2015

PATENT ATTORNEYS

EXAMINATION

PAPER E

Patent Attorney Practice in New Zealand
Including Interpretation and Criticism of Patent Specifications

Regulation 158 (1) (e)

Duration: 4 hours (plus 10 minutes for reading)

Facts

Your client Suzie Quinn has a business, Get In Behind Limited (GIB), manufacturing and selling vintage-style caravans.

When a caravan is stationary and disconnected from the towing vehicle it needs to be supported. The best way to do this is by using a jack, which can be adjusted to whatever level is needed.

The type of jack usually used with caravans and other towed vehicles comprises two tubular members, one of which telescopes inside the other. The members are locked in relation to each other by pins or other engaging members that are slidably received through holes in the tubular members. However, Suzie has noticed problems with other jacks on the market. They are expensive, with complex mechanisms, and are hard to operate efficiently with one hand. Also, she has found that they take in a lot of water, which can cause internal rusting problems in coastal locations. She has developed a new jack that she thinks overcomes these problems, and she wants to market it to her caravan customers.

Suzie's jack, which she calls the Krakka-Jack, is relatively simple and easy to use. Also, she thinks she's solved the rusting problem by changing the holes in the inner tubular member to depressions, making the jack watertight. She got the idea for this from an adjustable shower head she saw in a hotel, which could be moved up and down a vertical rail and locked in place with pins engaging with pairs of depressions in the rail.

Suzie has given you a description of the GIB Krakka-Jack product and how it works. Suzie's jack is designed to sit underneath a caravan, which rests on the cradle. She sells an optional chain and pin set to connect the jack to the vehicle while in use, to prevent the jack being stolen.

Suzie has asked you to do some patent searching to make sure she won't risk infringement by selling the Krakka-Jack. You have discovered accepted New Zealand application 123456, applied for by ABC Limited, which has an opposition deadline in a few weeks' time. You also find two prior art patents US 8,091,922 and US 4,842,252.

Documents

D1: Description of the Krakka-Jack product

D2: Accepted New Zealand patent application 123456

- Title: 'Landing gear for vehicle'
- Applicant: ABC Limited
- Filing date: 1 November 2013—filed with complete specification in the first instance
- Opposition deadline: 30 July 2015

P1: US 8,091,922

P2: US 4,842,252

Questions

Write a memorandum to Suzie on the following:

1. Would the Krakka-Jack infringe NZ 123456 if granted? 40 marks
2. Could Suzie successfully challenge NZ123456? In answering this, consider the following:
   a. What are the options for challenging NZ 123456 before and after grant, and what are the pros and cons of each? 5 marks
   b. Is NZ123456 valid? 45 marks
3. Based on your conclusions in 1 and 2: 10 marks
   a. What advice and/or recommendations would you give to Suzie?
   b. What other investigations you would make, actions would you take and/or advice would you provide?

D1— The Krakka-Jack

Figure 1 shows the client's jack 20 used with a caravan. Details of the jack are shown in figures 2 to 8.

As shown in figures 2 and 6, the jack 20 includes an outer housing 24, an inner housing 26, and a drop leg 28. The inner housing 26 is telescopingly engaged with the outer housing 24. The inner housing 26 may retract within or extend from the outer housing 24. The drop leg 28 is telescopingly engaged with the inner housing 26. The drop leg 28 may retract within and extend from the inner housing 26.

The drop leg 28 is secured to and supported by a base 32.

As shown in figures 2 and 4, the jack 20 includes a crank assembly 40, which can be used in a conventional manner to raise and lower the outer housing 24 relative to the inner housing 26 along an axis 39 by rotating a spindle 60 in a nut 61. The jack 20 is selectively positionable, i.e., extendable and retractable, so that the jack 20 may operate as necessary.

The jack 20 includes a cradle 10 that is engageable with the chassis on the underside of the caravan. When engaged with the caravan chassis it supports the caravan on the cradle. The jack optionally includes a chain and retaining pin to secure the jack to the caravan.

In practice, the gross height adjustment of the jack is made by extending the drop leg. The crank assembly can then be used for fine height adjustment.

As shown in figure 6, the inner housing 26 includes a pair of apertures 66 on opposing sides 67 of the inner housing 26. The apertures 66 are aligned on each side 67 of the inner housing 26 such that the apertures 66 extend through the inner housing 26.

The drop leg 28 includes a plurality of depressions 68. The depressions 68 are positioned as pairs on opposing sides 69 of the drop leg 28 and are positioned along an entire length or a portion of the length of the drop leg 28.

The drop leg 28 is selectively positioned relative to the inner housing 26 such that one of the pairs of depressions 68 of the drop leg 28 generally aligns with the pair of apertures 66 of the inner housing 26.

The jack 20 further includes a twin cam mechanism 70 that is operatively coupled with the inner housing 26. The twin cam mechanism 70 is capable of operatively engaging the inner

housing 26 and drop leg 28 between disengaged and engaged positions. The twin cam mechanism 70 is selectively moveable to a first position whereby the drop leg 28 is capable of moving relative to the inner housing 26, which is the disengaged position. The twin cam mechanism 70 is selectively moveable to a second position whereby the drop leg 28 is in a fixed position relative to the inner housing 26, which is the engaged position.

The twin cam mechanism 70 includes first and second guide members 74, 78 that extend from opposing sides 67 of the inner housing 26.

As shown in figure 6, the first guide member 74 includes a first generally hollow housing member 79 and the second guide member 78 includes a second generally hollow housing member 80.

The first housing member 79 includes a first slot 100 and the second housing member 80 includes a second slot 102 (figure 3). The first slot 100 includes first and second cam surfaces 104, 106 and the second slot 102 includes first and second cam surfaces 108, 110. The cam surfaces 104, 106, 108 and 110 generally form a closed periphery of the slots 100, 102.

The first and second guide members 74, 78 include first and second guides 112, 114, respectively (figures 4 and 5). The first and second guides 112, 114 are positioned within the housing members 79, 80, respectively.

As shown in figure 6, the first guide member 74 includes a first pin 120 and the second guide member 78 includes a second pin 124. The pins 120, 124 are retained within the first and second guides 112, 114, respectively of the housing members 79, 80. The pins 120, 124 are selectively positionable between first and second positions. In the first position, the pins 120, 124 are disengaged from the apertures 66 of the inner housing 26 and the one of the generally aligned pairs of depressions 68 in the drop leg 28. In the second position, the pins 120, 124 engage the apertures 66 of the inner housing 26 and one of the generally aligned pairs of depressions 68 of the drop leg 28, thereby axially retaining the drop leg 28 in a selectively fixed position relative to the inner housing 26 (i.e., the pins 120, 124 are in the engaged position).

The pins 120, 124 being in the first position releases the drop leg 28 relative to the inner housing 26 such that the drop leg 28 may extend and/or retract within the inner housing 26 (i.e., the pins 120, 124 are in the disengaged position). The pins 120, 124 in this first position provide quick elongation or retraction of the jack 20, or more specifically, the drop leg 28 relative to inner housing 26.

First and second compression springs 130, 134 are positioned between the first and second guides 112, 114, respectively. The biasing members 130, 134 are telescopingly engaged with the pins 120, 124. The biasing members 130, 134 bias the pins 120, 124 toward the inner housing 26 (i.e., in the second position) whereby the pins 120, 124 may engage the apertures 66 of the inner housing 26 and depressions of the drop leg 28, respectively.

The twin cam drop leg mechanism 70 further includes a handle 140 that is operatively engaged with the pins 120, 124. The handle 140 is actuated to selectively position the pins 120, 124 to and from the first and second positions to selectively allow movement of drop leg 28 relative to inner housing 26 and to generally prevent movement of drop leg 28 relative to the inner housing 26. Further, the biasing members 130, 134 biasing the pins 120, 124 toward the first position also serve to hold the handle 140 in a particular orientation, such as a generally elevated position. This prevents the handle 140 from falling toward the base plate 32 (i.e., the biasing members 130, 134 may serve to cause the handle 140 to seek one of two detent positions). The biasing members 130, 134 cause the handle 140 to position the pins 120, 124 against the surface 69 of the drop leg 28. This prevents the handle 140 from positioning to the engaged position unless and until the pins 120, 124 enter and engage the depressions 68 of the drop leg 28.

Referring to figure 4, the handle 140 includes a first handle portion 144 and a second handle portion 148. The first and second handle portions 144, 148 are each a generally L-shaped rod. The first handle portion 144 includes first and second end portions 152, 154 and the second handle portion 148 includes first and second end portions 156, 158. The first ends 152, 156 of the first and second handle portions 144, 148 are operatively coupled by a tubular connecting member 159. The second end portions 154, 158 are operatively engaged with the pins 120, 124, respectively.

The connecting member 159 slidably receives the first end portion 156 of the second handle portion 148 and is fixedly secured to the first end portion 152 of the first handle portion 144.

The second handle portion 148 is adjustable so that it may telescope or slide within the connecting member 159 relative to the first handle portion 144 (figures 7 and 8). This allows and maintains the required alignment as the distance between the first and second handle portions 144, 148 varies while the handle 140 is being actuated.

The first and second handle portions 144, 148 engage the cam surfaces 104, 106, 108, and 110 depending upon the position of the handle 140 and/or direction of impending travel. When the handle 140 is in the first position of figure 8 the first handle portion 144 engages the second cam surface 106 of the first slot 100 and the second handle portion 148 engages the second cam surface 110 of the second slot 102. When the handle 140 is pivoted to the second position of figure 7, the first handle portion 144 moves along the first slot 100 engaging the second cam surface 106 and the second handle portion 148 moves along the second slot 102 engaging the second cam surface 110.

In operation of the jack 20, the handle 140 is actuated or pivoted between the first and second positions. The first position is the disengaged position such as shown in figures 2, 4, and 8 and the second position is the engaged position such as shown in figures 3, 5, 6, and 7. In the engaged position, the drop leg 28 is fixed relative to the inner housing 26. The first pin 120 engages an aperture 66 of the first housing 26 and one of the pairs of depressions 68 of the drop leg 28 and the second pin 124 engages an aperture 66 of the first housing 26 and one of the pairs of depressions 68 of the drop leg 28.

The handle 140 is actuated, as indicated by the curved arrow of figure 8, from the second position or engaged position shown in figure 7 toward the first position or disengaged position shown in figure 8. During actuation of the handle 140 the first handle portion 144 transitions along the second cam surface 106 by following the first slot 100 and the second handle portion 148 transitions along the second cam surface 110 by following the second slot 102. During this transition, the handle portions 144, 148 move laterally away from the inner housing 26 and drop leg 28. This slides the pins 120, 124 against the biasing of the

biasing members 130, 134 and disengages them from the apertures 66 and the depressions 68.

To return the drop leg 28 to the second position, i.e., the engaged or fixed position, the drop leg 28 is positioned relative to the inner housing 26 such that the apertures 66 align with one of the pair of depressions 68. When generally aligned, the handle 140 is actuated, such as in a direction of the curved arrow shown in figure 7, toward the second position or engaged position.

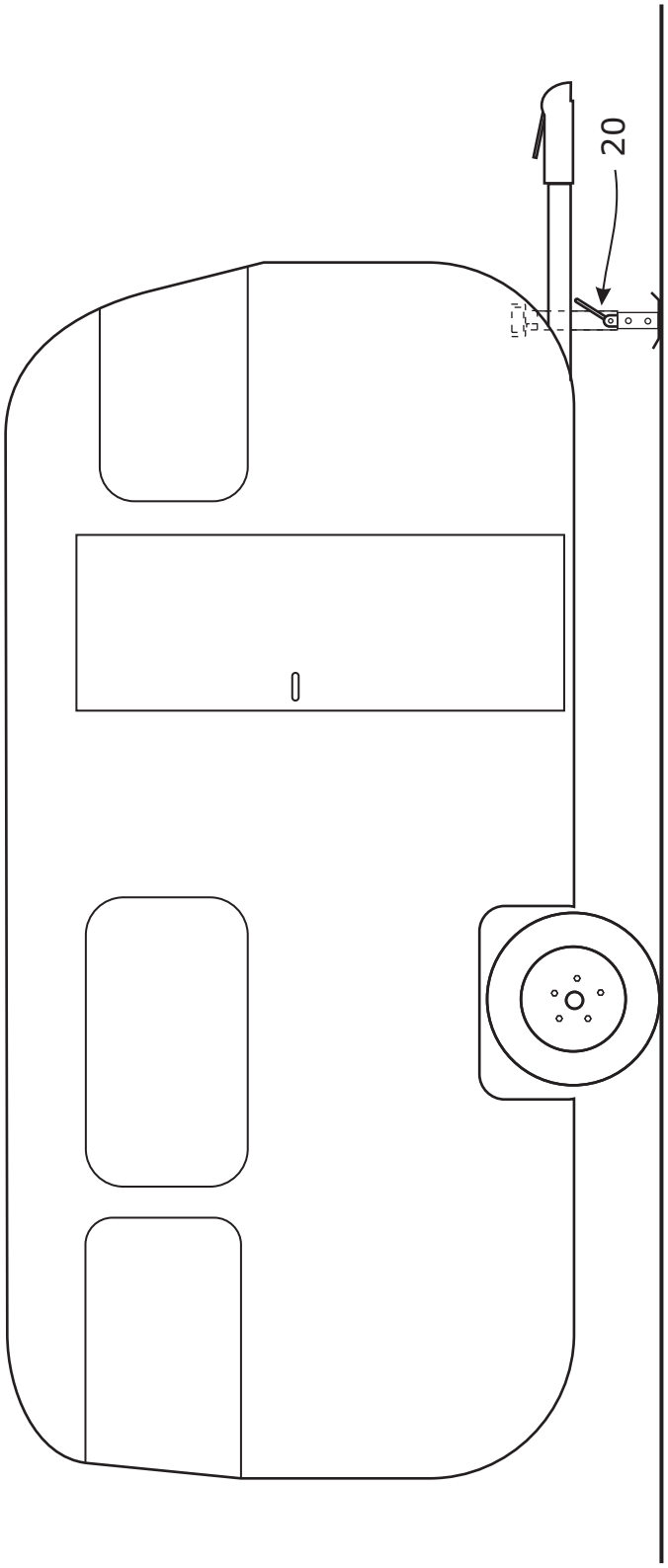

FIGURE 1

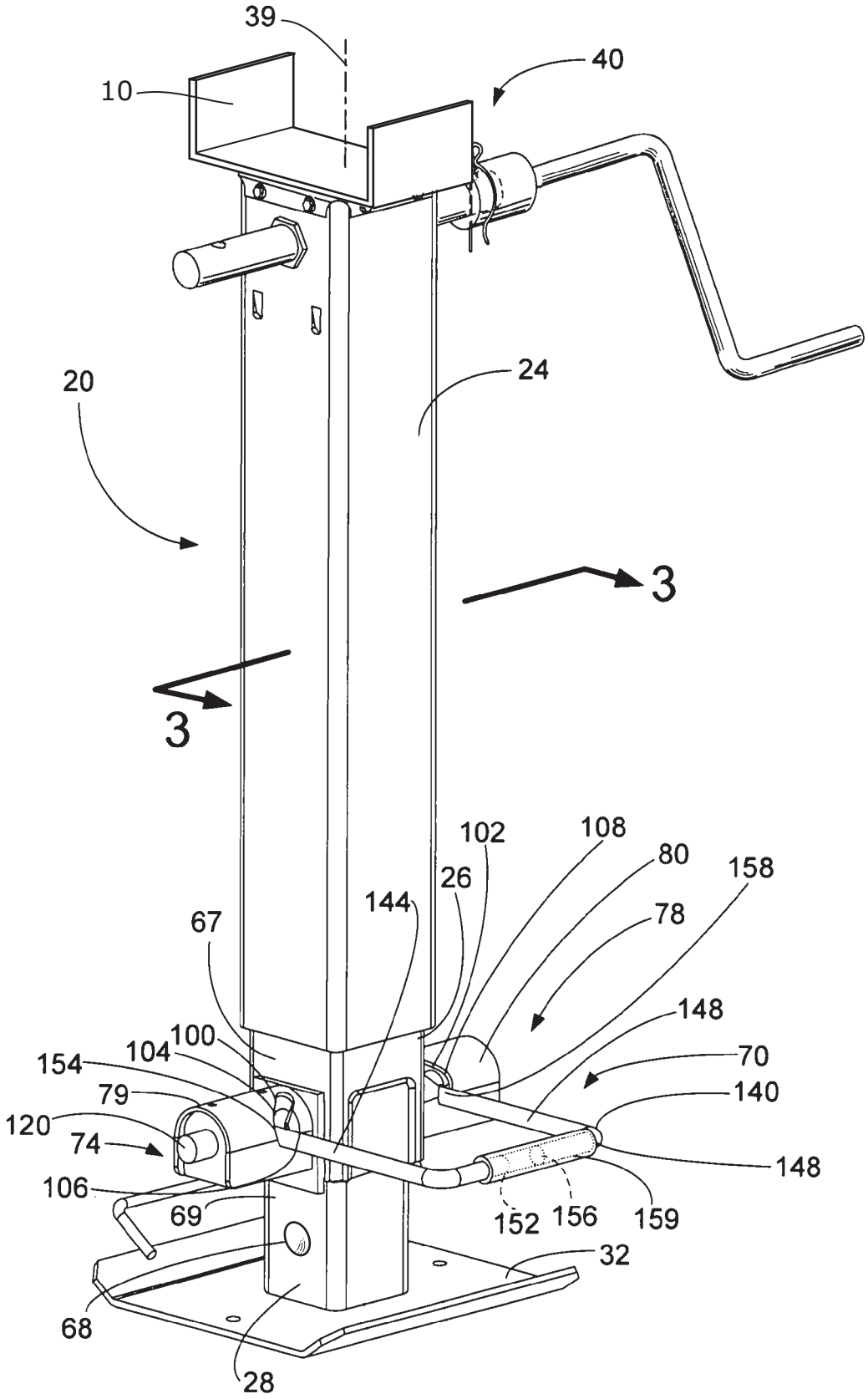
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FIGURE 2

