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(54) **HOSE REEL APPARATUS AND METHOD**

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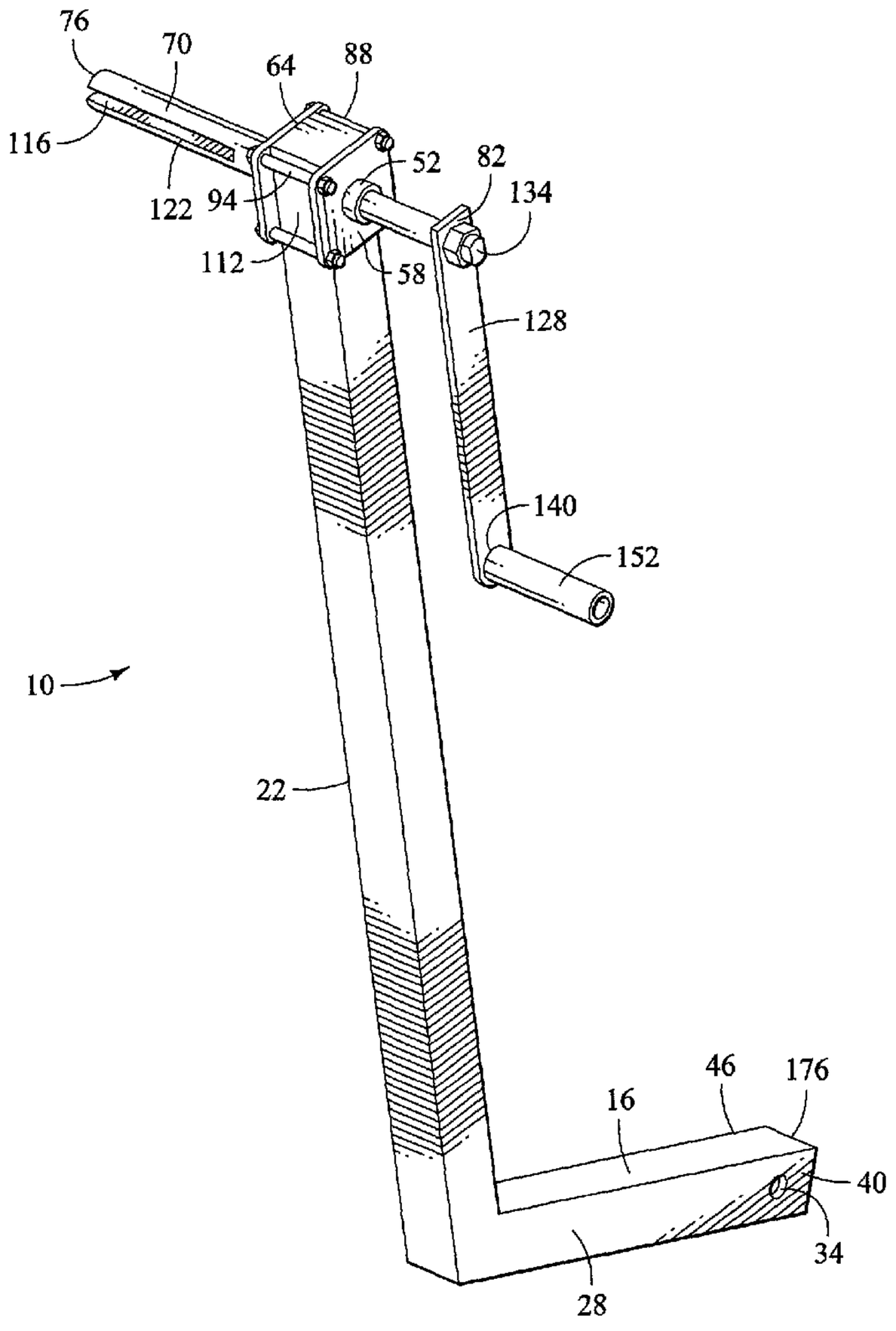
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(57) **ABSTRACT**

A portable fire hose reel apparatus, and a method for its use, is provided. In one embodiment, the apparatus comprises a support frame having a lower portion and an upper portion, a reel shaft having first and second ends, and a crank attached to the second end of the reel shaft. The reel shaft is attached to the upper portion of the support frame. The first end of the reel shaft defines a slot running radially through a cross-section of the reel shaft, which extends axially from the first end of the reel shaft towards the second end of the reel shaft. In another embodiment, the reel shaft extends through an aperture running radially through a cross section of the upper portion from a first to second side. The first end of the reel shaft projects out of the aperture on the first side of the upper portion, while the second end of the reel shaft projects out of the aperture on the second side of the upper portion. To couple a fire hose to the reel shaft, the slot is adapted to allow an end portion of a fire hose to be slid into the slot at the first end of the reel shaft. The crank is then rotated to wind the fire hose around the reel shaft. In other embodiments, the fire hose apparatus is adapted to be attached to an automobile hitch, or to a base support stationed on the ground.



