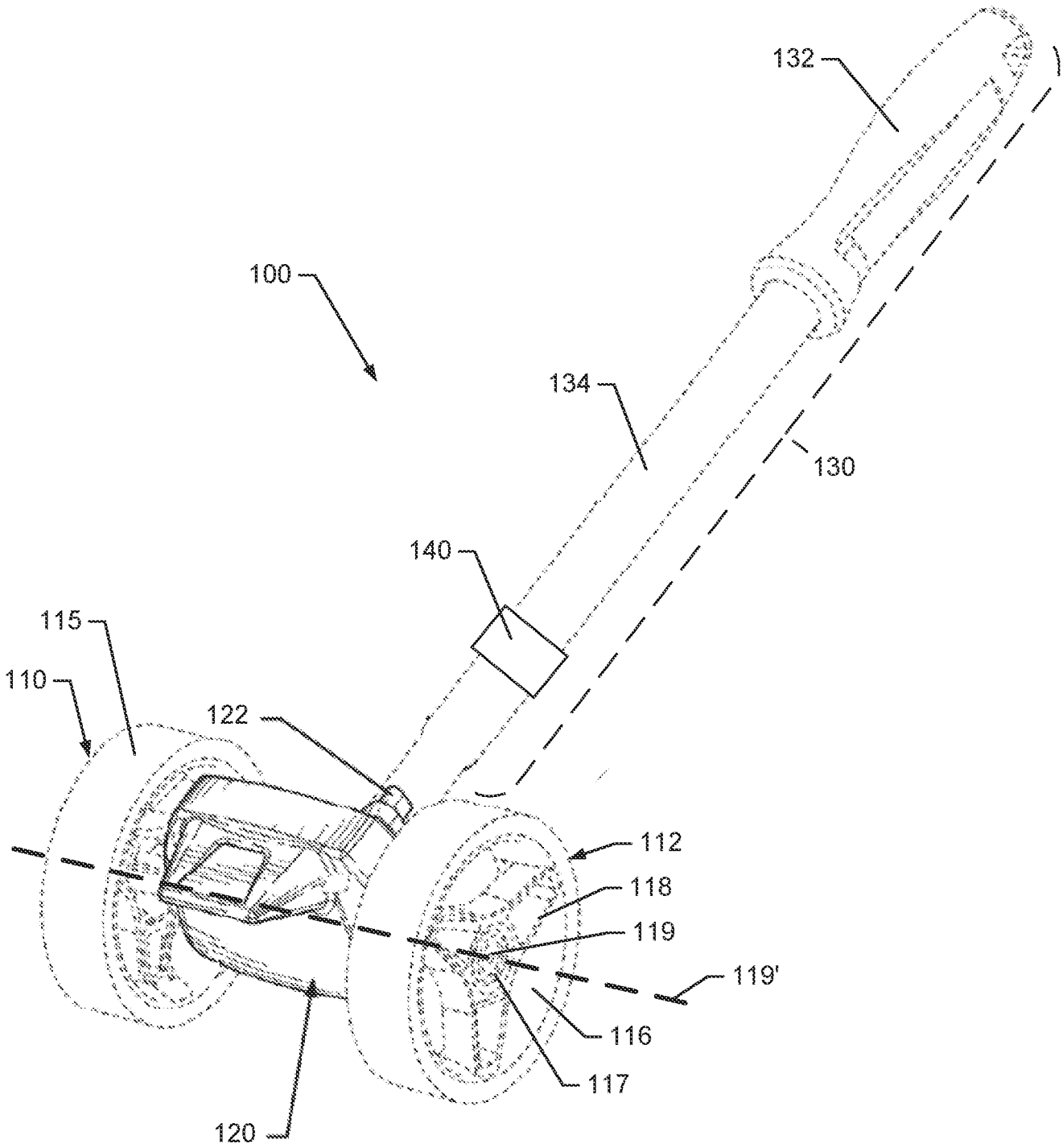


FIG. 1