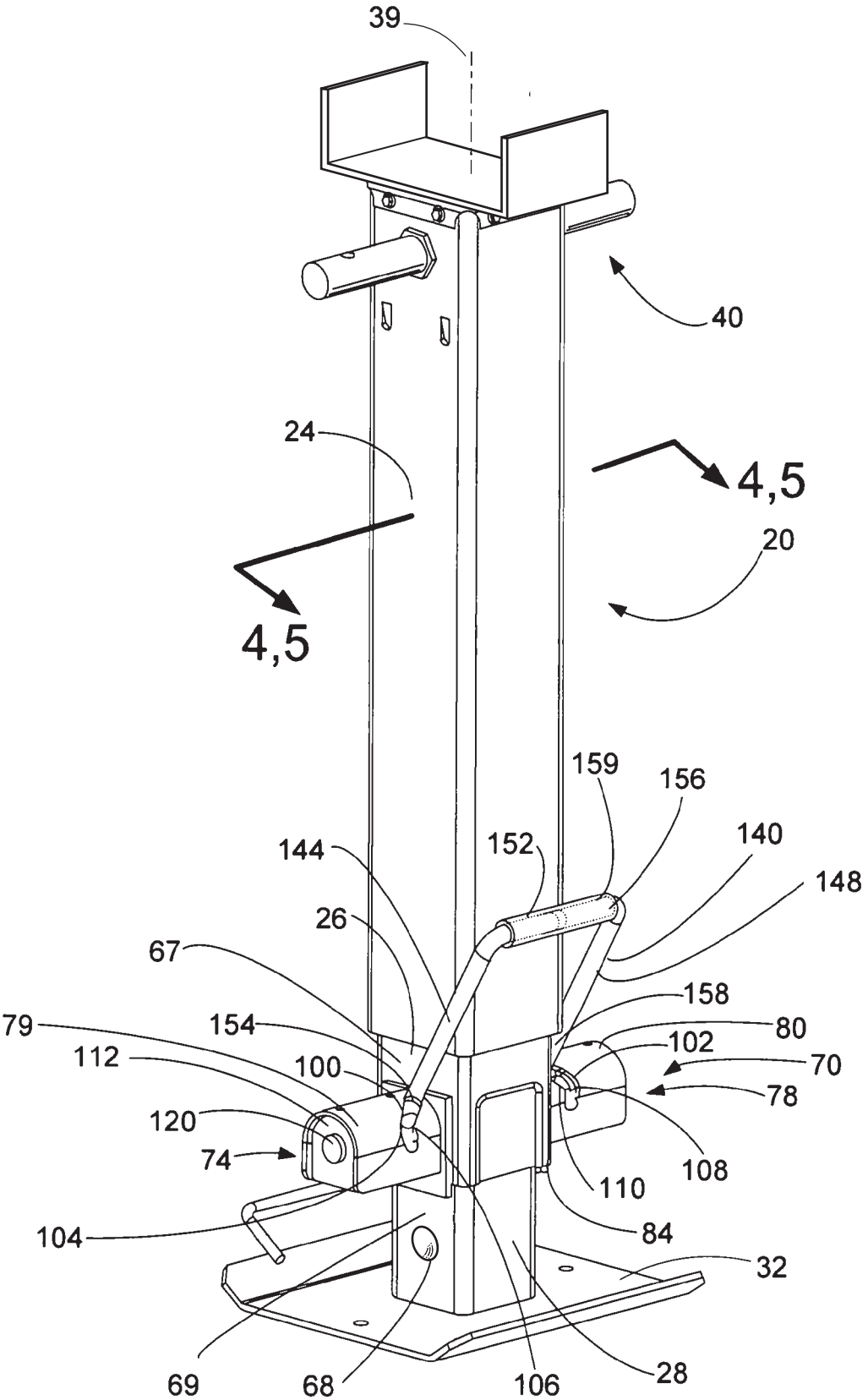
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FIGURE 3

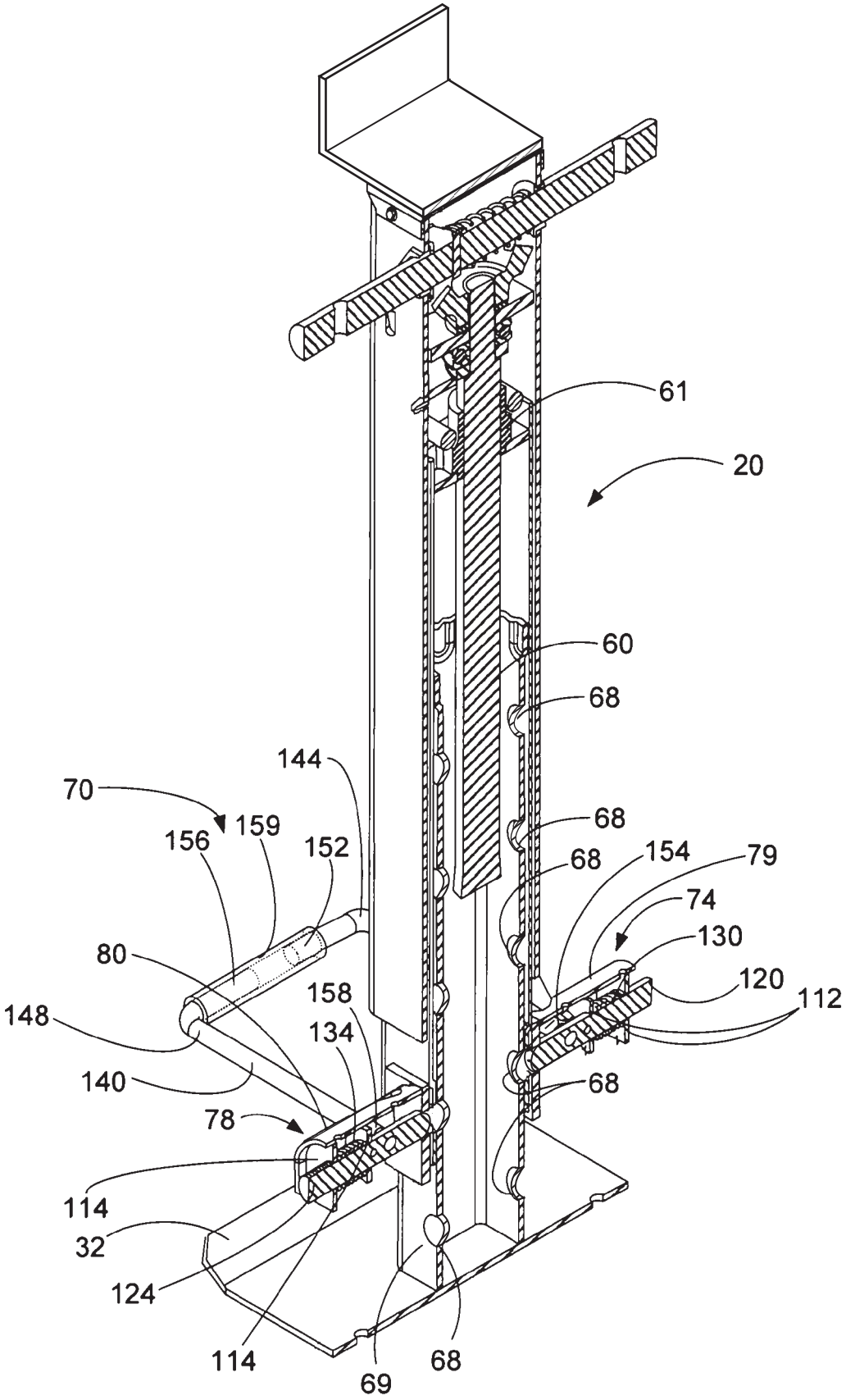
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FIGURE 4

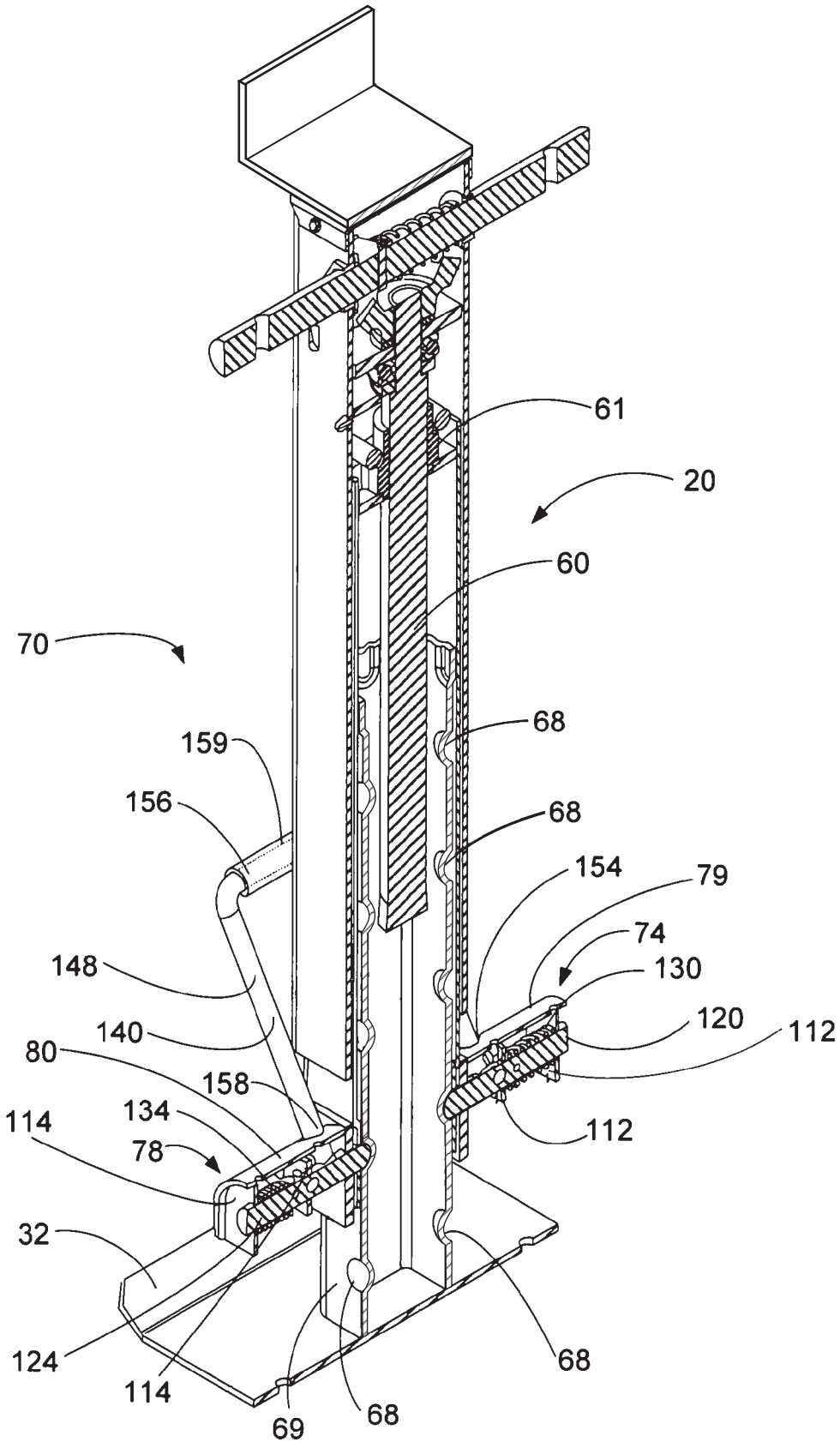
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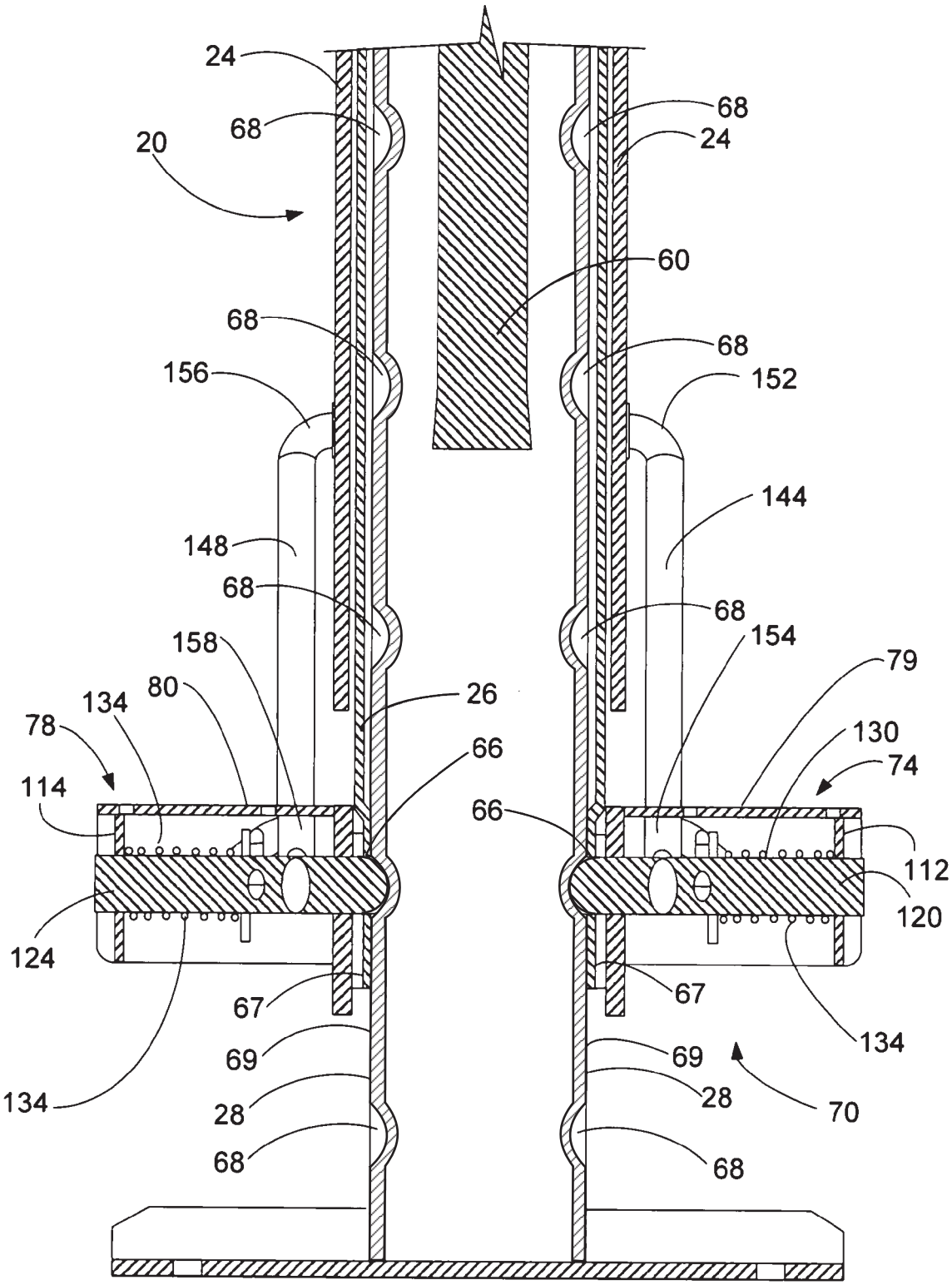
FIGURE 5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134
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FIGURE 6