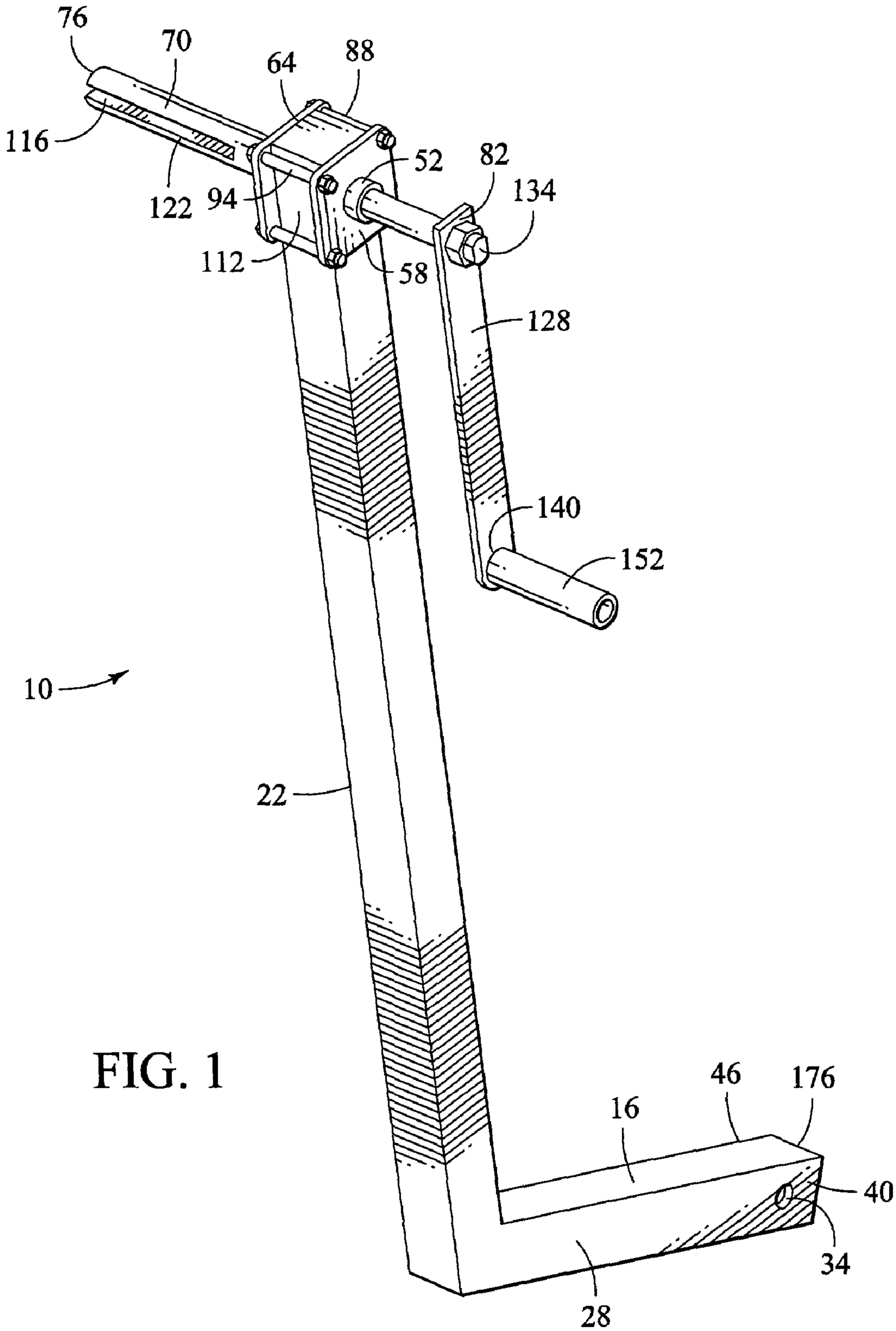

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FIG. 1