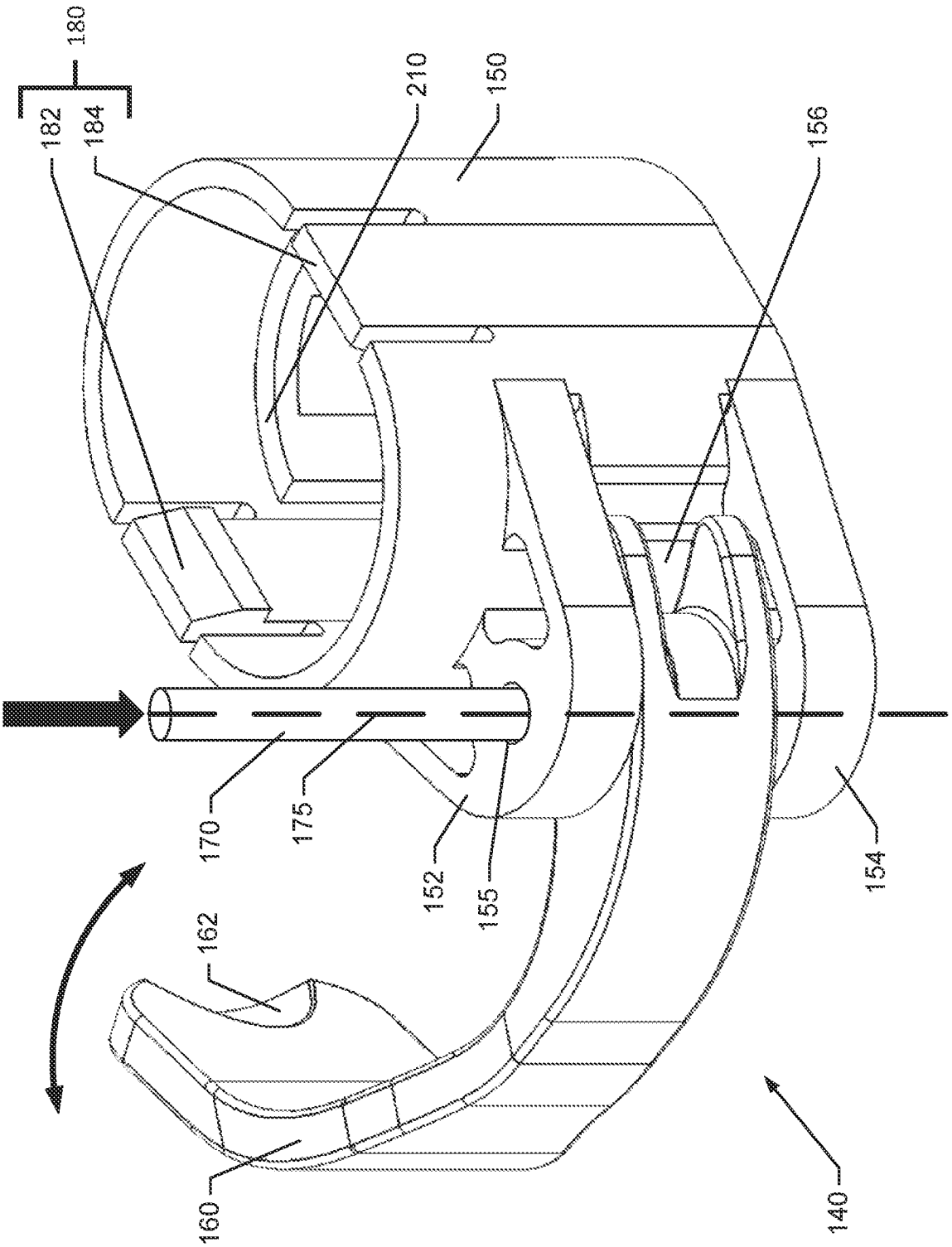


FIG. 2