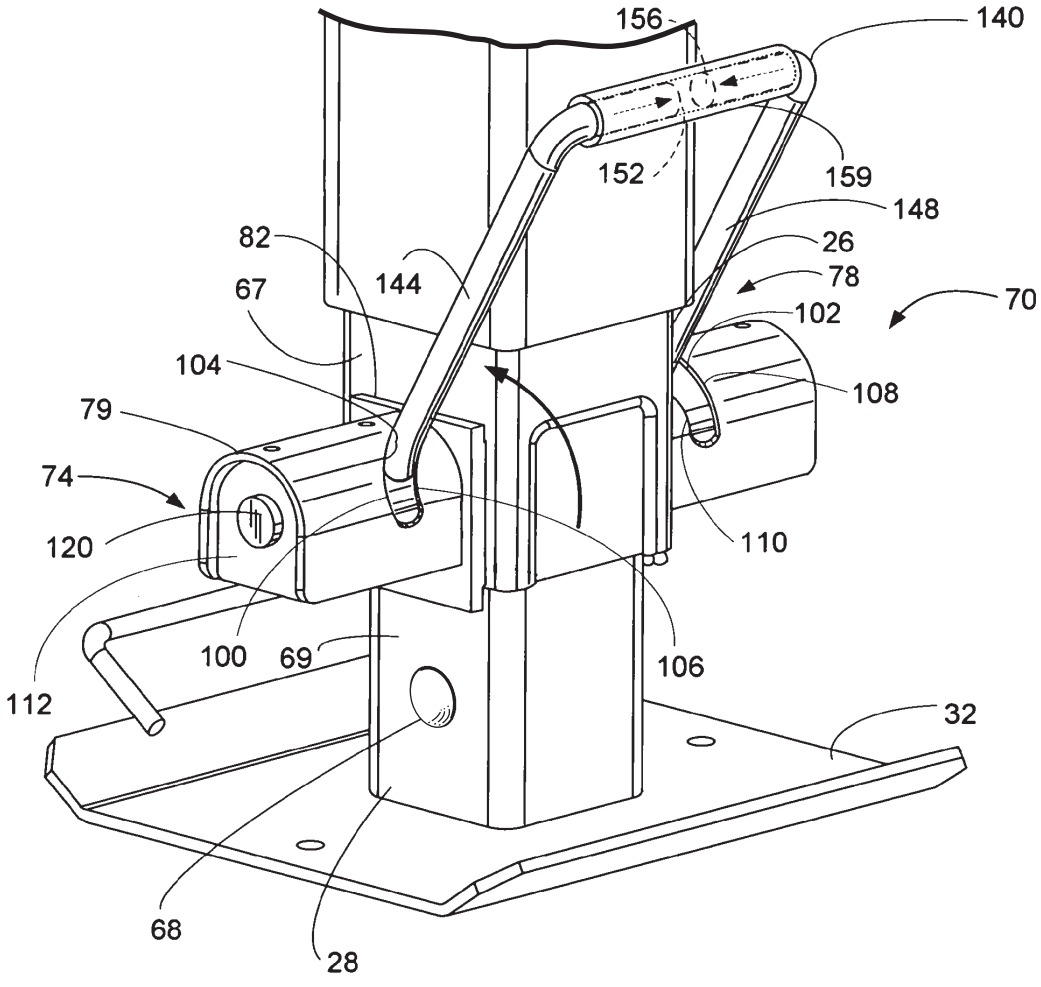
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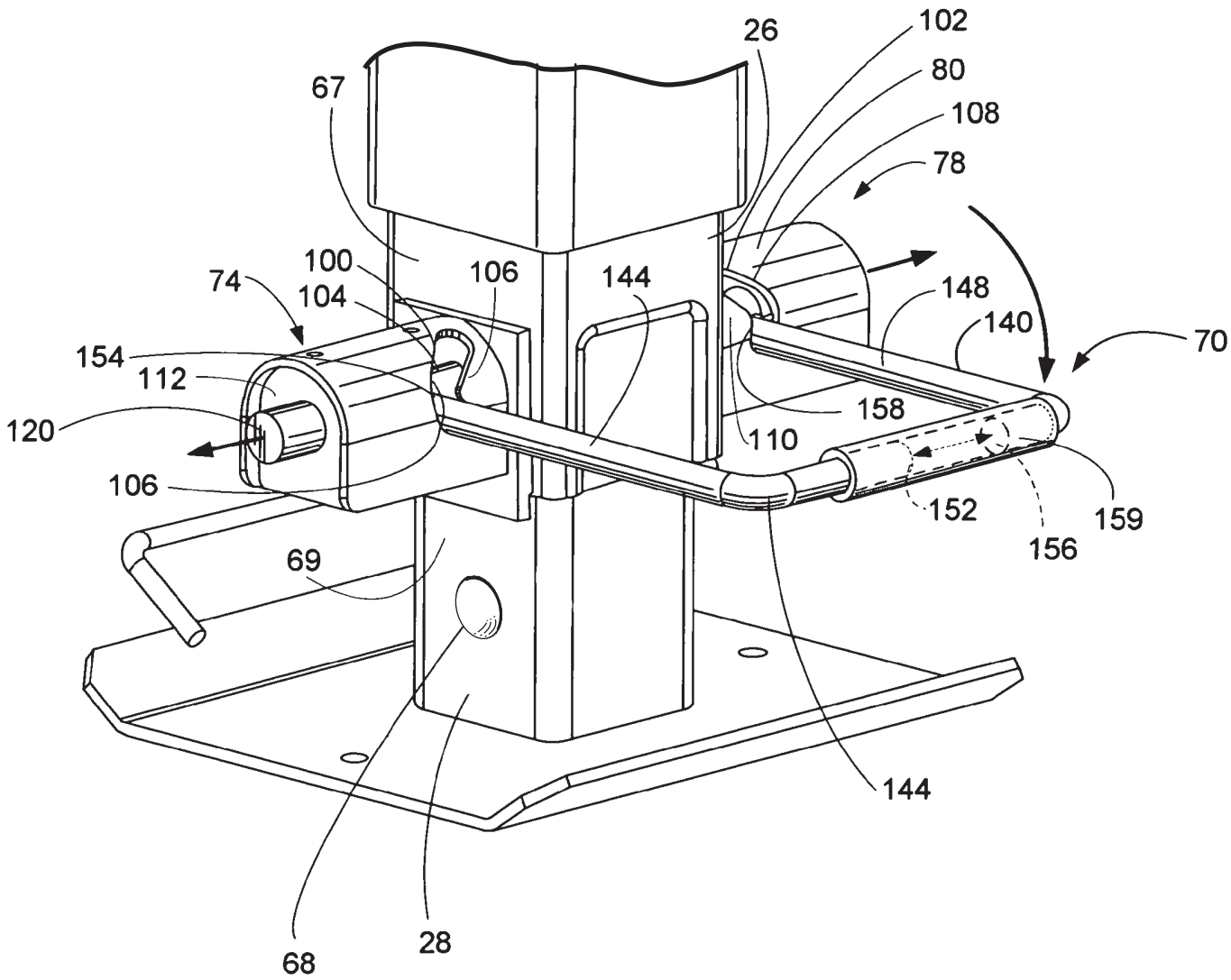
FIGURE 7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144
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FIGURE 8

D2—NZ 123456

LANDING GEAR FOR VEHICLE

FIELD OF THE INVENTION

This invention relates to landing gear for a vehicle and more particularly to landing gear for use on a trailer for supporting the trailer adjacent its forward end when the trailer is uncoupled from the vehicle used for pulling the trailer and parked.

BACKGROUND

Landing gear are used to support and stabilise stationary vehicles, such as trailers, when they are disengaged from the towing vehicle.

Landing gear of various types are known in the art. One type comprises a body for attachment to a vehicle (for example a trailer gooseneck) and an adjustable-length leg moveable up and down relative to the body, the adjustable length leg comprising an outer tubular member and an inner tubular member telescopically slidable in the outer tubular member to one of a plurality of adjusted positions relative to the outer tubular member for adjustment of the length of the leg, and a pin carried by the outer tubular member moveable in and out of one of a series of pin-receiving openings in the inner member for locking the inner member in any one of a plurality of adjusted positions lengthwise of the outer tubular member. It has been observed that with a single locking pin, the inner member may cant relative to the outer member. Also, in some prior art landing gear the inner and outer members may rotate relative to each other, causing misalignment of the openings.

Prior art landing gear with a similar adjustable-length leg and with two locking pins at opposite sides thereof for avoiding canting has performed satisfactorily, but is relatively expensive to manufacture.

It is an object of the present invention to provide an improved form of landing gear that prevents the inner member canting relative to the outer member.

SUMMARY OF THE INVENTION

In accordance with an aspect of the present invention there is provided a landing gear comprising:

a body for attachment to a vehicle;

an adjustable-length leg carried by the body for up and down movement relative to the body, comprising an outer tubular member and an inner member telescopically slidable in the outer tubular member;

means for releasably locking the inner member in any one of said plurality of adjusted positions relative to the outer tubular member comprising:

a first series of pin-receiving openings in one side of said inner member;

a second series of pin-receiving openings in the opposite side of said inner member;

a first pin slidable between a locking position extending into one of the pin-receiving openings of the first series in the inner member and a retracted position;

a second pin slidable between a locking position extending into one of the pin-receiving openings of the second series in the inner member and a retracted position;

a pair of cam formations;

a handle engaging with the cam formations, where the handle is interconnected with the pins and is swingable about the axis of the pins between a first and a second position.

The landing gear may include first and second pin guides extend from the outer tubular member coaxial with the holes in the outer tubular member at opposite sides of the outer tubular member.

Preferably the cam formation is located at the outer end of each pin guide.

The handle may comprise a spring member having a hand grip portion and spring arms extending laterally from the hand grip portion, wherein the spring arms have free end portions interconnected with the outer end portions of the pins and exerting a spring bias on the pins tending to move them inwardly to their locking positions.

Preferably the spring arms engage with the cam formations and are cammed out to move the pins out when the handle is swung from its first to its second position and being allowed to move in when the handle is swung from its second to its first position.

The cam formation at the outer end of each guide may comprise a pair of generally V-shaped notches, the end of each arm riding up one of the sides of the respective notches and thus being cammed outwardly when the handle is swung from its first to its second position.

Preferably the formation at the outer end of each guide includes a pair of detent notches located between the V-shaped notches, the ends of the arms being received in the detent notches for detaining the handle in its said second position wherein the pins are retracted.

The landing gear may include at least one annular sleeve bearing around the inner member.

The term 'comprising' as used in this specification and claims means 'consisting at least in part of'. When interpreting each statement in this specification and claims that includes the term 'comprising', features other than that or those prefaced by the term may also be present. Related terms such as 'comprise' and 'comprises' are to be interpreted in the same manner.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be described by way of example only and with reference to the accompanying drawings in which:

Figure 1 is a side elevation view of a landing gear of this invention,

Figure 2 is a central vertical section of the landing gear taken on line 2-2 of Figure 1,

Figure 3 is a horizontal transverse section on line 3-3 of Figures 1 and 2,

Figure 4 is a view similar to Figure 3 showing the pins in their outer retracted position,

Figure 5 is a view similar to Figure 1 with the body of the landing gear broken away to show detail of the outer tubular member of the adjustable-length leg of the landing gear,

Figure 6 is a view similar to Figure 5 further broken away to show detail of the inner tubular member of the adjustable-length leg of the landing gear and other detail.

Figure 7 is an enlarged view on line 7-7 of Figure 5 of a pin guide of the landing gear.

Figure 8 is an enlarged view on line 8-8 of Figure 5 of the pin guide (at 90^{o} to Figure 7),

Figure 9 is an enlarged fragment of Figure 2 showing the pins of the landing gear in their outer retracted position,

Figure 10 is a view similar to Figure 9 showing the inner tubular member of the adjustable-length leg in an extended position and showing the pins locking the inner tubular member in the extended position.

Corresponding reference characters indicate corresponding parts throughout several view of the drawings.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings, a landing gear of this invention for a vehicle such as a trailer (not shown) is shown to comprise a body **1**, more particularly a steel tube of square cross-section,

for attachment to the vehicle in suitable well-known manner, for example by means of a bracket (not shown), in position for supporting the vehicle when the vehicle is parked, and an adjustable-length leg designated in its entirety by the reference numeral **3** (which may be referred to as a "drop leg") carried by the body for up and down movement relative to the body.

The adjustable-length leg comprises an outer (upper) tubular leg member **5** and an inner (lower) tubular leg member **7** telescopically slidable in the outer tubular member **5** to any one of a plurality of adjusted positions relative to the outer tubular member for adjustment of the length of the leg. As herein illustrated, the outer tubular member **5** comprises a steel tube of square cross-section having a sliding fit in the tubular body **1** (which is of square cross-section), and the inner tubular leg member **7** comprises a steel tube of square cross-section having a sliding fit in the outer tubular leg member **5**.

Members **1**, **5** and **7** being of square cross-section, member **5** is held against rotation in member **1** and member **7** is held against rotation in member **5**.

At **9** is generally indicated means of this invention for releasably locking the inner member **7** in any one of a plurality of adjusted positions lengthwise of the outer member **5**. The inner leg member **7** has a foot **11** at its lower end constituted by a square steel plate and is shown as biased upwardly relative to the outer leg member **5** by a coil tension spring **13** toward a raised retracted position in the outer leg member **5** wherein the foot **11** engages the lower end of the outer leg member. At **15** (Figure 2) is generally indicated means for effecting a relatively fine up and down adjustment of the adjustable-length leg **3** as a whole relative to the body **1**.

The locking means **9** comprises a first series generally designated **17** of pin-receiving openings **19** in one side of the inner tubular leg member **7** spaced at intervals along its length, and a second series generally designated **21** of pin-receiving openings **23** in the opposite side of the inner tubular leg member spaced at intervals along its length corresponding to the spacing of the openings of the first series. Each opening of each series is aligned and paired with an opening of the other. The outer tubular leg member **5** has first and second holes **25** and **27** at opposite sides thereof, the first hole **25** being coplanar with the first series **17** of pin-receiving openings **19** in the inner member, the second hole **27** being coplanar with the second series **21** of pin-receiving openings **23** in the inner member. The outer tubular leg member has first and second tubular pin guides **29** and **31** extending laterally outwardly therefrom coaxial with the holes **25** and **27** in the outer tubular member **5** at opposite sides of the outer tubular member. Each of these pin guides has an open inner end at the outer tubular member **5** and an open outer end spaced outwardly from the outer tubular member. A first pin **33** is axially slidable in the first pin guide **29** between an inner locking position (Figures 2 and 3) extending into one of the pin-receiving openings **19** of the first series **17** of openings in the inner member **7** and an outer retracted position (Figures 3 and 9) clear of the inner member **7**. A

second pin **35** is axially slidable in the second pin guide **31** between an inner locking position (Figures 2 and 3) extending into one of the pin-receiving openings **23** of the second series **21** of openings in the inner member **7** and a retracted position (Figures 4 and 10) clear of the inner member **7**. The pins **33** and **35** are coaxial. In their retracted position, their outer ends **33a**, **35a** (see Figure 4) extend out of the outer ends of the pin guides **29**, **31**.