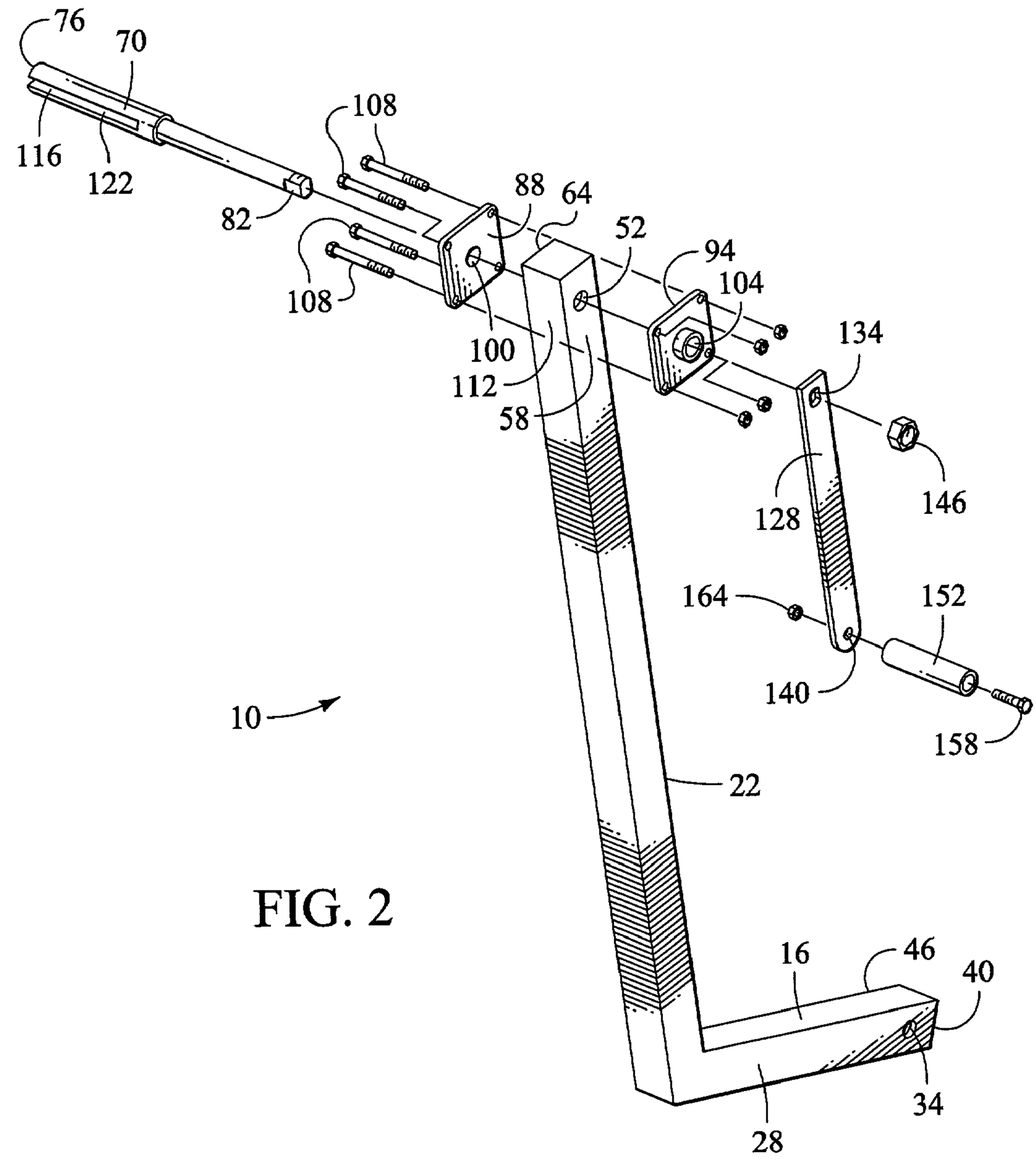
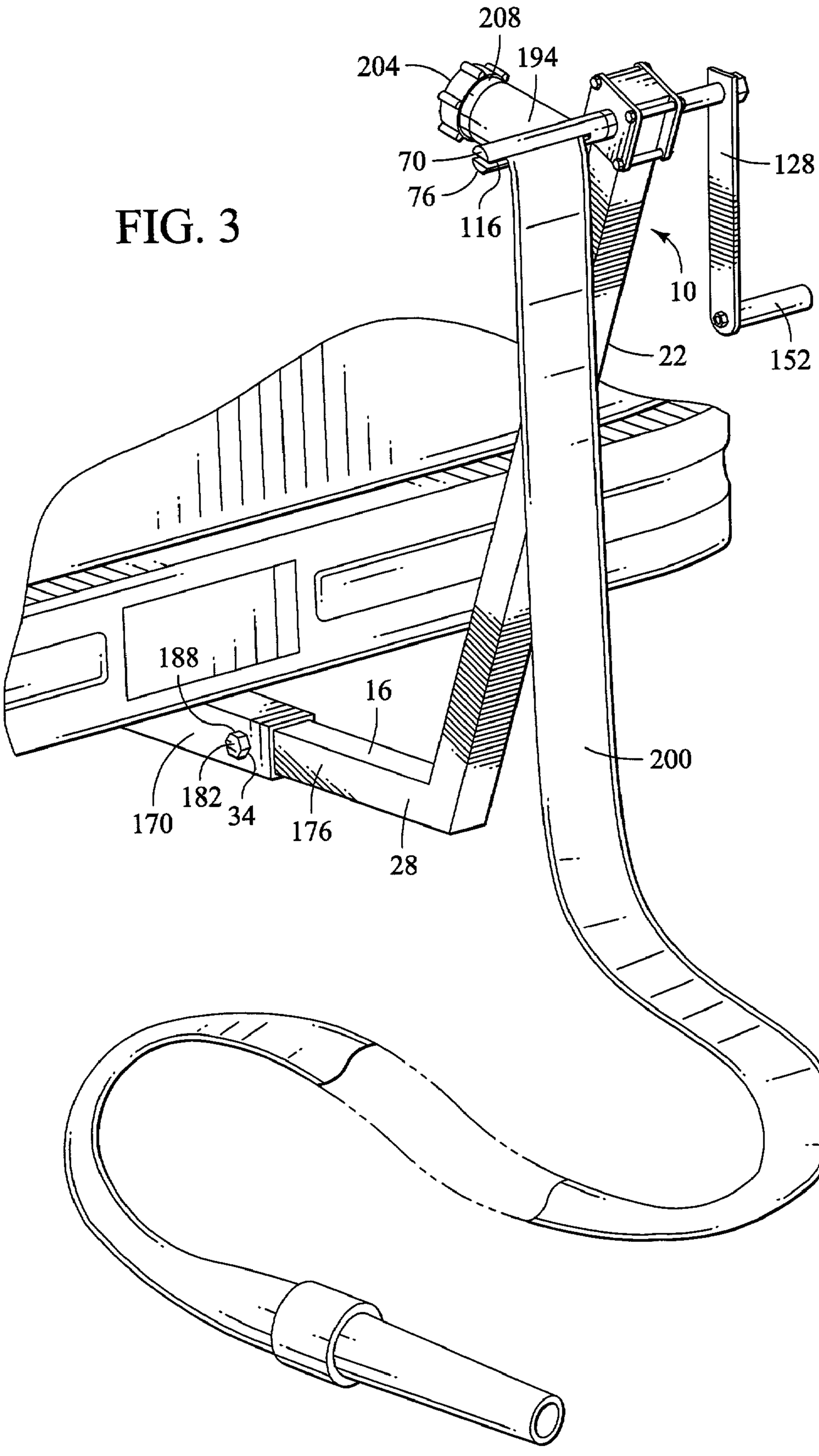