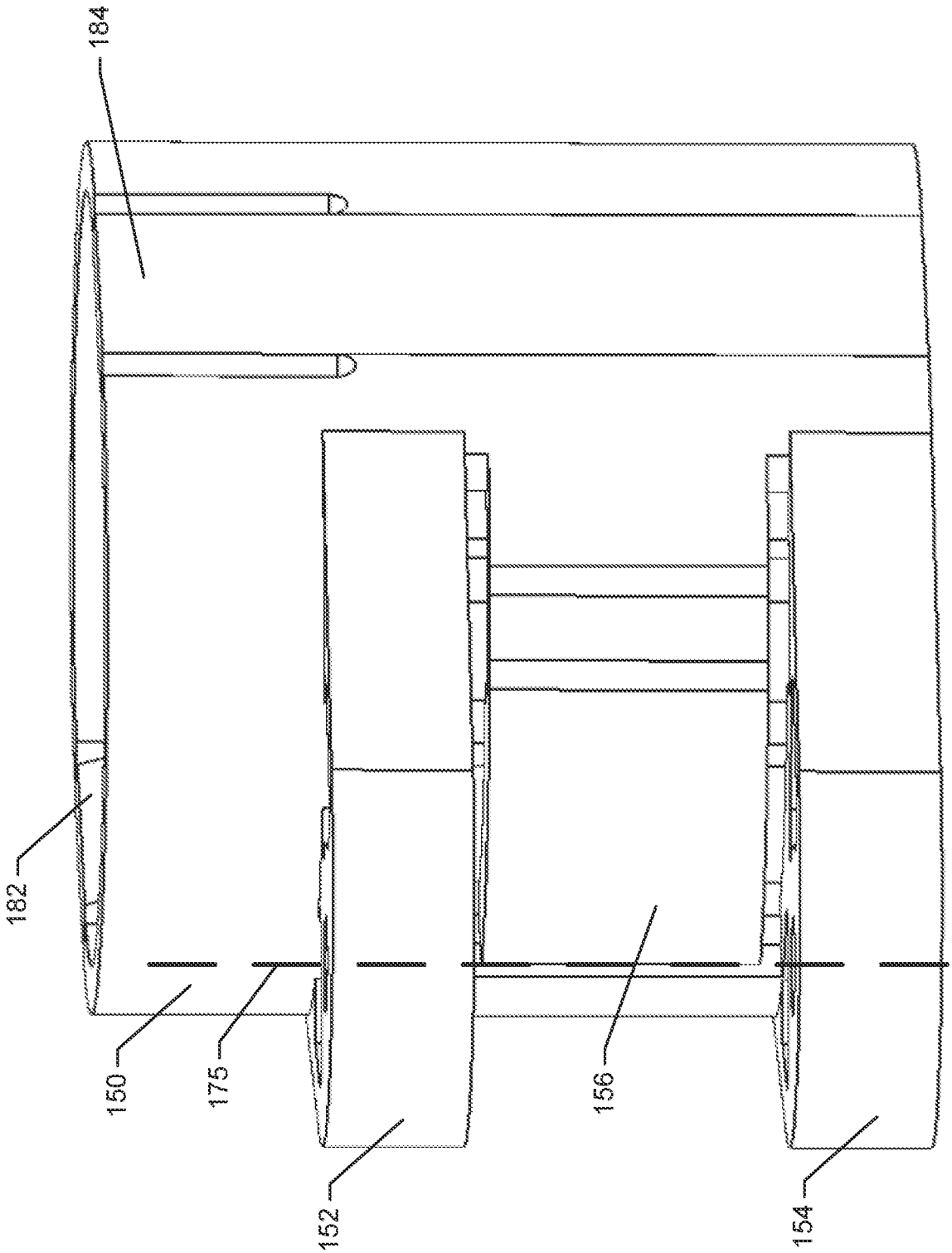


FIG. 3