At **37** is indicated a handle having a hand grip portion designated **39** and spring arms each designated **41** extending laterally from the hand grip portion. The spring arms **41** have free end portions **41a** which are curved as shown in Figures 2, 4 and 9 interconnected with the outer end portions of the pins **33** and **35** and exerting a spring bias on the pins tending to move them inwardly (as indicated by the arrows in Figures 2 and 9) to their locking positions. The handle **37** is swingable about the axis of the pins between a first position (its raised position shown in solid lines in Figure 1) and a second position (its lowered position shown in phantom Figure 1).

At **45** is generally indicated means for effecting outward movement of the pins **33** and **35** in the guides **29** and **31** from their inner locking position (Figures 2 and 3) to their outer retracted position (Figures 4 and 9) against the spring bias on the pins of the spring arms **41** of the handle **37** on swinging movement of the handle from its first (raised) position (shown in solid lines in Figures 1, 2 and 3) to its second (lowered) position (shown in phantom in Figure 1 and in solid lines in Figure 9) and allowing inward movement of the pins in the guides from their retracted to their locking position under the said spring bias of the arms on the pins on swinging movement of the handle from its second to its first position. The pins **33** and **35** are rotatable in the guides **29** and **31** as well as axially slidable in the guides. The curved end portions **41a** of spring arms **41** of the handle **37** extend through holes **47** in the outer end portions of the pins so that the pins rotate on their axis in the pin guides on swinging the handle one way or the other.

The means **45** for effecting the outward movement of the pins from their inner locking position of Figure 3 to their outer retracted position of Figure 4 comprises a cam formation generally designated **49** (see Figures 3, 4, 7, and 9) at the outer end of each guide, the curved end portions **41a** of the spring arms engaging these cam formations and being cammed out to move the pins out when the handle is swung from its first to its second position, and being allowed to move in when the handle is swung from its second to its first position.

The cam formation **49** at the outer end of each guide comprises a pair of generally V-shaped notches **51** in the end of the guide spaced at 180^{o} intervals around the end of the guide, the end of each arm **41** riding up one of the sides of the respective notches and thus cammed outwardly when the handle is swung from its first to its second position. The cam formation at the outer end of each guide includes a pair of detent notches **53** located between the V-shaped notches **51**, the curved free ends of the arms **41** being received in the detent notches for

detaining the handle in its second position wherein the pins are retracted (see Figure 9). The arrangement is such that, for parking the vehicle on which the landing gear is used, the inner leg member **7** may be released to allow it to be pushed down relative to the outer leg member **5**, then pushed down against the return bias of the spring **13** to the point where the foot **11** engages the ground, then released to be moved upward by the spring **13** to the point where the pins **33** and **35** slide into locking position in the first set of pin-receiving openings **19**, **23** in the inner member **7** which they encounter, and means **15** then operated to effect a fine adjustment bringing the foot back down into engagement with the ground.

In detail, the outer leg member **5** has a nut designated in its entirety by the reference numeral **55** secured thereto at its upper end, the outer leg member **5** extending down from the nut in the tubular body **1** of the landing gear. The nut is threaded on an adjusting screw **57** which extends down from adjacent the upper end of the body **1** within the inner tubular leg member **7** on the vertical axis of the body **1** and the two leg members **5** and **7** to a point somewhat above the level of the pin guides **29** and **31**. The nut **55**, carrying the outer tubular leg member **5**, is adapted to be driven up by the screw **57** to an upper limit wherein the nut engages a limit stop **81** constituted by a collar on the screw. At **85** is indicated a lower limit stop on the screw adjacent its lower end for limiting the downward travel of the nut on the screw.

At **87** is generally indicated means for driving the screw **57** comprising a bevel gear **89** secured on the upper end of the screw above a washer **91**, with a lock **93** for locking the gear on the screw, and a bevel gear **95** meshing with the gear **89** fixed on a shaft **97.** The shaft **97** extends out of the body **1** at one side thereof, having an extension **107** on which a crank **109** is pivoted at **111**. The crank is moveable between the operating position in which it is illustrated in solid lines in Figure 2 and the storage position in which it is illustrated in phantom in Figure 2. When in operating position, it may be turned for rotating the shaft **97** to rotate gear **95** for driving gear **89** to rotate the screw **57** in one direction or the other to drive the nut **55** and the outer leg member **5** up and down for fine adjustment of the adjustable-length leg **3** (constituted by the leg members **5** and **7**) up and down relative to the body **1**.

The spring **13** surrounds the screw **57** in coaxial relation with respect to the screw and the nut **55**, being secured at its upper end to the lower end of the nut as indicated at **113** and being secured at its lower end to the foot **11** at the lower end of the inner tubular leg as indicated at **115**.

Annular bearings **140** and **141** are located around inner leg member **7**, the bearings preventing the inner leg member **7** and outer leg member **5** canting relative to each other.

Preferred embodiments of the invention have been described by way of example only and modifications may be made thereto without departing from the scope of the invention.

CLAIMS

1. Landing gear for a vehicle comprising:

   a body attached to a vehicle;

   an adjustable-length leg carried by the body for up and down movement relative to the body, comprising an outer tubular member and an inner member telescopically slidable in the outer tubular member;

   means for releasably locking the inner member in any one of a plurality of adjusted positions relative to the outer tubular member, comprising at least one series of pin-receiving apertures in one side of the inner member;

   at least one pin slidable between a locking position extending into one of the pin-receiving apertures in the inner member and a retracted position;

   at least one cam formation;

   a handle engaging with the cam formation, where the handle is interconnected with the pin and is swingable about the axis of the pin between a first and a second position.

2. Landing gear as claimed in claim 1 having:

   a first series of pin receiving apertures in one side of the inner member;

   a second series of pin receiving apertures in the opposite side of the inner member;

   a first pin slidable between a locking position extending into one of the pin-receiving apertures in the inner member and a retracted position;

   a second pin slidable between a locking position extending into one of the pin-receiving apertures in the inner member and a retracted position;

   a pair of cam formations.

3. Landing gear as claimed in claim 2 having first and second pin guides extending from the outer tubular member coaxial with the holes in the outer tubular member at opposite sides of the outer tubular member.

4. Landing gear as claimed in claim 3 wherein the cam formation is located at the outer end of each pin guide.

5. Landing gear as claimed in any one of the preceding claims wherein the handle comprises a spring member having a hand grip portion and spring arms extending laterally from the hand grip portion and wherein the spring arms have free end portions interconnected with the outer end portions of the pins and exerting a spring bias on the pins tending to move them inwardly to their locking positions.

6. Landing gear as claimed in claim 5 wherein the spring arms engage with the cam formations and are cammed out to move the pins out when the handle is swung from its first to its second position and being allowed to move in when the handle is swung from its second to its first position.

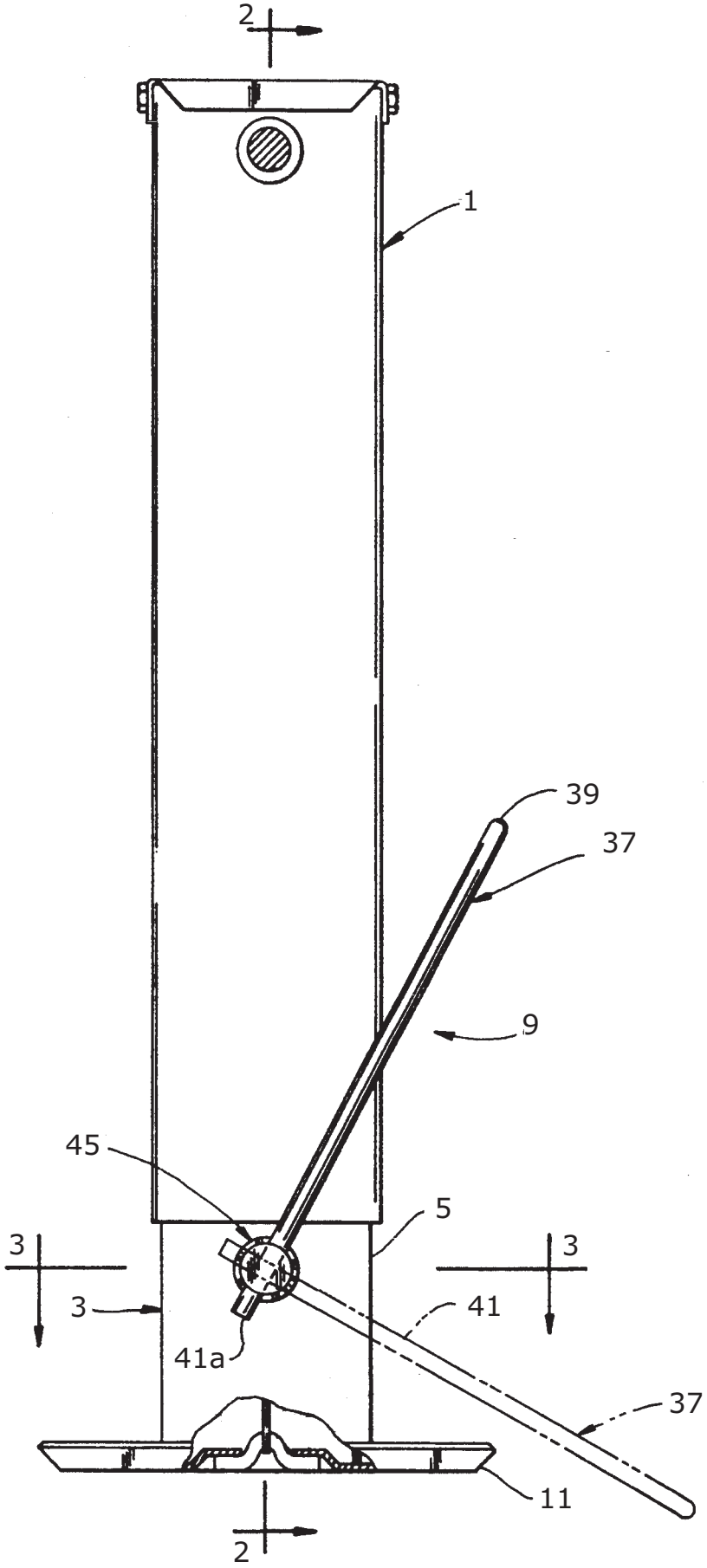
7. Landing gear as claimed in claim 6 wherein the cam formation at the outer end of each guide comprises a pair of generally V-shaped notches, the end of each arm riding up one of the sides of the respective notches and thus being cammed outwardly when the handle is swung from its first to its second position.

8. Landing gear as claimed in claim 7 wherein the formation at the outer end of each guide includes a pair of detent notches located between the V-shaped notches, the ends of the arms being received in the detent notches for retaining the handle in its said second position wherein the pins are retracted.

9. Landing gear as claimed in any one of the preceding claims having at least one annular sleeve bearing around the inner member.