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FIG. 2

FIG. 3



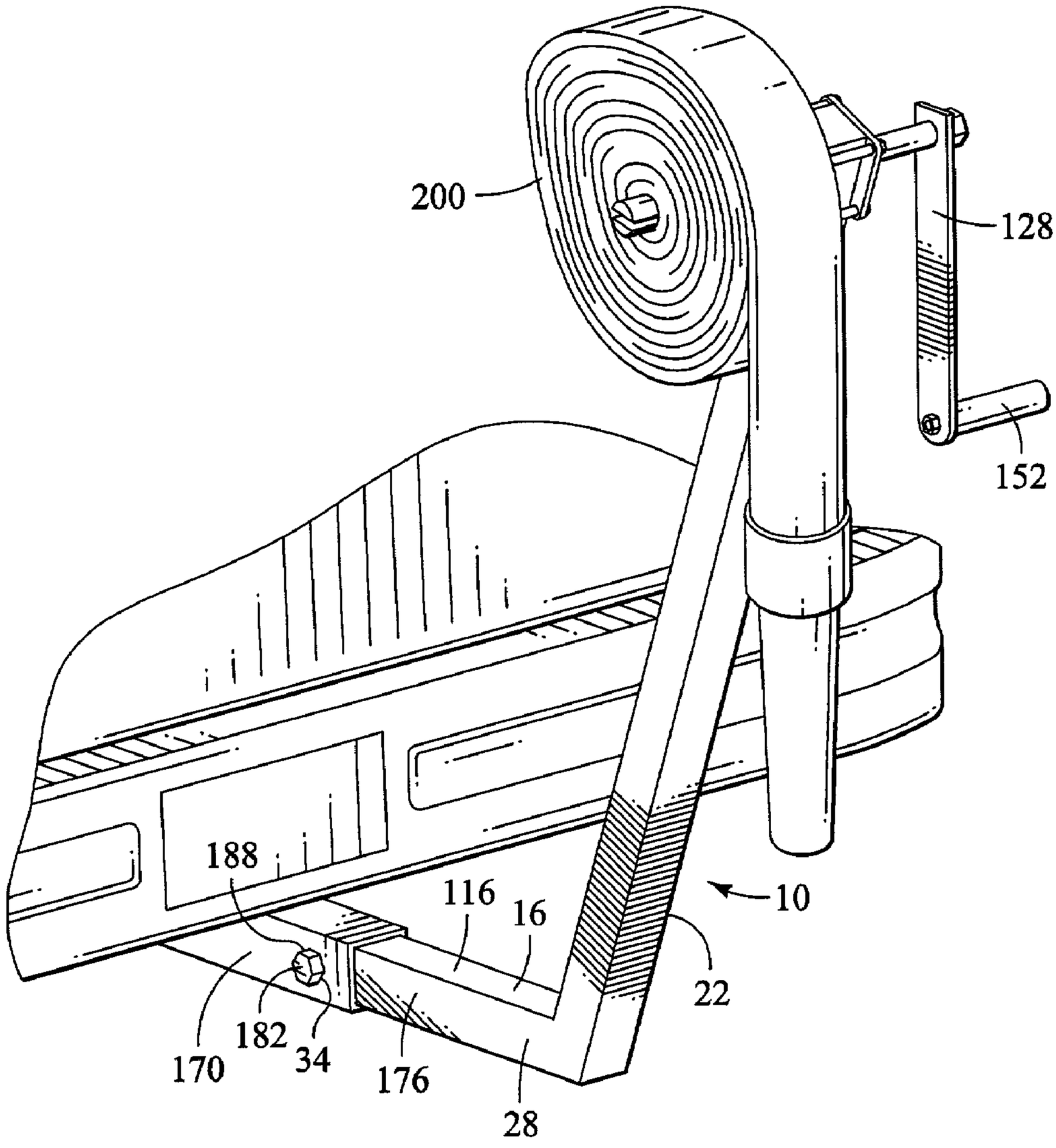


FIG. 4

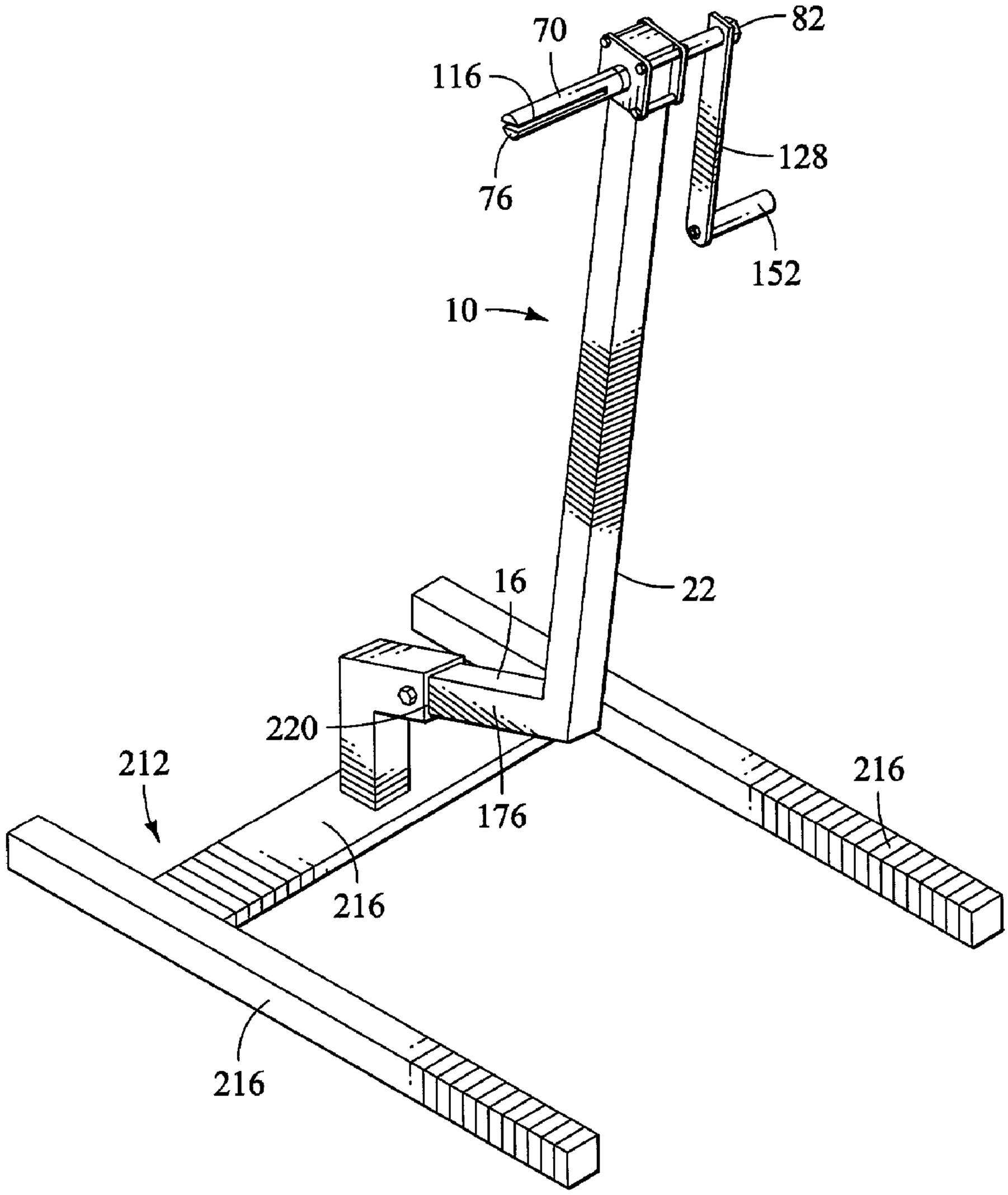


FIG. 5

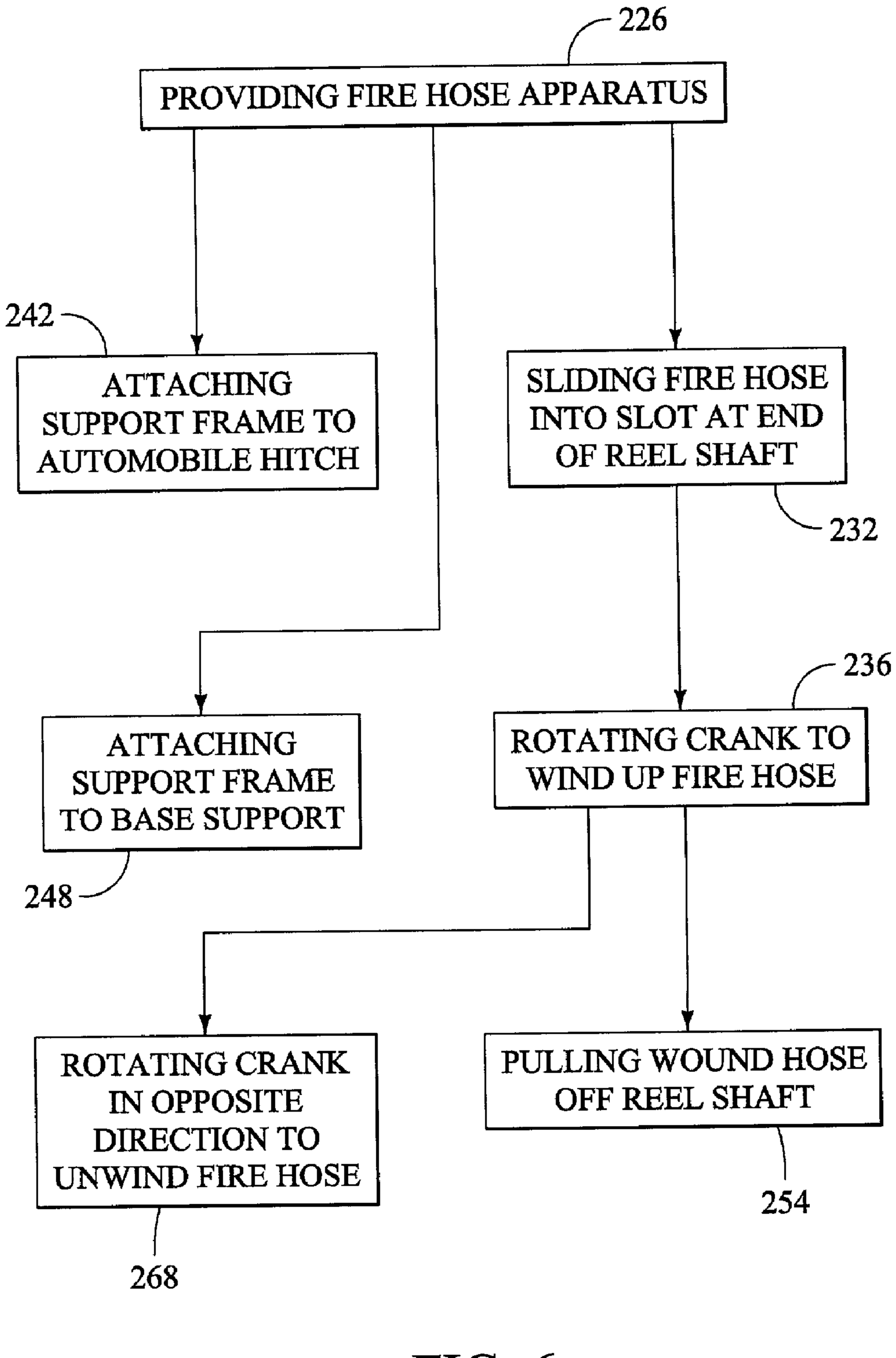

226
PROVIDING FIRE HOSE APPARATUS
242
ATTACHING SUPPORT FRAME TO AUTOMOBILE HITCH
SLIDING FIRE HOSE INTO SLOT AT END OF REEL SHAFT
232
236
ATTACHING SUPPORT FRAME TO BASE SUPPORT
ROTATING CRANK TO WIND UP FIRE HOSE
248
ROTATING CRANK IN OPPOSITE DIRECTION TO UNWIND FIRE HOSE
PULLING WOUND HOSE OFF REEL SHAFT
254
268

FIG. 6

HOSE REEL APPARATUS AND METHOD

BACKGROUND OF THE INVENTION

[0001] The present invention relates generally to a portable hose reel apparatus for rolling fire hoses, and to a method for use thereof.

[0002] Fire hoses are heavy by nature and can be difficult to roll up, particularly when water remnants remain in the fire hose. Since the fire hoses are heavy, they require a hose reel device to roll them up so that they can be stored. Some existing fire hose reel devices are portable, and allow for relatively easy rolling of the fire hose. One such existing device described in U.S. Pat. No. 6,206,317 B1, comprises a main support, a hose reel having an axle, a crank, and a separate retainer. In order to roll a fire hose using that device, the retainer has to be pulled out from the hose reel. An end of the hose is then positioned between the rods of the retainer, and the retainer is reattached to the hose reel. The crank is then rotated, and the hose winds around the retainer. A hose rim attached to the hose reel keeps the hose in place as it is winded around the retainer.