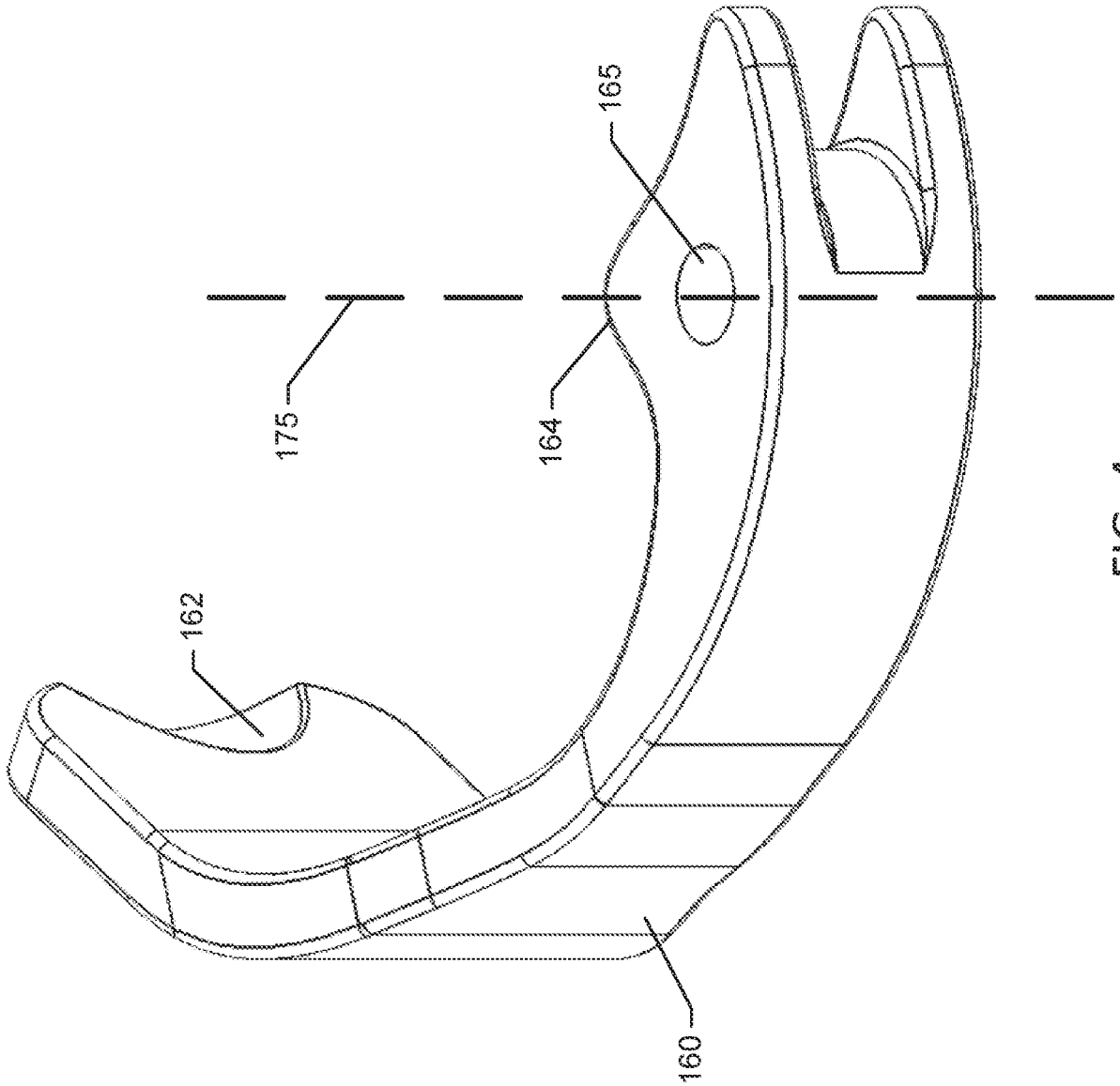


FIG. 4