10. Landing gear substantially as herein described with reference to the accompanying drawings.

FIGURE 1



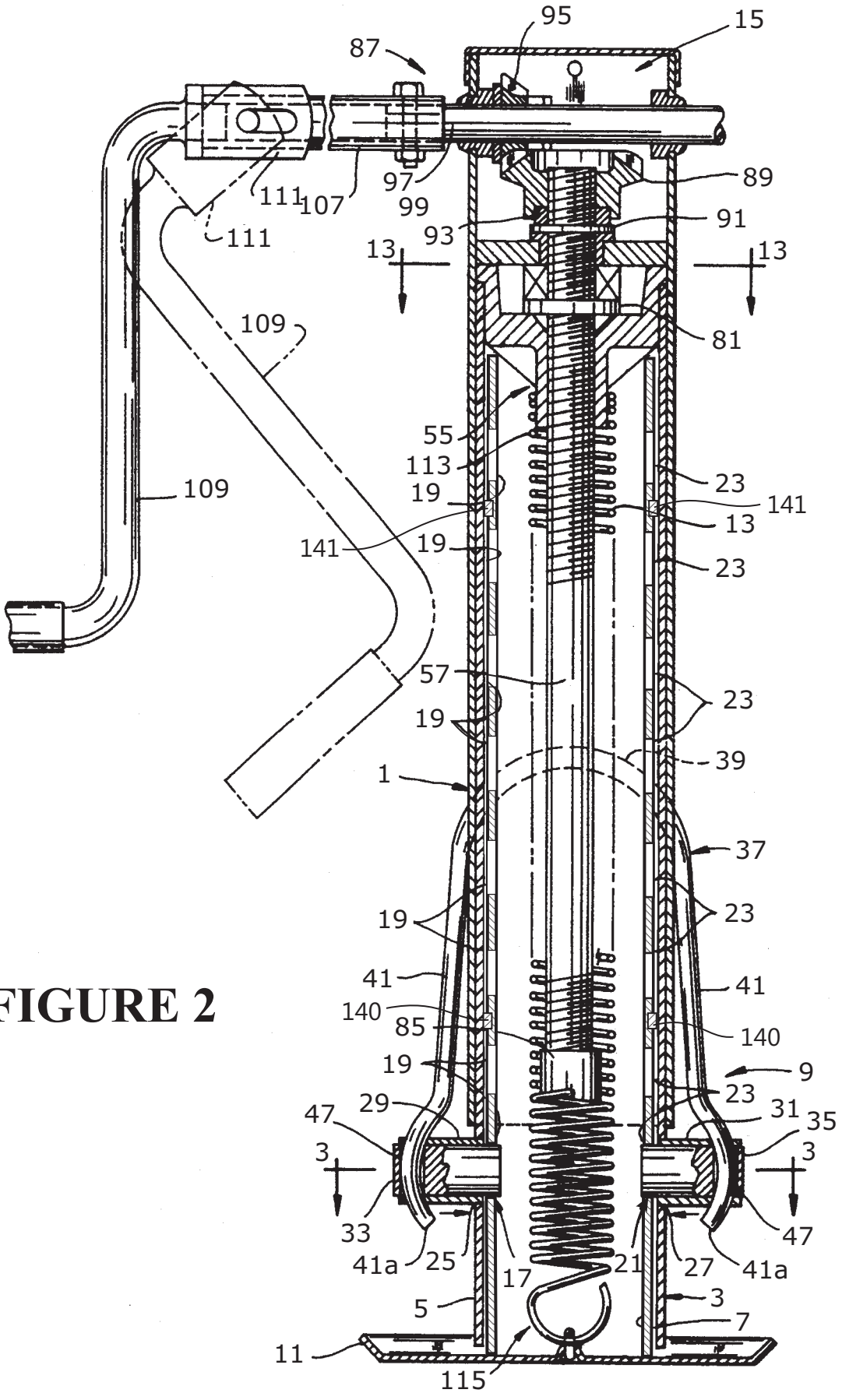

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FIGURE 2

FIGURE 2A

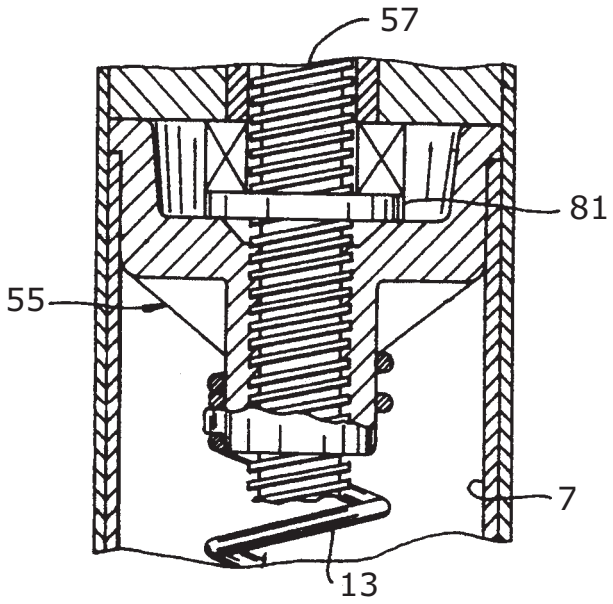
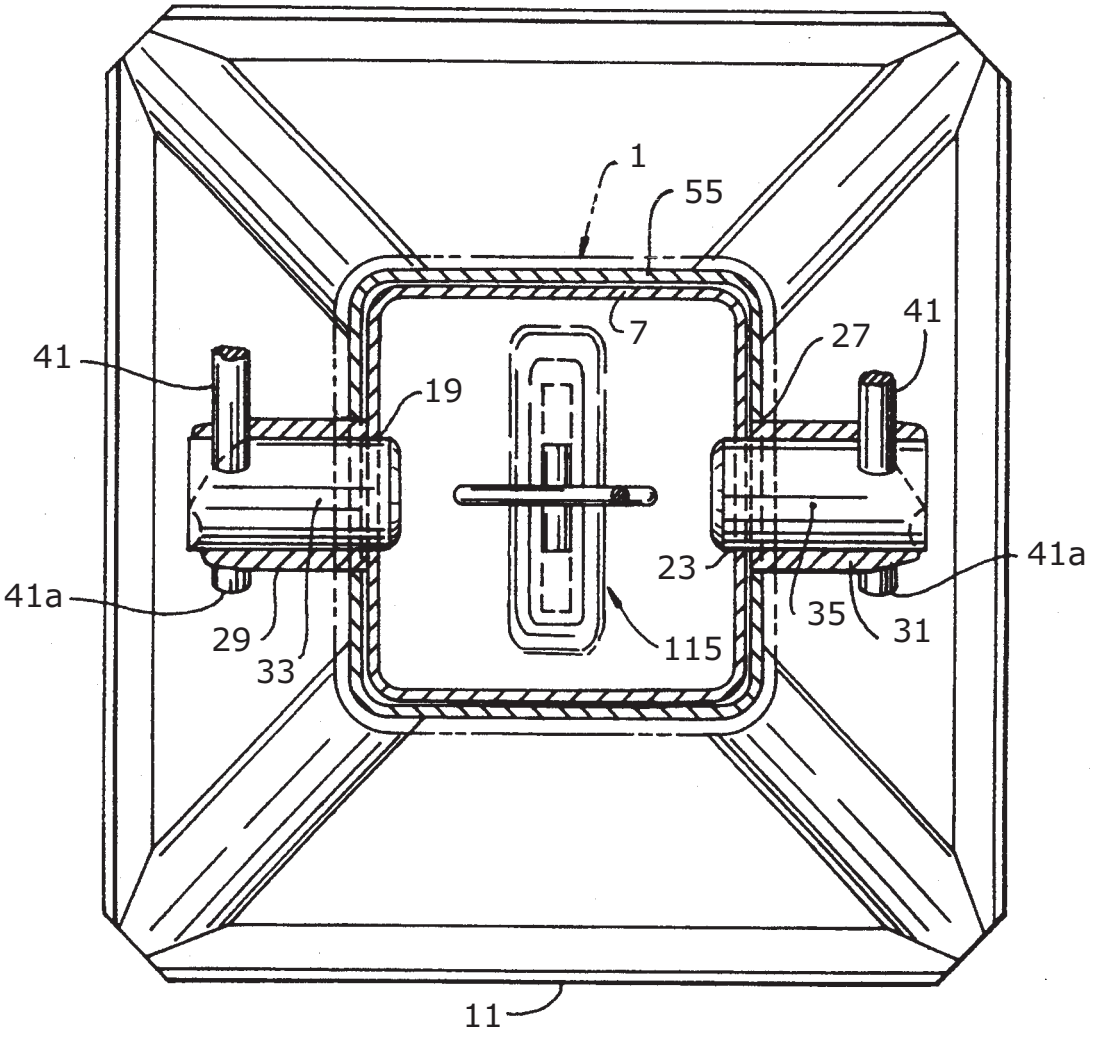


FIGURE 3



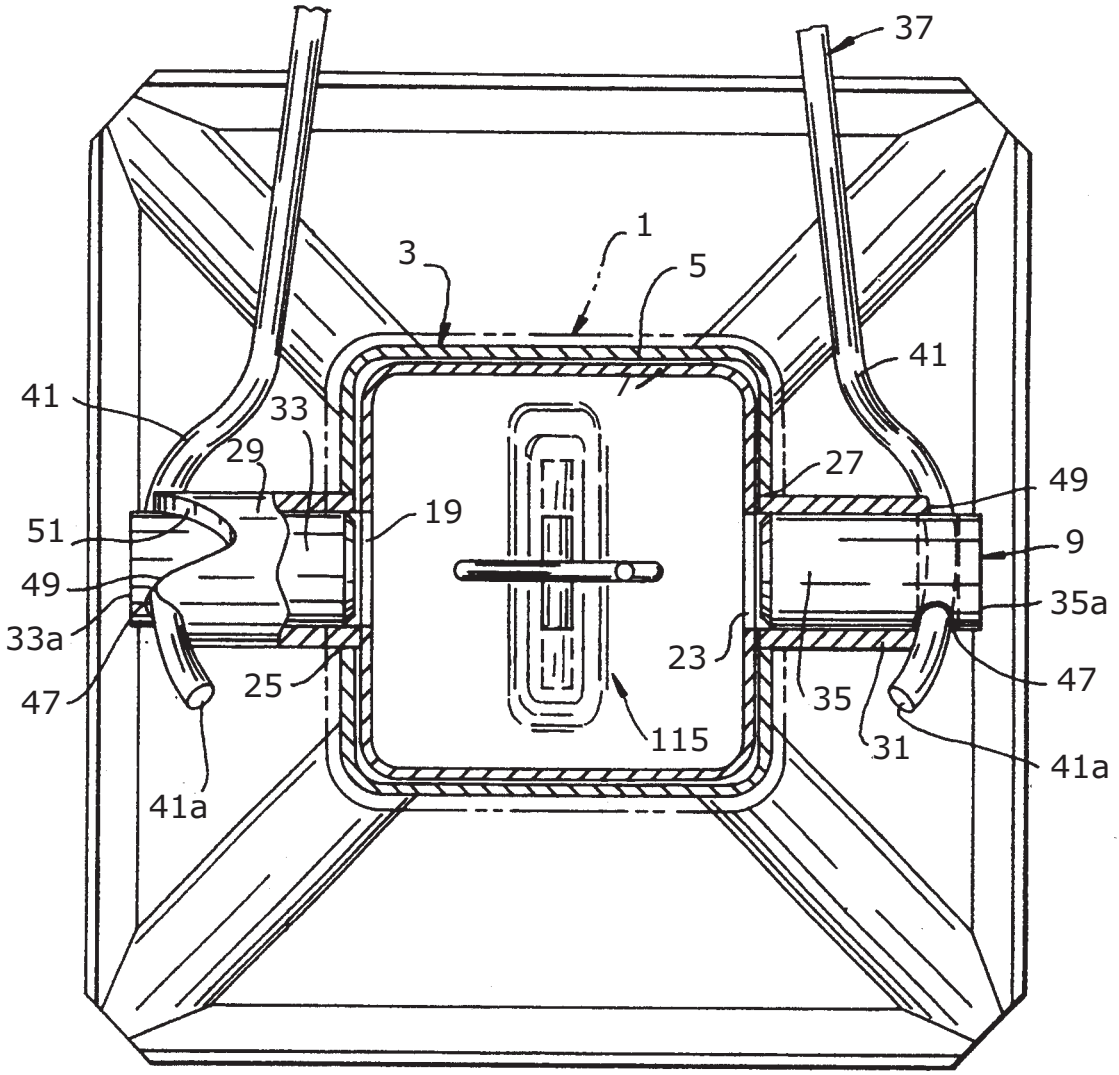

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FIGURE 4

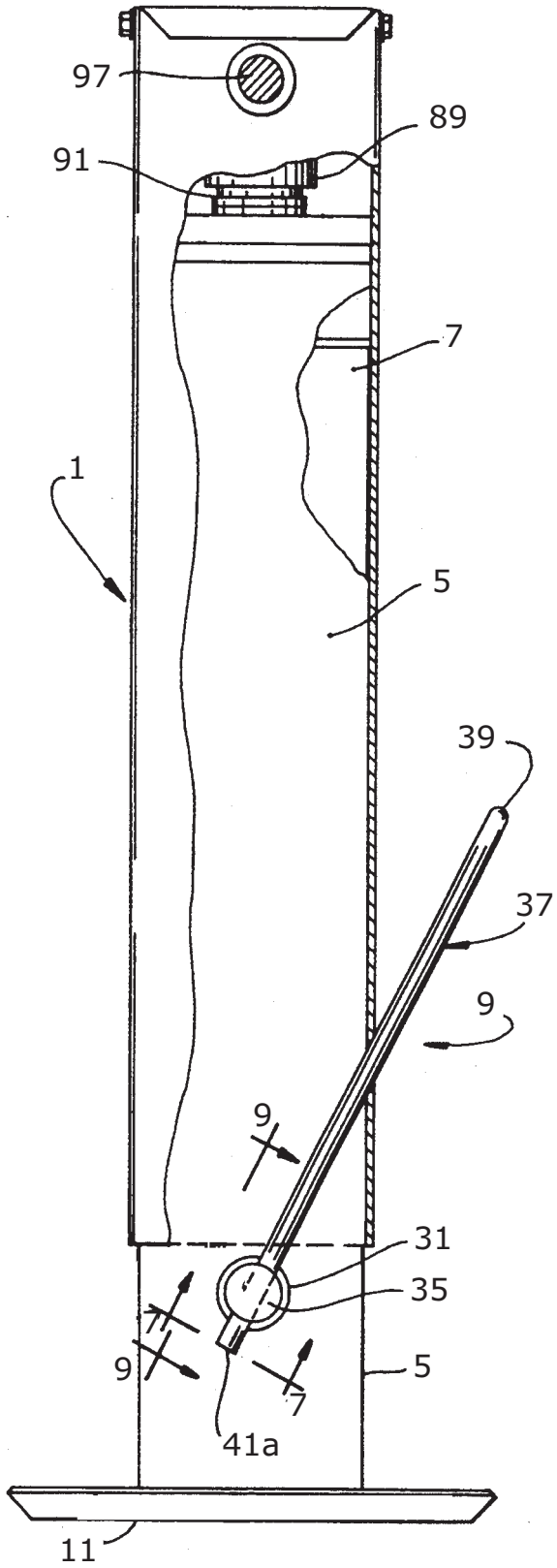


FIGURE 5

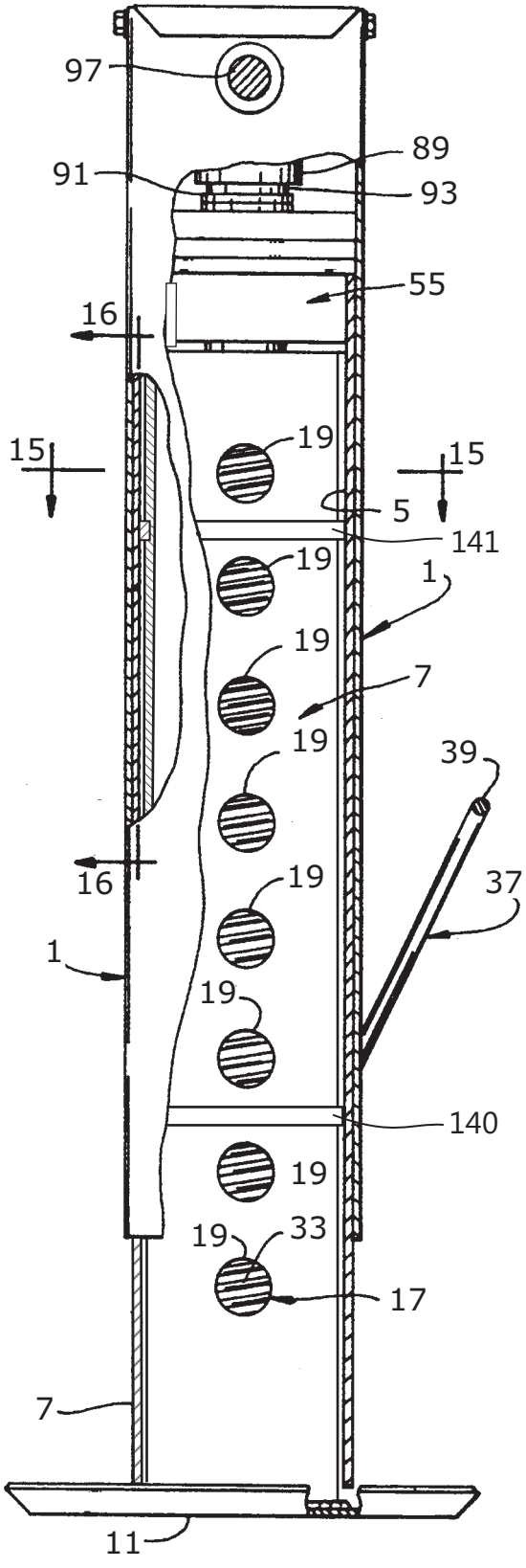


FIGURE 6

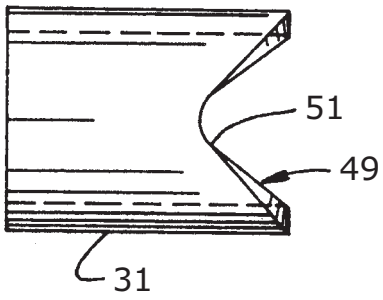


FIGURE 7

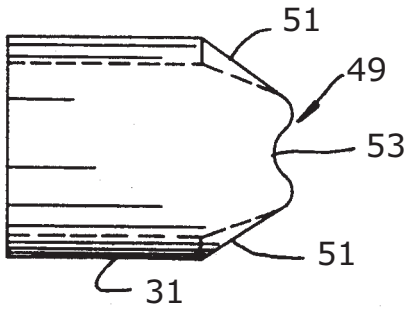
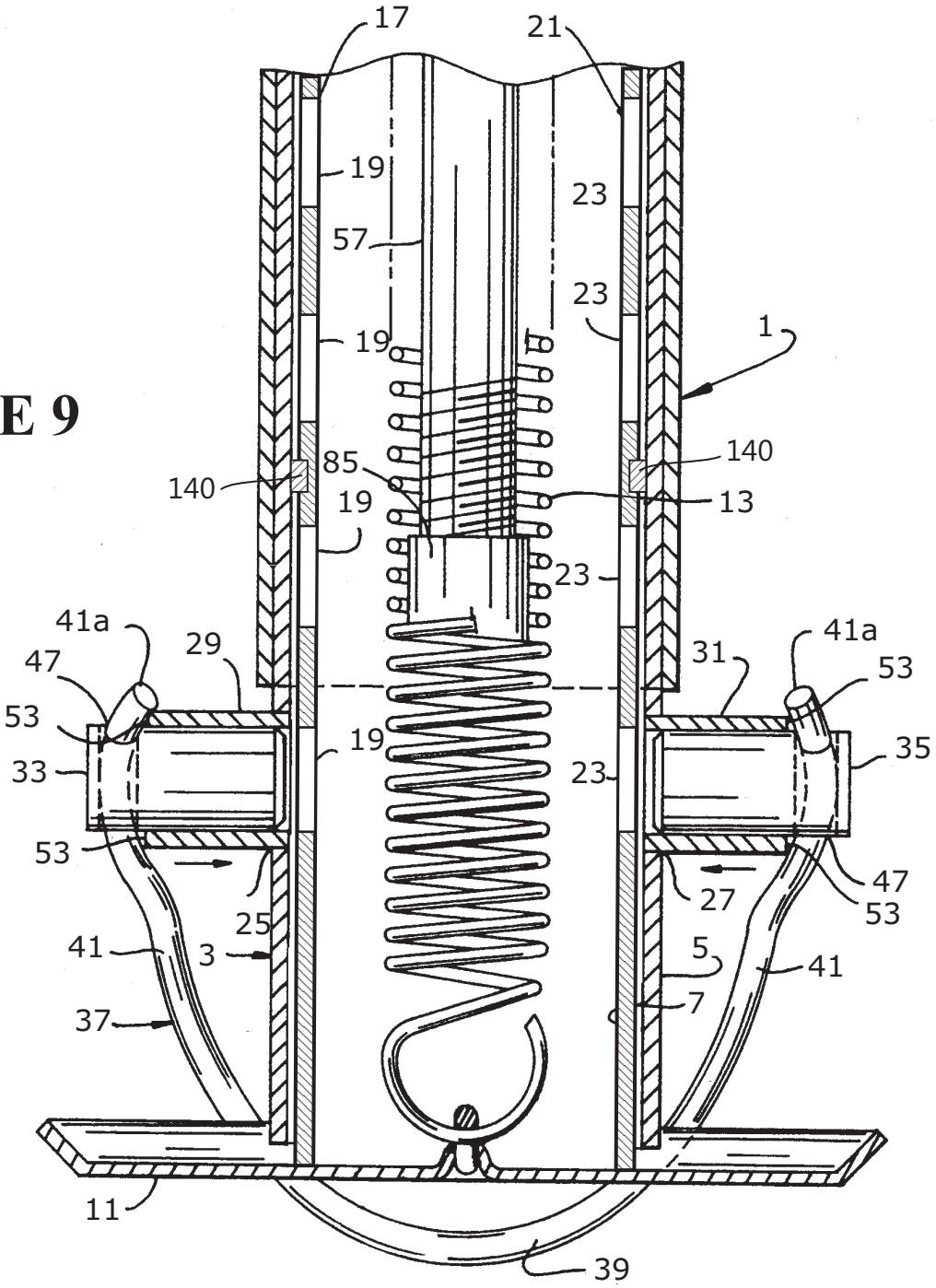