[0003] However, the available fire hose reel devices utilize an excess of components, thereby unduly increasing the cost of manufacturing the devices, increasing the time required to couple fire hoses to the devices, and increasing the complexity of their operation.

[0004] As a result, a simple, efficient, portable fire hose reel apparatus, and a method for its use, is required having a minimum number of components in order to cut manufacturing cost, and to make operation of the apparatus more user friendly.

BRIEF SUMMARY OF THE INVENTION

[0005] It is in general an object of the invention to provide a simple, efficient, portable hose reel apparatus, and method for use thereof, for rolling fire hoses.

[0006] In one aspect, this invention provides a fire hose apparatus comprising a support frame having a lower portion and an upper portion, a reel shaft having first and second ends, and a crank attached to the second end of the reel shaft. The reel shaft is attached to the upper portion of the support frame. The first end of the reel shaft defines a slot running radially through a cross-section of the reel shaft, which extends axially from the first end of the reel shaft towards the second end of the reel shaft.

[0007] In another aspect, this invention again provides a fire hose apparatus comprising a support frame having a lower portion and an upper portion, a reel shaft having first and second ends, and a crank attached to the second end of the reel shaft. The upper portion defines an aperture running radially through a cross section of the upper portion from a first to second side of the upper portion. The reel shaft extends through the aperture in the upper portion of the support frame, with the first end of the reel shaft projecting out of the aperture on the first side of the upper portion, and the second end of the reel shaft projecting out of the aperture on the second side of the upper portion. The first end of the reel shaft defines a slot running radially through a cross-section of the reel shaft, the slot extending axially along at least a portion of the reel shaft.

[0008] In a final aspect, this invention provides a method of winding a fire hose. The method comprises providing a fire hose apparatus, sliding an end portion of a fire hose into a slot at the first end of a reel shaft, and rotating a crank thereby winding the fire hose around the reel shaft. The fire hose apparatus comprises a support frame having a lower portion and an upper portion, a reel shaft having first and second ends, and a crank attached to the second end of the reel shaft. The reel shaft is attached to the upper portion of the support frame. The first end of the reel shaft defines a slot running radially through a cross-section of the reel shaft, the slot extending axially from the first end of the reel shaft towards the second end of the reel shaft.

[0009] The present invention, together with further objects and advantages, will be best understood by reference to the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

[0010] **FIG. 1** is an assembled perspective view of one embodiment of a fire hose reel apparatus;

[0011] **FIG. 2** is an unassembled side view of the fire hose reel apparatus shown in **FIG. 1**;

[0012] **FIG. 3** is an assembled perspective view of the fire hose reel apparatus shown in **FIG. 1**, with the fire hose reel apparatus being attached to an automobile hitch, showing the attachment of a fire hose to the hose reel;

[0013] **FIG. 4** is an assembled perspective view of the fire hose reel apparatus shown in **FIG. 1**, with the fire hose reel apparatus being attached to an automobile hitch, showing the fire hose in a rolled up position around the fire hose reel;

[0014] **FIG. 5** is an assembled perspective view of the fire hose reel apparatus shown in **FIG. 1**, with the fire hose reel apparatus being attached to a base support standing on the ground; and

[0015] **FIG. 6** is a flow diagram illustrating one exemplary method in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0016] Referring to the drawings, and as best shown in **FIGS. 1 and 2**, a preferred embodiment of a fire hose apparatus includes a support frame **10** having a lower portion **16** and an upper portion **22**. The support frame **10** is preferably steel or another type of metal, but in alternative embodiments, could be manufactured from a hard plastic. In a preferred embodiment, the support frame **10** is one-piece, and the lower portion **16** and upper portion **22** are welded together. The welded one-piece support frame **10** drastically increases the strength, rigidity, and stability of the support frame **10**. As shown in **FIGS. 3 and 4**, when the support frame **10** is in place, the lower portion **16** preferably extends horizontally, and the upper portion **22** preferably extends generally vertically. The cross-section **28** of the support frame **10** is preferably square, but in other embodiments, could consist of other shapes such as rectangular, or cylindrical. The square shape of the support frame **10**, again drastically increases its strength, rigidity, and stability.

[0017] As shown in **FIG. 2**, the lower portion **16** defines an aperture **34** extending radially from a first side **40** to a second side **46** of the lower portion **16**. The aperture **34** is preferably cylindrical, but may comprise other shapes, such as rectangular, or polygonal. Similarly, the upper portion **22** defines an aperture **52** running radially from a first side **58** to a second side **64** of said upper portion **22**. Again, the aperture **52** is preferably cylindrical, but may comprise other shapes, such as rectangular, or polygonal.

[0018] As best shown in **FIGS. 1 and 2**, a preferred embodiment also includes a reel shaft **70** having a first end **76** and a second end **82**. The reel shaft **70** is preferably cylindrical, comprised of metal, and one-piece. In alternative embodiments, the reel shaft **70** may be manufactured from other hardened materials such as plastic. The reel shaft **70** is extended through the aperture **52** in the upper portion **22** of the support frame **10**. When in place, the first end **76** of the reel shaft **70** projects out of the aperture **52** on the second side **64** of the upper portion **22**. Likewise, the second end **82** of the reel shaft **70** projects out of the aperture **52** on the first side **58** of the upper portion **22**.