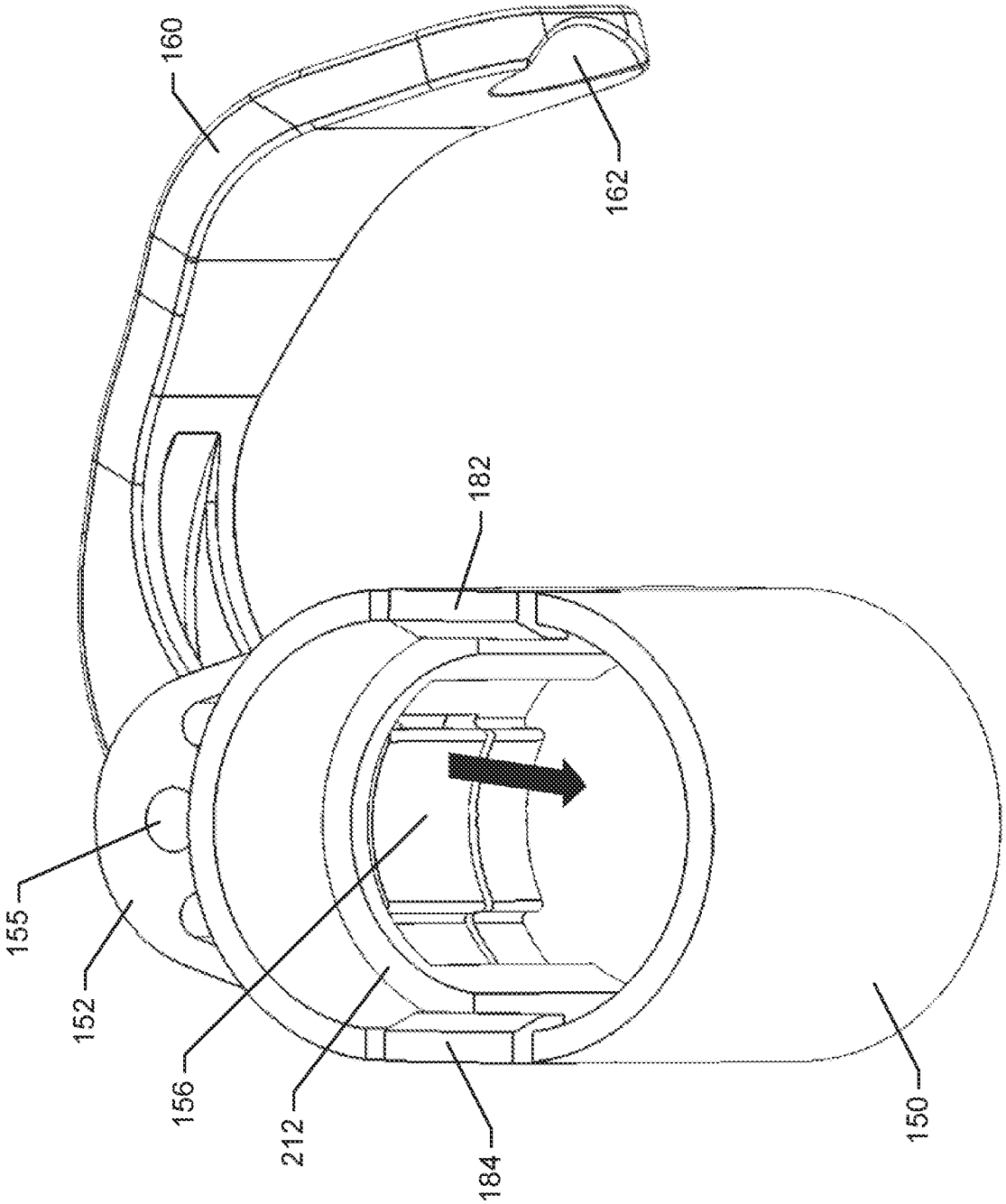


FIG. 5