FIGURE 8

FIGURE 9



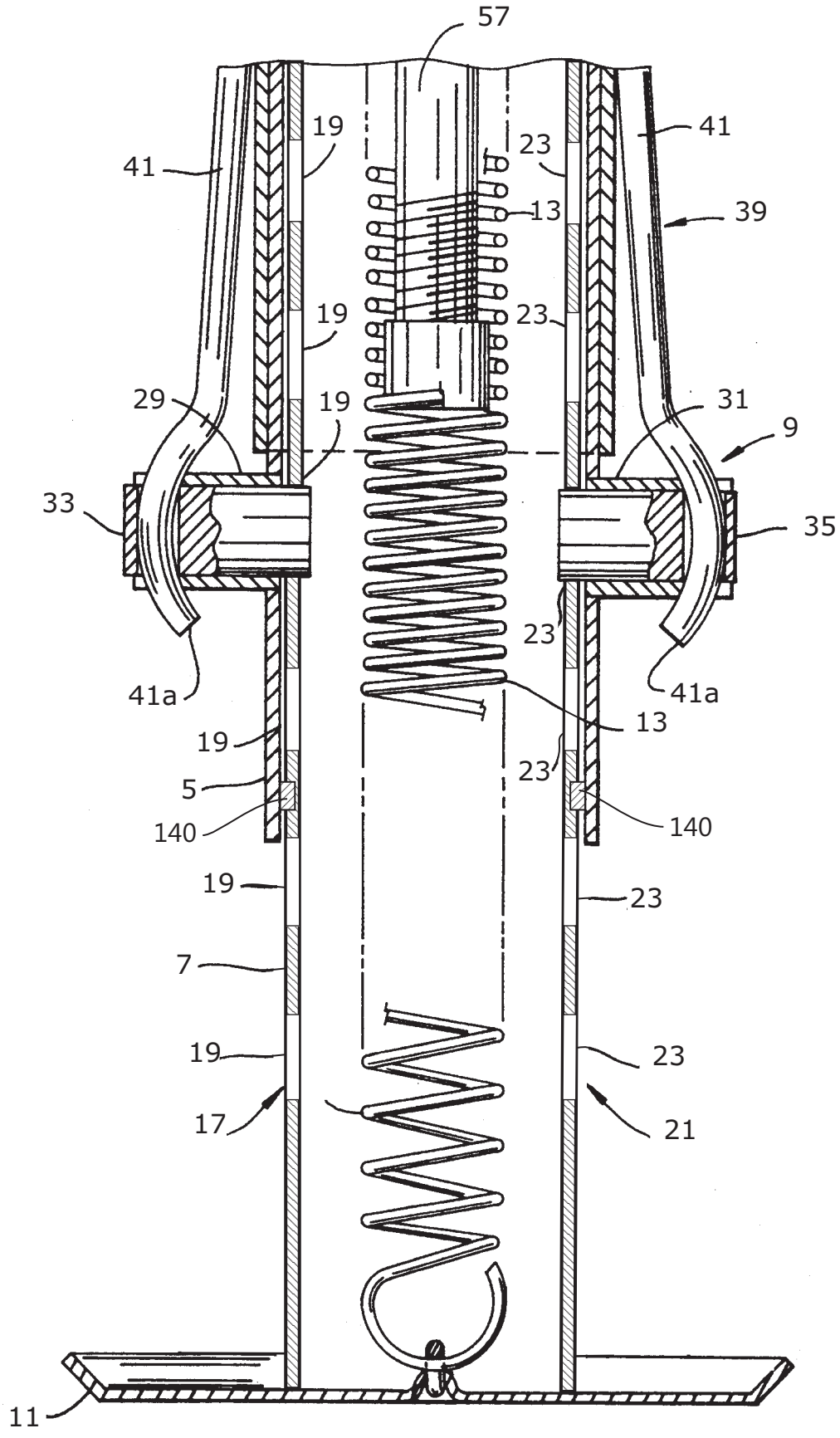

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FIGURE 10

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McMahan

(10) **Patent No.: US 8,091,922 B2**
(45) **Date of Patent: Jan. 10, 2012**

(54) **TRAILER JACK CAPABLE OF RAPID GROSS AND INCREMENTAL ADJUSTMENTS IN THE HEIGHT OF A TRAILER**

(76) Inventor: **Dale McMahan**, Sulphur Springs, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 308 days.

(21) Appl. No.: **12/552,446**

(22) Filed: **Sep. 2, 2009**

(65) **Prior Publication Data**

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Related U.S. Application Data

(60) Provisional application No. 61/192,038, filed on Sep. 15, 2008.

(51) **Int. Cl.**
B60S 9/02 (2006.01)

(52) **U.S. Cl.** **280/766.1**; 254/420

(58) **Field of Classification Search** 280/763.1, 280/766.1, 475; 254/418, 420, 424, 425
See application file for complete search history.

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Primary Examiner — John Walters
(74) *Attorney, Agent, or Firm* — John Scott Carlson

(57) **ABSTRACT**

A trailer jack capable of rapid gross and incremental adjustments in height adapted for attachment to a trailer. The jack is comprised of an inner member nested within an outer member, a collar, a housing and a pin. The inner member is threadably connected to the outer member with a bolt having a crank attached at one end. The bolt enables incremental adjustments in the trailer height by extension and retraction of the inner member with respect to the outer member. The connected outer and inner members are secured to the trailer with a pin inserted through the housing, a hole in the collar and one of a plurality of longitudinal holes in the outer member. To create rapid gross adjustments in the trailer height, the pin is retracted, a different hole in the outer member is registered with the hole in the collar and the pin re-inserted.

10 Claims, 4 Drawing Sheets

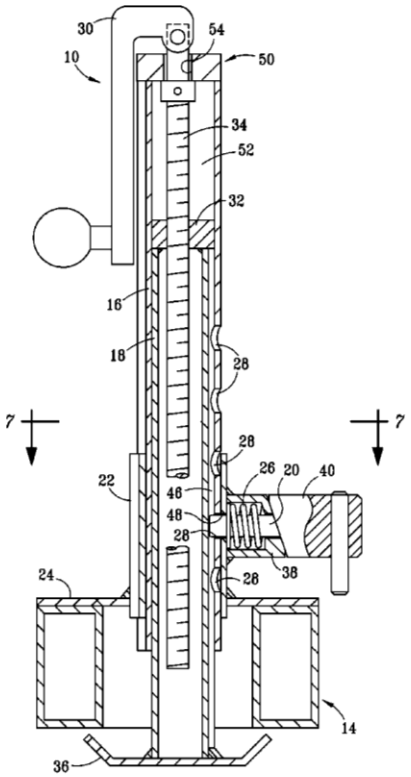

FIG. 1

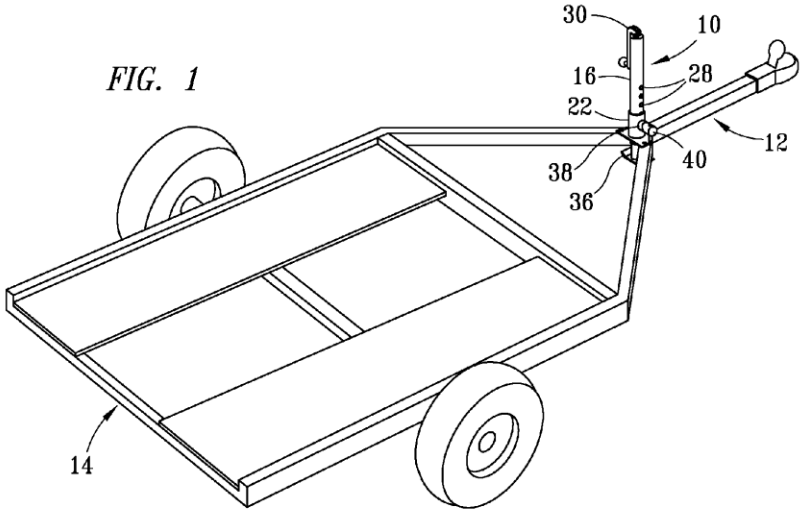

FIG. 2

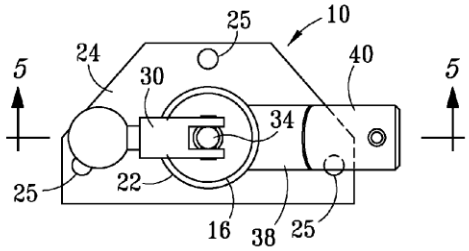

FIG. 3

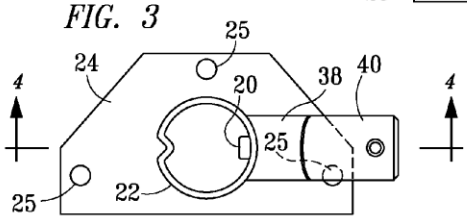

FIG. 4

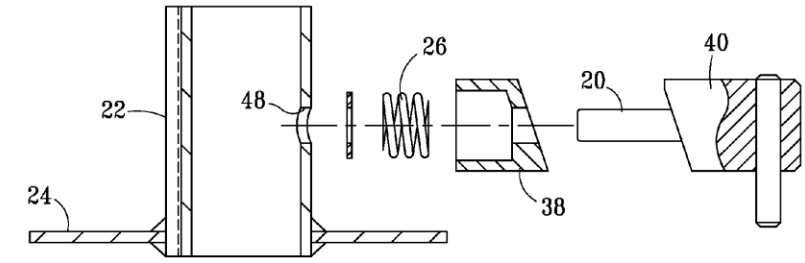

FIG. 5

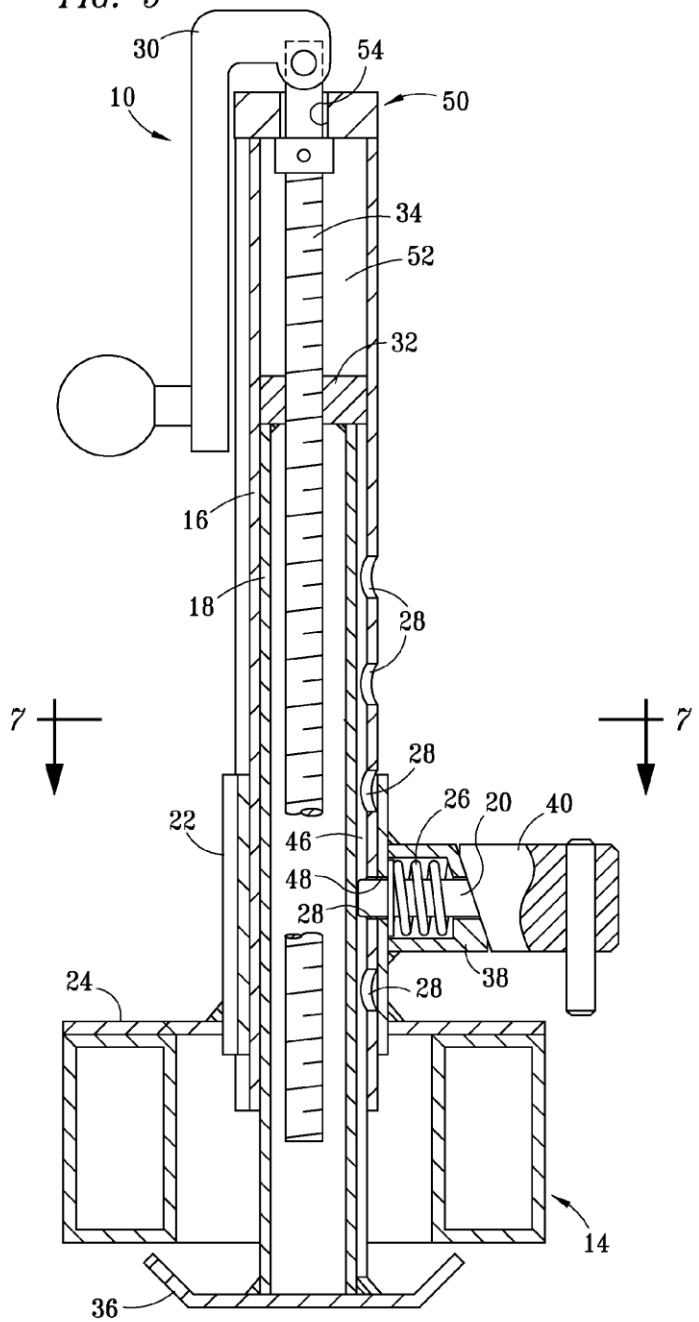

FIG. 6

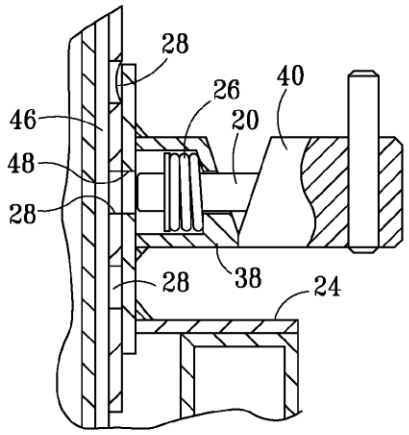
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FIG. 7

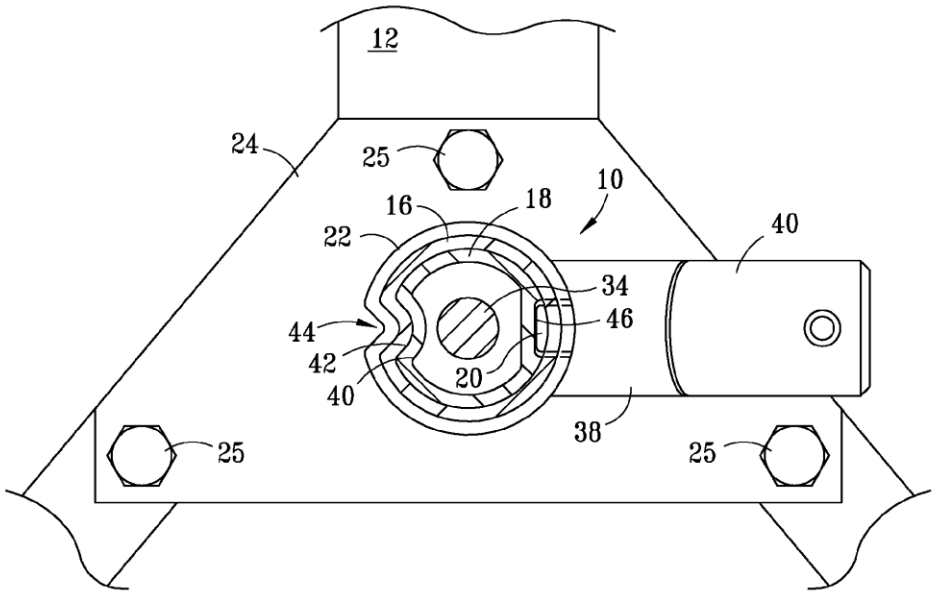
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FIG. 8

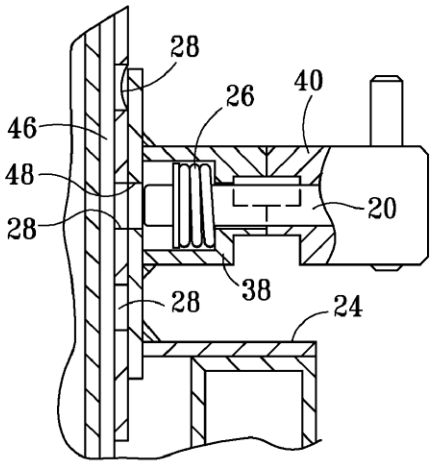
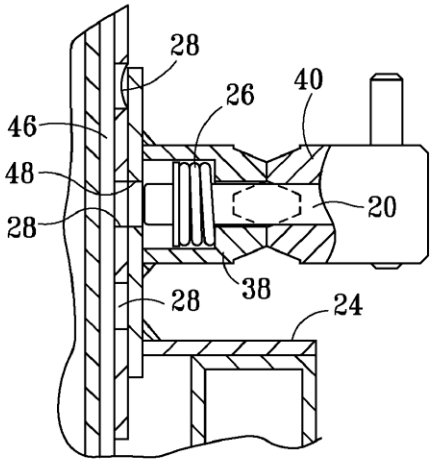


FIG. 9



TRAILER JACK CAPABLE OF RAPID GROSS AND INCREMENTAL ADJUSTMENTS IN THE HEIGHT OF A TRAILER

BACKGROUND

1. Technical Field

The disclosure relates to a multi element trailer jack capable of being configured for and enabling rapid gross and incremental adjustments in the height of a trailer.