[0019] The reel shaft **70** is preferably attached to the upper portion **22** of the support frame **10** using one or more bearings. Preferably, ball bearings are utilized, but other bearings, such as roller, ball thrust, roller thrust, and tapered roller thrust may be used. In one embodiment, a first bearing **88** and a second bearing **94** are utilized. The first bearing **88** defines an aperture **100** extending axially through the first bearing **88**. Similarly, the second bearing **94** defines an aperture **104** extending axially through the second bearing **94**. The aperture **100** of the first bearing **88** is aligned along the second side **64** of the upper portion **22** of the support frame **10** around the aperture **52**. Likewise, the aperture **104** of the second bearing **94** is aligned along the first side **58** of the support frame **10** around the aperture **52**. The bearing structures are preferably metal. As shown, four bolts **108** are utilized to secure the first bearing **88** and second bearing **94** to the upper portion **22** of the support frame **10**. However, a varying number of bolts may be utilized. In a preferred embodiment, the bolts **108** extend from the first bearing **88** through the second bearing **94** outside the periphery **112** of the upper portion **22** of the support frame **10**. In other embodiments, the bolts **108** may extend through the upper portion **22**. Similarly, in other embodiments, the bearing structures may be attached using other types of attachment mechanisms, such as being snap-fit.

[0020] When attached to the support frame **10**, in a preferred embodiment, the reel shaft **70** extends perpendicularly away from the upper portion **22** of the support frame **10** in a horizontal direction parallel to the ground. As best shown in **FIGS. 1 and 2**, the first end **76** of the reel shaft **70** defines a slot **116** running radially through a cross-section **122** of the reel shaft **70**. The slot **116** extends axially from the first end **76** of the reel shaft **70** towards the second end **82** of the reel shaft **70**.

[0021] A crank **128** is attached to the second end **82** of the reel shaft **70**. The crank **128** has a first end **134** and a second end **140**. The first end **134** of the crank **128** is attached to the second end **82** of the reel shaft **70** by threading a nut **146** onto the second end **82** of the reel shaft **70**. In other embodiments, the crank **128** may be connected to the reel shaft **70** through varying means, including snap-fits. The second end **140** of the crank **128** contains a handle **152** for turning the crank **128**. Preferably, the crank **128** is metal, but may comprise other hardened materials such as plastic. Likewise, the handle **152** may be a variety of materials, but is preferably plastic or rubber. Preferably, the handle **152** is attached to the crank using a bolt **158** and nut **164**, but may be attached using a variety of means, including snap-fits.

[0022] As shown in **FIGS. 3 and 4**, the lower portion **16** of the support frame **10** may be attached to an automobile hitch **170** by sliding an end **176** of the lower portion **16** into the automobile hitch **170**. The automobile hitch **170** is preferably a square pocket to fit the preferably square cross-section **28** of the support frame **10**, but may comprise other shapes such as polygonal. After the lower portion **16** is slid into the automobile hitch **170**, a locking pin **182** is extended through an aperture **188** defined in the automobile hitch **170** into the aperture **34** in the lower portion **16** to secure the support frame **10** to the automobile hitch **170**. In alternative embodiments, other methods of attachment may be utilized, such as a locking screw, or a snap-fit.

[0023] In operation, an end portion **194** of a fire hose **200** is slid into the slot **116** at the first end **76** of the reel shaft **70** to couple the fire hose **200** to the reel shaft **70**. An end **204** of the fire hose **200** contains a rim **208**, which is larger in diameter than the diameter of the slot **116**. As such, once the end portion **194** of the fire hose **200** is slid into the slot **116**, the rim **208** prevents the end **204** of the fire hose **200** from slipping through the slot **116**, thereby locking the fire hose **200** in place. At this point, when the crank **128** is rotated, the reel shaft **70** also rotates thereby winding the fire hose **200** around the reel shaft **70** to wind up the fire hose **200**. The crank **128** can then be rotated in an opposite direction to unwind the fire hose **200**. Additionally, the wound up fire hose **200** can be pulled off the reel shaft **70** by sliding the end portion **194** of the fire hose **200** out of the slot **116** at the first end **76** of the reel shaft **70**.

[0024] As shown in **FIG. 5**, the lower portion **16** of the support frame **10** may be attached to a base support **212** adapted to stand on the ground. The base support **212** comprises a plurality of members **216** welded to form a one-piece base support **212**. Preferably, at least one of the base support members **216** is attached perpendicularly to two or more base support members **216**, one at each end, to increase the stability of the base support **212**. In other embodiments, the members **216** may be attached using varying methods including bolts and nuts, and snapfits. The members **216** are preferably steel or other types of metal, but may be manufactured from other hardened materials including plastic. The base support **212** defines a pocket **220**, which preferably jets upwardly at an angle to allow for easy attachment of the support frame **10**. An end **176** of the lower portion **16** of the support frame **10** is slid into the pocket **220** of the base support **212** to attach the support frame **10** to the base support **212**.

[0025] As shown in **FIG. 6**, one method of winding a fire hose is to first provide a fire hose apparatus **226**. The fire hose apparatus comprises a support frame having a lower portion and an upper portion, a reel shaft having first and second ends attached to the upper portion of the support frame, and a crank attached to the second end of the reel shaft. The first end of the reel shaft defines a slot running radially through a cross-section of the reel shaft extending

axially from the first end of the reel shaft towards the second end of the reel shaft. Next, an end portion of a fire hose is slid into the slot at the first end of the reel shaft **232**. An end of the fire hose may have a rim larger in diameter than the slot in order to prevent the end of the fire hose from slipping out of the slot. Finally, the crank is rotated to wind the fire hose around the reel shaft **236**.

[**0026**] A further step may comprise attaching an end of the lower portion of the support frame to an automobile hitch **242**. This step may be accomplished by sliding an end of the lower portion of the support frame into an automobile hitch pocket, and extending a locking pin through apertures defined in the lower portion of the support frame and the automobile hitch pocket. Another step may comprise sliding an end of the lower portion of the support frame into the pocket of a base support to attach the support frame to the base support **248**. Yet another step may comprise pulling the wound hose off the reel shaft **254**. This may be accomplished by sliding the end portion of the fire hose out of the slot at the first end of the reel shaft. A final step may comprise rotating the crank in an opposite direction to unwind the fire hose from the reel shaft **260**.

[**0027**] It is to be understood that the invention is not to be limited to the exact construction and/or method which has been illustrated and discussed above, but that various changes and/or modifications may be made without departing from the spirit and the scope of the invention.