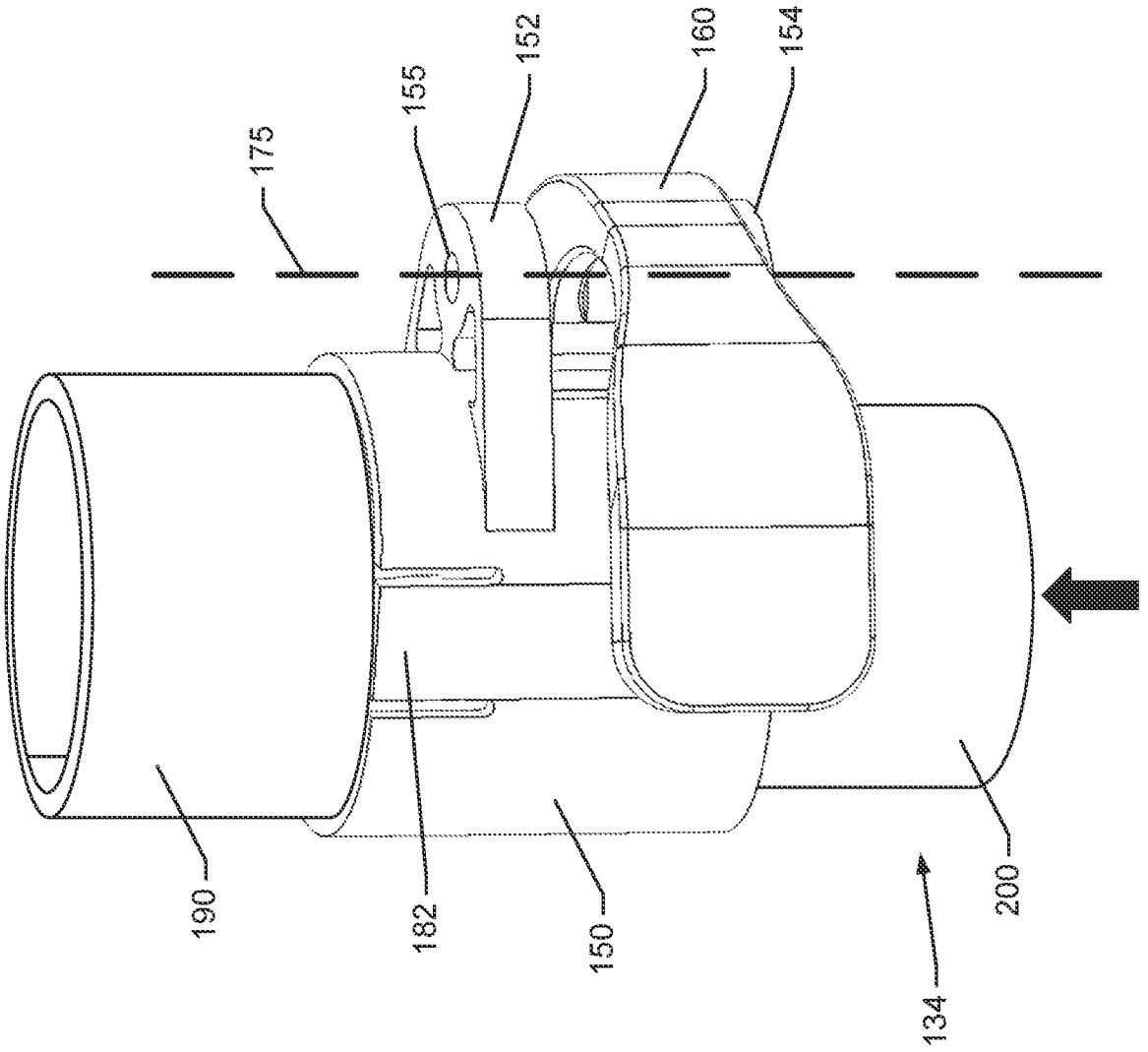


FIG. 6