2. Background

Many trailers have jacks that enable individuals operating the trailer to hitch and unhitch the trailer from the towing vehicle. Typically, such trailers are used for boats, campers and other similar towed vehicles. The trailer jacks are customarily rigidly fixed to the trailer, often by welded or bolted connections and have used a threaded mechanism advanced by a crank to achieve the adjustments in height needed for operation of the trailer. In attaching the trailer to the towing vehicle, elements of the jack must first be extended to the ground, the tongue of the trailer then raised above the hitch mechanism on the towing vehicle through application of a cranking or rotational movement to the threaded mechanism that operationally raises the trailer tongue and, once situated over the hitch mechanism of the towing vehicle, the tongue of the trailer is lowered into place so that the trailer may be coupled to the hitch mechanism of the towing vehicle by reversing the same rotational or cranking application to the threaded mechanism. To unhitch the trailer, the reverse steps are needed. In preparation for actual transport, the element of the jack extending from the trailer to the ground must be substantially retracted to provide adequate clearance between the roadway and the lower portion of the jack during travel. See U.S. Pat. No. 4,842,252 which is incorporated herein by reference for further discussion, the disadvantages of the threaded mechanisms for rapid adjustments in height and the effort needed by an operator to make the height adjustments necessary to couple and uncouple a towing vehicle and a trailer with a threaded mechanism alone.

BRIEF SUMMARY

One embodiment is directed to a trailer jack capable of enabling rapid gross and incremental adjustments in height of a trailer and adaptable for attachment to a trailer, comprising a collar attached to and oriented perpendicular to the horizontal plane of a trailer. The collar contains a bored hole. This embodiment further includes an elongated hollow outer member having i) an enclosed end forming a cavity, ii) a total cross section smaller than and defined by the cross section of the interior of the collar so that the elongated hollow outer member slides freely through the collar, iii) a hole in the enclosed end smaller in diameter than any dimension of the inner cross section and iv) a plurality of longitudinally aligned holes whose diameters equal the diameter of the bored hole in the collar. The longitudinally aligned holes are situated so that when the outer member is inserted in the collar, each of the longitudinally aligned holes is capable of coincidence with the bored hole in the collar with proper vertical adjustment of the outer member. This embodiment further includes a threaded bolt with a handle located at one end. The bolt has a diameter smaller than the diameter of the hole in the enclosed end of the outer member. The handle is positioned exterior to the outer member and the bolt inserted through the hole in the enclosed end of the outer member and extended longitudinally within the cavity of the outer member. This embodiment further comprises an elongated hollow inner member having i) a total cross section smaller than and defined by the cross section of the cavity of the outer member so that the inner member may is slideable within the cavity of the outer member, and ii) a threaded connection proximate to one end enabling the inner member to be threadably connected to the outer member by first inserting the end of the inner member containing the threaded connection in the outer member and engaging the threaded connection with the bolt and, by rotation of the handle, operatively enabling the inner member to be extended or retracted relative to the outer member. This embodiment further comprises a hollow housing with an inner diameter equal to the diameter of the bored hole in the collar. The housing is attached to collar such that that the longitudinal axis of the housing intersects the centerpoint of the bored hole in the collar and is orthogonal to the radial vector of the bored hole in the collar. This embodiment further comprises a pin having a diameter less than the

inner diameter of the housing such that the pin may be slideably received in the housing. The pin operatively enables the threadably connected inner member and outer member to be collectively secured to the trailer by aligning one of the plurality of longitudinally aligned holes in the outer member with the bored hole in the collar and into the longitudinally aligned holes in the outer member and operatively enables the threadably connected inner and inner members to be adjusted vertically relative to the trailer by extraction of the pin and repositioning of one of the longitudinally aligned holes in the outer member to coincide with the bored hole in the collar and and re-insertion of the pin.

Another embodiment is directed to a trailer jack capable of enabling rapid gross and incremental adjustments in height of a trailer and adaptable for attachment to the tongue of a trailer, comprising a collar attached to and oriented perpendicular to the horizontal plane of the trailer. The collar contains a bored hole and a longitudinally aligned indentation. This embodiment further includes an elongated hollow outer member i) enclosed on one end creating a cavity, ii) having a total cross section smaller than and defined by the interior cross section of the collar such that the outer member may be inserted in and slides freely through the collar with proper orientation of the elongated hollow outer member with respect to the collar, iii) a hole in the enclosed end smaller in diameter than any dimension of the inner cross section and iv) containing a plurality of longitudinally aligned holes whose diameters equal the diameter of the bored hole. The longitudinally aligned holes are situated so that when the outer member is inserted in the collar, each of the longitudinally aligned holes is capable of coincidence with the bored hole in the collar with proper vertical adjustment of the outer member. This embodiment further includes a threaded bolt with a handle attached at one end, the bolt having a diameter smaller than the diameter of the hole in the enclosed end of the outer member. The handle is positioned exterior to the elongated hollow outer member and the bolt inserted through the hole in the enclosed end of the elongated hollow outer member and extended longitudinally within the cavity of the outer member. This embodiment further comprises a hollow housing with an inner diameter equal to the diameter of the bored hole in the collar. The housing is attached to collar such that that the longitudinal axis of the housing intersects the centerpoint of the bored hole in the collar and is orthogonal to the radial vector of the bored hole in the collar. This embodiment further comprises an elongated hollow inner member having i) a total cross section smaller than and defined by the cross section of the outer member cavity so that the inner member is slideable within the cavity of the outer member, ii) a threaded connection proximate to one end enabling the inner member to be threadably connected to the outer member by inserting the end of the inner member containing the threaded connection in the outer member and engaging the threaded connection with the threaded bolt, and by rotation of the handle, operatively enabling the inner member to be extended or retracted relative to the outer member and iii) a longitudinal channel composed of a base and two sides with a width equal to the diameter of the bored hole in the collar. The channel is embedded within the exterior surface of the inner member and situated such that the longitudinal centerline intersects the longitudinal axis of the housing when the inner member is nested within the outer member when inserted in the collar. This embodiment further comprises a pin having a diameter less than the inner diameter of the housing such that the pin may be slideably received in the housing. The pin operatively enables the threadably connected inner member and outer member to be collectively secured to the trailer by aligning one of the plurality of longitudinally aligned holes in the outer member with the bored hole of the collar and inserting the end of the pin through the housing and the bored hole in the collar and through one of the longitudinally aligned holes in the outer member and into the channel of the inner member and operatively enables the threadably connected inner and outer members to be adjusted vertically relative to the trailer by extraction of the pin and repositioning of one of the longitudinally aligned holes in the outer member to coincide with the bored hole in the collar and re-insertion of the pin.

Another embodiment is directed to a trailer jack comprising a first hollow elongated member threadably and movably coupled to a threaded jack crank shaft that extends through the first elongated hollow member. This embodiment further comprises a second hollow elongated member having a plurality of spaced apart first pin openings located therethrough and along a portion of the length of the second elongated

hollow member and in which the first elongated hollow member is slideably received. The second hollow elongated member is coupled to the threaded jack crank shaft. This embodiment further comprises a handle attached to the end of threaded jack shaft enabling the threaded jack crank shaft to be rotated and the first hollow elongated member thereby to be extended and retracted relative to the second hollow elongated member. This embodiment further comprises a trailer jack collar attached to a plate attached to a trailer support frame and having a second pin opening located therethrough. The first pin openings are registerable with the second pin opening as the second elongated hollow member is moved with respect to the trailer jack collar. This embodiment further comprises a spring biased locking member attached to the collar and having a first body that houses a spring biased pin and a second body handle that is rotatable with respect to the first body, the first and second bodies being movable between a first position in which the spring biased pin is received through one of the first openings and the second opening and opposing faces of the first and second bodies form an interface with each other and a second position in which the spring biased pin is retracted from one of the first openings and the second opening and the opposing faces are separated.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the drawings in which the reference numbers represent corresponding parts throughout.

FIG. 1 is a perspective view of a trailer embodying features of the present invention, the jack being situated upon the tongue of the trailer;

FIG. 2 is a plan view of the inner and outer member of the trailer jack of FIG. 1 inserted through the collar and triangular plate, the complementary surfaces of the sheath and housing in flush contact so that the threadably connected inner and outer members are secured to the trailer by way of the pin inserted through the housing, bored hole of the collar and the longitudinally aligned hole of the outer member and the crank handle for extending or retracting the inner member relative to the outer member is folded into the position for non-use;

FIG. 3 is a plan view of the triangular plate of FIG. 1 and the collar of FIG. 1 with longitudinally aligned indentation in the collar, with the complementary surfaces of the sheath and housing of FIG. 2 in flush contact and the pin thereby inserted through the housing and bored hole in the collar and extending beyond the inner surface of the collar (the inner and outer members are absent from this view);

FIG. 4 is a cross-sectional exploded view of the collar, the housing, pin with sheath, spring with washer to secure the pin to the collar and plate taken along the line **4**-**4** of FIG. 3 showing complementary diagonal planar surfaces of the housing and sheath (the inner and outer members are absent from this view);

FIG. 5 is a cross sectional view of the jack attached to the trailer taken along the line **5**-**5** of FIG. 2 showing the pin and the housing surfaces in flush contact and the pin thereby inserted through the housing, the bored hole in the collar, one of the plurality of longitudinally aligned holes in the outer member and into the inset longitudinal channel of the inner member and the handle, the collar having a indentation and the inner and outer members having complementary indentations, the threaded connection situated in the upper end of the inner member, and the threaded bolt attached to the crank and the bolt threadably engaged with the inner member through the threaded connection, the crank shown in the position for non-use when the jack is attached to the trailer;

FIG. 6 is an exploded view of the housing and sheath oriented so that the complementary surfaces of the housing and sheath act to retract the pin from the inset channel of the inner member, the hole in the outer member and the bored hole in the collar;

FIG. 7 is a cross-sectional explosion of the jack taken along line **7**-**7** of FIG. 5 showing the threadably connected inner and outer members inserted in the collar having a longitudinal indentation and the correspondingly shaped inner member and outer member, the complementary planar surfaces of the housing and sheath in flush contact and the pin inserted through the housing, the bored hole in the collar, one of the plurality of longitudinally aligned holes in the outer member and into the

embedded longitudinally aligned channel of the inner member;

FIG. 8 is a cross-sectional exploded view of the housing and sheath each with complementary crenellated geometries, the housing and sheath oriented to retract the pin from the inset channel of the inner member, the hole in the outer member and the bored hole in the collar; and

FIG. 9 is a cross-sectional exploded view of the housing and sheath each with complementary sawtooth geometries, the housing and sheath oriented to retract the pin from the inset channel of the inner member, the hole in the outer member and the bored hole in the collar.

DETAILED DESCRIPTION

FIGS. 1 through 7 show a preferred embodiment. Referring to the drawings, FIG. 1, shows a jack **10** situated on the tongue **12** of a trailer **14**. In one particular embodiment shown in FIGS. 2 through 7, the jack **10** comprises a pin **20**, a plate **24**, a collar **22** with a longitudinally aligned indentation **44** and a bored hole **48** with a diameter larger than the diameter of pin **20** so that the pin **20** is slideable through bored hole **48**. In this particular embodiment, the jack **10** further comprises an outer member **16** with a plurality of longitudinally aligned holes **28** and cross section shaped as and smaller than that defined by the inner surface of the collar **22** thereby creating a continuous longitudinal indentation **42** geometrically complementary to the indentation **44** of the collar **22**. Outer member **16** is capable of insertion in the collar **22** with proper orientation. Outer member **16** is enclosed on one end **50** thereby forming a cavity **52**, and a hole **54**, smaller in diameter than any dimension of the interior cross section of outer member **16**, is bored in the enclosed end **50**. In this particular embodiment, the jack **10** further comprises an inner member **18** having a cross section shaped as and smaller than the cavity of the outer member **16** thereby creating a continuous longitudinal indentation **40**. The inner member **18** contains an inset continuous longitudinal channel **46** having a width equal to the diameter of the bored hole **48**. The jack **10** further comprises a hollow housing **38** with two ends, having an inner diameter equal to the bored hole **48**, and a diagonal cut at one of the two ends. The jack **10** further comprises a sheath **40** encasing a portion of the length of pin **20**, the sheath **40** having a complementary diagonal cut and cross section as the housing **38** on the end with the diagonal cut. This embodiment further comprises a plate **24** with a hole conforming in shape to the inner cross section of the collar **22**. The plate **24** is customarily either bolted using holes **25** or welded to the upper side of the trailer **14**. The collar **22** is affixed to the plate **24** so that the inner surface of the hole in the plate **24** and the inner surface of collar **22** coincide. The housing **38** is attached to the collar **22** at the end distal from the diagonal cut so that the housing longitudinal axis intersects the center point of bored hole **48** and lies orthogonal to the radial vector of bored hole **48**. This particular embodiment further comprises a threaded bolt **34** with a handle **30** attached to one end. The threaded bolt **34** has a diameter smaller than the hole **54**. In this particular preferred embodiment shown in FIGS. 5 and 7, the inner member **18** may be nested within the outer member **16** by orienting and overlapping the indentation **42** of the outer member **16** with the indentation **40** in the inner member **18**. The threaded bolt **34** extends longitudinally in outer member **16** through hole **54**, threadably engaging the threaded connection **32** of the inner member **18** and longitudinally into inner member **18** to near the lower end of the inner member **18** when the inner member **18** is in a retracted position relative to outer member **16**. The threaded bolt **34** thereby secures the inner member **18** to the outer member **16** and operatively enables the inner member **18** to be extended or retracted relative to the outer member **16** by rotation of crank **30** acting on threaded bolt **34**. The outer member **16** with the inner member **18** threadably connected is secured to the trailer **14** by inserting the pin **20** through the housing **38**, the bored hole **48** in the collar **22**, into one hole **28** of the plurality of longitudinally aligned holes in the outer member **16** and into the inset channel **46** of the inner member **18** by bringing the complementary diagonal planar surfaces of the housing **38** and sheath **40** in flush contact with each other. The outer member **16** and threadably connected inner member **18** may be adjusted up or down in height by retracting the pin **20** from the inset channel **46** in the inner member **18** and hole **28** in the outer member **16** and rotating the pin **20** to rest the sheath **40** on the housing **38**. A different hole **28** is positioned to coincide with bored hole **48** in the

collar and the pin **20** then rotated and positioned so that the diagonal surfaces of the housing **38** and sheath **40** are in full planar contact and the pin **20** is re-inserted through the bored hole **48** in the collar, the different hole **28** and into the inset channel **46** of inner member **18**. In the preferred embodiment, the interactions between the indentations **40** and **42** and indentation **40** prevent the rotation of the outer member **16** and inner member **18** relative to each other and the combined inner **18** and outer member **16** relative to the collar **22** when the crank **30** is rotated and enables alignment of the plurality of longitudinally aligned holes **28** in the outer member **16** with the bored hole **48** in the collar **22** and the intersection of the centerline of the inset longitudinal channel **46** of the inner member **18** with longitudinal axis of the housing **38**. The inset longitudinal channel **46** enables the outer member **16** with threadably connected inner member **18** to be more securely fastened to trailer **14** because the pin **20** is inserted entirely through the outer member **16** and into inset longitudinal channel **46**. In other embodiments without the inset longitudinal channel **46**, the pin **20** can be extended into one of the plurality of longitudinal holes **28** of the outer member **16** but only to the outer surface of the inner member **18**. A footing **36** adapted for contact with ground may be attached to the inner member **18** in any embodiment. The jack **10** is depicted upon tongue **12** of trailer **14**. The collar **22** of jack **10** may also be positioned to abut the side of the trailer tongue **12** of trailer **14**. The inner member **18** and outer member **16** and the collar **22** may be of any complementary geometric shape. Depicted are tubular like members, but the outer member **16** and inner member **18** and collar **22** could be square, rectangular, oval, or other shape. The complementary indentations of the collar, inner member and outer member are not necessary in all embodiments.