1. A fire hose apparatus comprising:

a support frame having a lower portion and an upper portion;

a reel shaft having first and second ends, wherein said reel shaft is attached to the upper portion of said support frame, the first end of said reel shaft defines a slot running radially through a cross-section of said reel shaft, said slot extending axially from the first end of said reel shaft towards the second end of said reel shaft; and

a crank attached to said second end of said reel shaft.

2. The invention of claim 1 wherein said support frame is one-piece.

3. The invention of claim 1 wherein said support frame is metal.

4. The invention of claim 1 wherein said lower portion extends generally horizontally, and said upper portion extends generally vertically.

5. The invention of claim 1 wherein a cross section of said support frame is rectangular.

6. The invention of claim 1 wherein said lower portion is welded to said upper portion.

7. The invention of claim 1 wherein said lower portion is adapted to be attached to an automobile hitch.

8. The invention of claim 7 wherein said lower portion defines an aperture extending from a first side of said lower portion to a second side of said lower portion, a cross section of said lower portion is rectangular, an end of said lower portion is adapted to be slid into a rectangular automobile hitch, and a locking pin is provided to extend into said aperture in said lower portion to lock said support frame to the automobile hitch.

9. The invention of claim 1 further comprising a base support adapted to stand on the ground, wherein the base support defines a pocket, wherein an end of said lower portion of said support frame is adapted to be slid into the pocket to attach said support frame to said base support.

10. The invention of claim 9 wherein said base support comprises a plurality of members welded to form a one-piece base support.

11. The invention of claim 1 wherein said reel shaft is cylindrical.

12. The invention of claim 1 wherein said reel shaft is metal.

13. The invention of claim 12 wherein said reel shaft extends perpendicularly away from said upper portion of said support frame in a horizontal direction.

14. The invention of claim 1 wherein said upper portion of said support frame defines an aperture running radially through a cross section of said upper portion from a first to second side of said upper portion.

15. The invention of claim 14 wherein said reel shaft extends through said aperture in said upper portion of said support frame, said first end of said reel shaft projects out of said aperture on said first side of said upper portion, and said second end of said reel shaft projects out of said aperture on said second side of said upper portion.

16. The invention of claim 1 wherein said reel shaft is attached to the upper portion of said support frame using at least one bearing.

17. The invention of claim 16 wherein said reel shaft is attached to the upper portion of said support frame using first and second bearings, wherein said first bearing is aligned along a first side of said upper portion, said second bearing is aligned along a second side of said upper portion, and said first and second bearings are attached to said upper portion of said support frame using one or more bolts.

18. The invention of claim 1 wherein said slot is adapted to allow an end portion of a fire hose to be slid into said slot at the first end of said reel shaft to couple the fire hose to said reel shaft.

19. The invention of claim 18 wherein an end of the fire hose has a rim larger in diameter than said slot, said rim preventing the end of said fire hose from slipping through said slot.

20. The invention of claim 19 wherein said fire hose winds around said reel shaft as said crank is rotated.

21. The invention of claim 1 wherein said crank has a first end and a second end, said first end of said crank is attached to said second end of said reel shaft, and said second end of said crank contains a handle for turning the crank.

22. The invention of claim 1 wherein said crank is metal, and said crank contains a plastic handle.

23. A fire hose apparatus comprising:

a support frame having a lower portion and an upper portion, wherein said upper portion defines an aperture running radially through a cross section of said upper portion from a first to second side of said upper portion;

a reel shaft having first and second ends, wherein said reel shaft extends through said aperture in said upper portion of said support frame, said first end of said reel shaft projects out of said aperture on said first side of said upper portion, said second end of said reel shaft projects out of said aperture on said second side of said upper portion, said first end of said reel shaft defines a

slot running radially through a cross-section of said reel shaft, said slot extends axially along at least a portion of said reel shaft; and

a crank attached to said second end of said reel shaft.

24. The invention of claim 23 wherein said slot extends axially from the first end of said reel shaft towards the second end of said reel shaft, said slot being adapted to allow an end portion of a fire hose to be slid into said slot at the first end of said reel shaft to couple the fire hose to said reel shaft.

25. A method of winding a fire hose comprising:

providing a fire hose apparatus comprising a support frame having a lower portion and an upper portion, a reel shaft having first and second ends, wherein said reel shaft is attached to the upper portion of said support frame, the first end of said reel shaft defines a slot running radially through a cross-section of said reel shaft, said slot extending axially from the first end of said reel shaft towards the second end of said reel shaft, and a crank attached to said second end of said reel shaft;

sliding an end portion of a fire hose into said slot at the first end of said reel shaft; and

rotating said crank thereby winding said fire hose around said reel shaft.

26. The invention of claim 25 wherein an end of the fire hose has a rim larger in diameter than said slot, said rim preventing the end of said fire hose from slipping through said slot after said end portion of said fire hose is slid into said slot at the first end of said reel shaft.

27. The invention of claim 25 further comprising the step of attaching an end of said lower portion of said support frame to an automobile hitch.

28. The invention of claim 27 wherein said lower portion defines an aperture extending from a first side of said lower portion to a second side of said lower portion, a cross section of said lower portion is rectangular, and the step of attaching an end of said lower portion of said support frame to an automobile hitch comprises sliding an end of said lower portion into a rectangular automobile hitch, and extending a locking pin into said aperture in said lower portion to lock said support frame to said automobile hitch.

29. The invention of claim 25 further comprising a base support adapted to stand on the ground, wherein said base support defines a pocket, and further comprising the step of sliding an end of said lower portion of said support frame into said pocket to attach said support frame to said base support.

30. The invention of claim 29 wherein said base support comprises a plurality of members welded to form a one-piece base support.

31. The invention of claim 25 further comprising the step of pulling the wound hose off said reel shaft.

32. The invention of claim 25 further comprising the step of rotating said crank in an opposite direction to unwind said fire hose from said reel shaft.

* * * * *