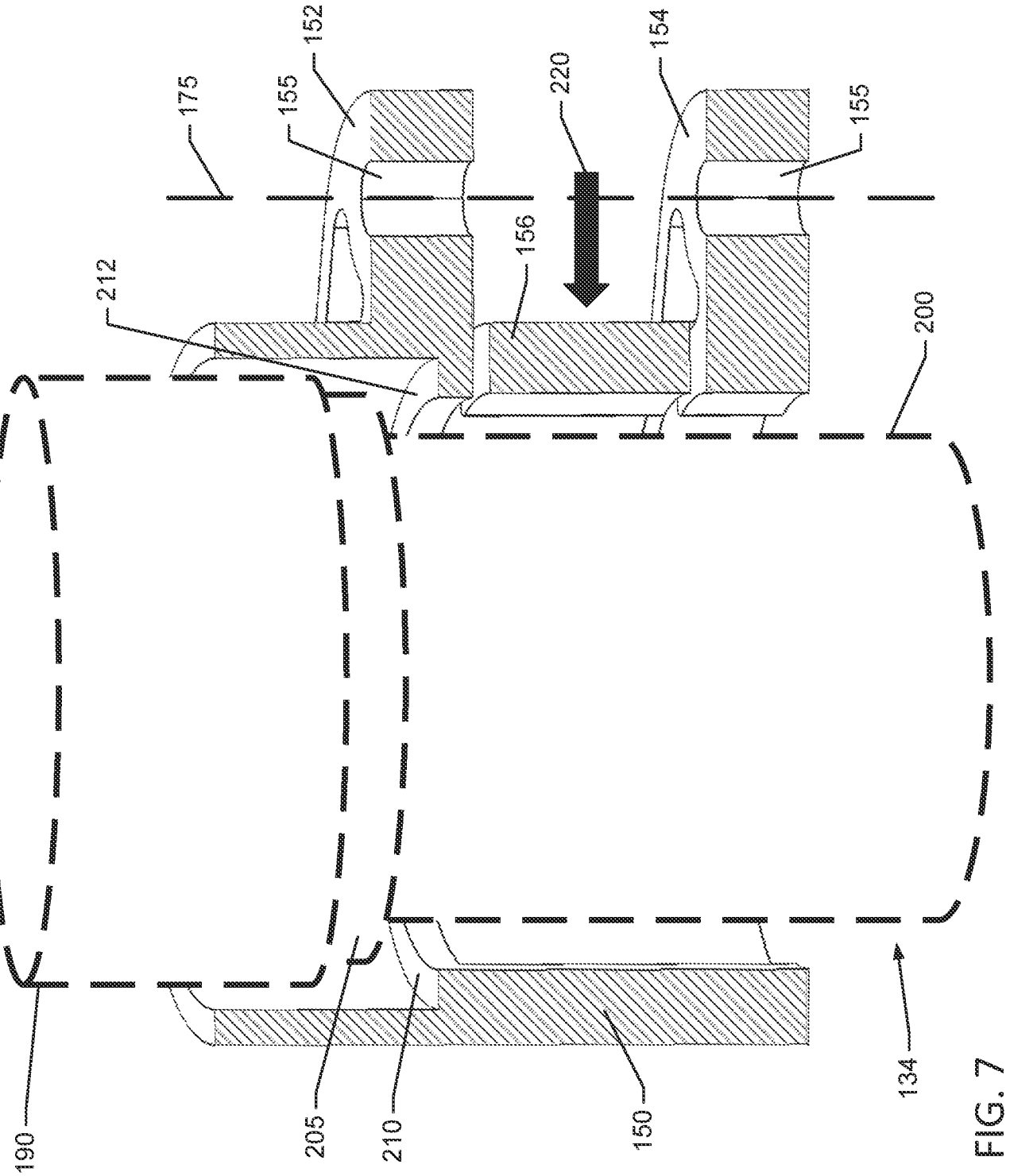


FIG. 7