The indentation **42** of the outer member **16** and indentation **40** of inner member **18** may be any shape, such as V-shaped, U-shaped or square-shaped, with the longitudinally aligned indentation **44** in the collar **22** complementarily shaped and sized so that the indentation **44** interfits with the indentation **42** of the outer member **16** and the outer member **16** may be properly oriented and inserted through the collar **22**. The indentation **40** of the inner member **18** must be complementarily shaped and sized with the indentation **42** of the outer member **16**.

Other embodiments for the geometrically complementary interfacing surfaces of the sheath **40** and housing **38** exist in addition to the diagonal surfaces depicted and described in the preferred embodiment. In another embodiment, as shown in FIG. 8, complementary crenellations in the sheath **40** and housing **38** could be used to achieve a complementary geometry that enables the pin **20** to be extracted from one of the longitudinally aligned holes **28**, rotated and remain in a retracted position while the outer member **16** is repositioned to align with a different longitudinally aligned hole **28** and then the pin **20** is rotated and re-inserted through the preferred longitudinally aligned hole **28** through orientation of the crenellations of the housing **38** and sheath **40** with respect to each other to either rapidly raise or lower the height of the trailer **14**. In another embodiment, as shown in FIG. 9, a complementary sawtooth pattern in the sheath **40** and housing **38** could be used to achieve a geometry that enables the pin **20** to be extracted from one of the longitudinally aligned holes **28**, rotated and remain in a retracted position while the outer member **16** is repositioned to align with a different longitudinally aligned hole **28** and then the pin **20** is rotated and re-inserted through the preferred longitudinally aligned hole **28** through proper orientation of the sawtooth pattern of the housing **38** and sheath **40** with respect to each other to either rapidly raise or lower the height of the trailer **14**.

In all embodiments, the height of the trailer **14** may be adjusted through two mechanisms. Once the inner member **18** and the outer member **16** are threadably engaged with threaded bolt **34**, the inner member **18** may be extended or retracted relative to the outer member **16** by rotation of the crank **30** acting on threaded bolt **34**. In FIGS. 2 and 5, the crank **30** is depicted in a stored or non-use position. When in use, the crank **30** would be raised and rotated in a horizontal plane. When rotated, inner member **18** would be extended or retracted, depending upon the direction that the crank **30** is turned, by threaded bolt **34** acting on threaded connection **32**. The extension and retraction of the inner member **18** relative to the outer member **16** enables the height of the trailer **14** to be adjusted in an incremental or precise manner.

The height of the trailer **14** may be quickly adjusted by removal of the pin **20**, reorientation of one of the plurality of longitudinally aligned holes **28** with the bored hole **48** of the collar **22** and reinserting the pin **20** to once again secure the outer member **16** and threadably engaged inner member **18** to the trailer **14**.

This disclosure differs from those cited in the prior art. The advantages provided herein include, without limitation, a simpler design than three piece jacks. No telescoping third element is necessary to achieve the rapid gross adjustment in height of the trailer. In particular, the rapid gross adjustment in height, either up or down, may be achieved through use of the pin **20** and collar **22** acting upon the threadably connected inner member **18** and outer member **16**. The rapid gross adjustment is achieved through the interaction of the pin **20** and the threadably connected inner member **18** and outer member **16** without use of the cranking mechanism. Many conventional devices are directed to rigid fixation of the entire jack mechanism to the trailer with an element extended to make contact with the ground through a crank mechanism. To achieve a significant adjustment in height, the crank mechanism must be rotated extensively. The embodiments herein limit the crank mechanism to only the incremental adjustments in height that an operator might require thereby significantly reducing the time and effort required to raise or lower the trailer by means of the jack. The two piece combination of the inner and outer member as provided by the embodiments herein reduces complexity and the chance of malfunction and provides greater ease of manufacture and repair. In three piece conventional devices, rapid adjustment is accomplished or performed under rather than above the surface of the trailer. In the present embodiments, the mechanism to make the rapid adjustment is located above the trailer within easy reach of the operator. While the foregoing written description of the invention enables one of ordinary skill to make and use what is considered presently to be the best mode thereof, those of ordinary skill will understand and appreciate the existence of variations, combinations, and equivalents of the specific embodiment, method, and examples herein. The invention should therefore not be limited by the above described embodiment, method, and examples, but by all embodiments and methods within the scope and spirit of the invention as claimed.

I claim:

1. A trailer jack capable of enabling rapid gross and incremental adjustments in height of a trailer and adaptable for attachment to a trailer, the trailer jack comprising:

a collar attached to and oriented perpendicular to the horizontal plane of the trailer, the collar containing a bored hole; and

an elongated hollow outer member having i) an enclosed end thereby forming a cavity, ii) a total cross section smaller than and defined by the cross section of the interior of the collar so that the elongated hollow outer member slides freely through the collar, iii) a hole in the enclosed end smaller in diameter than any dimension of the inner cross section and iv) a plurality of longitudinally aligned holes whose diameters equal the diameter of the bored hole in the collar, the holes being situated so that when the outer member is inserted in the collar, each of the longitudinally aligned holes is capable of coincidence with the bored hole in the collar with proper vertical adjustment of the outer member; and

a threaded bolt with a handle located at one end, the bolt having a diameter smaller than the diameter of the hole in the enclosed end of the outer member, the handle positioned exterior to the outer member and the bolt inserted through the hole in the enclosed end of the outer member and extended longitudinally within the cavity of the outer member; and

an elongated hollow inner member having i) a total cross section smaller than and defined by the cross section of the cavity of the outer member so that the inner member is slideable within the cavity of the outer member, and ii) a threaded connection proximate to one end enabling the inner member to be threadably connected to the outer member by first inserting the end of the

inner member containing the threaded connection in the outer member and engaging the threaded connection with the bolt and, by rotation of the handle, operatively enabling the inner member to be extended or retracted relative to the outer member; and

a hollow housing with an inner diameter equal to the diameter of the bored hole in the collar, the housing attached to the collar such that the longitudinal axis of the housing intersects the centerpoint of the bored hole in the collar and is orthogonal to the radial vector of the bored hole in the collar; and

a pin having a diameter less than the inner diameter of the housing such that the pin may be slideably received in the housing, the pin operatively enabling the threadably connected inner member and outer member to be collectively secured to the trailer by aligning one of the plurality of longitudinally aligned holes in the outer member with the bored hole of the collar and inserting the pin through the housing and the bored hole in the collar and into one of the longitudinally aligned holes in the outer member and operatively enabling the threadably connected inner and outer members to be adjusted vertically relative to the trailer by extraction of the pin and repositioning of one of the longitudinally aligned holes in the outer member to coincide with the bored hole in the collar and re-insertion of the pin.

2. The trailer jack of claim 1 further comprising a spring secured in the housing and attached to the pin.

3. The trailer jack of claim 2 further comprising a plate with a hole whose shape matches the inner cross section of the collar, the plate attached to the trailer and the collar attached to the plate so that the hole in the plate and the interior of the collar coincide.

4. The trailer jack of claim 3 further comprising a sheath encasing a portion of the pin, the housing and sheath having complementary interfacing geometrical cross-sections such that with the sheath in contact with the housing in one position, the pin may be inserted into one of the plurality of longitudinally aligned holes of the outer member and the threadably connected inner and outer member thereby secured to the trailer and when the pin is extracted from the longitudinal aligned hole, rotated and the sheath in contact with the housing in a second position, the pin may, at a minimum, remain retracted from a longitudinally aligned hole of the outer member enabling the outer member and threadably connected inner member to be adjusted in height with respect to the trailer.

5. A trailer jack capable of enabling rapid gross and incremental adjustments in height of a trailer and adaptable for attachment to a trailer, the trailer jack comprising:

a collar attached to and oriented perpendicular to the horizontal plane of the trailer, the collar containing a bored hole and a longitudinally aligned indentation;

an elongated hollow outer member i) enclosed on one end thereby creating a cavity, ii) having a total cross section smaller than and defined by the interior cross section of the collar such that the outer member may be inserted in and slide freely through the collar with proper orientation of the outer member with respect to the collar iii) a hole in the enclosed end smaller in diameter than any dimension of the inner cross section and iv) containing a plurality of longitudinally aligned holes whose diameters equal the diameter of the bored hole, the longitudinally aligned holes being situated so that when the outer member is inserted in the collar, each of the longitudinally aligned holes is capable of coincidence with the bored hole with proper vertical adjustment of the outer member; and

a threaded bolt with a handle located at one end, the bolt having a diameter smaller than the diameter of the hole contained in the enclosed end of the outer member, the handle positioned exterior to the outer member and the bolt inserted through the hole in the enclosed end of the outer member and

extended longitudinally within the cavity of the outer member; and

a hollow housing with an inner diameter equal to the diameter of the bored hole in the collar, the housing attached to the collar such that the longitudinal axis of the housing intersects the centerpoint of the bored hole in the collar and is orthogonal to the radial vector of the bored hole in the collar; and

an elongated hollow inner member having i) a total cross section smaller than and defined by the cross section of the outer member cavity so that the inner member is slideable within cavity of the outer member, ii) a threaded connection proximate to one end enabling the inner member to be threadably connected to the outer member by inserting the end of the inner member containing the threaded connection in the outer member and engaging the threaded connection with the threaded bolt and, by rotation of the handle, operatively enabling the inner member to be extended or retracted relative to the outer member and iii) a longitudinal channel composed of a base and two sides with a width equal to the diameter of the bored hole in the collar, the channel being embedded within the exterior surface of the inner member and situated such that the longitudinal centerline intersects the longitudinal axis of the housing when the inner member is nested within the outer member when inserted in the collar; and

a pin having a diameter less than the inner diameter of the housing such that the pin may be slideably received in the housing, the pin operatively enabling the threadably connected inner member and outer member to be collectively secured to the trailer by aligning one of the plurality of longitudinally aligned holes in the outer member with the bored hole of the collar and inserting the end of the pin though the housing and the bored hole in the collar and through one of the longitudinally aligned holes in the outer member and into the channel of the inner member and operatively enabling the threadably connected inner and outer members to be adjusted vertically relative to the trailer by extraction of the pin and repositioning of one of the longitudinally aligned holes in the outer member to coincide with the bored hole in the collar and re-insertion of the pin.

6. The trailer jack of claim 5 further comprising a spring secured in the housing and attached to the pin.

7. The trailer jack of claim 6 further comprising a plate with a hole whose shape matches the inner cross section of the collar, the plate attached to the trailer and the collar attached to the plate so that the hole in the plate and the interior of the collar coincide.

8. The trailer jack of claim 7 further comprising a sheath encasing a portion of the pin, the housing and sheath having complementary interfacing geometrical cross-sections such that with the sheath in contact with the housing in one position, the pin may be inserted through one of the plurality of longitudinally aligned holes of the outer member and into the inset longitudinal channel of the inner member and the threadably connected inner and outer member thereby secured to the trailer and when pin is extracted from the inset longitudinal channel and longitudinal hole, rotated and the sheath in contact with the housing in a second position, the pin may, at a minimum, remain retracted from a longitudinally aligned hole of the outer member enabling the outer member and threadably connected inner member to be adjusted in height with respect to the trailer.

9. A trailer jack comprising:

a first hollow elongated member threadably and movably coupled to a threaded jack crank shaft that extends through the first elongated hollow member;

a second hollow elongated member having a plurality of spaced apart first pin openings located therethrough and along a portion of the length of the second elongated hollow member and in which the first elongated hollow member is slidably received and

connected to the first hollow elongated member with the threaded jack crank shaft, the second hollow elongated member being coupled to the threaded jack crank shaft;

a handle attached to the end of threaded jack shaft enabling the threaded jack crank shaft to be rotated and the first hollow elongated member thereby to be extended and retracted relative to the second hollow elongated member;

a trailer jack collar attached to a plate attached to a trailer support frame and having a second pin opening located therethrough, the first pin openings being registerable with the second pin opening as the second elongated hollow member is moved with respect to the trailer jack collar; and

a spring biased locking member attached to the collar and having a first body that houses a spring biased pin and a second body handle that is rotatable with respect to the first body, the first and second bodies being movable between a first position in which the spring biased pin is received through one of the first openings and the second opening and opposing faces of the first and second bodies form an interface with each other and a second position in which the spring biased pin is retracted from one of the first openings and the second opening and the opposing faces are separated.

10. The trailer jack of claim 9 wherein the first hollow elongated member contains an embedded longitudinal channel capable of receiving the spring biased pin in the first position.

United States Patent [19]

McMahan

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[54] **RAPIDLY EXTENDABLE JACK**

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[51] **Int. Cl.**[4] **B01J 37/00**

[52] **U.S. Cl.** **254/420;** 254/424

[58] **Field of Search** 254/420, 424; 248/354.6, 407, 408

[56] **References Cited**

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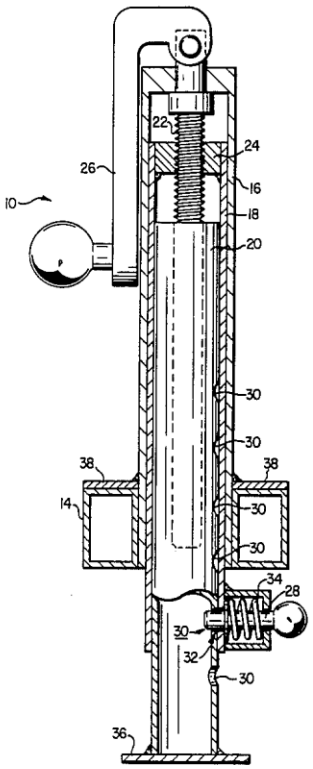
3,595,527	7/1971	Douglass .
3,709,467	1/1973	Mann .
3,957,249	5/1976	Williams .
4,078,774	3/1978	Williams .
4,221,362	9/1980	Van Santen .

Primary Examiner—James G. Smith
Assistant Examiner—David Holmes
Attorney, Agent, or Firm—Richards, Harris, Medlock & Andrews

[57] **ABSTRACT**

The present invention provides a three-piece telescoping jack that is capable of rapid coarse adjustments in height. The invention comprises first, second and third elongated tubular members that are somewhat nested in a telescoping relationship. The invention further comprises fine adjustment means for holding and adjusting the position of the second member in relation to the first and coarse adjustment means for holding and adjusting the position of the third member in relation to the second. The coarse adjustment means further allow the position of the third member to be rapidly adjusted, either retracted or extended, in relation to the second member. In a preferred embodiment, the fine adjustment means are a threaded nut and bolt. Also in a preferred embodiment, the coarse adjustment means are a pin and a series of holes in the second and third members.

15 Claims, 1 Drawing Sheet



U.S. Patent Jun. 27, 1989 4,842,252

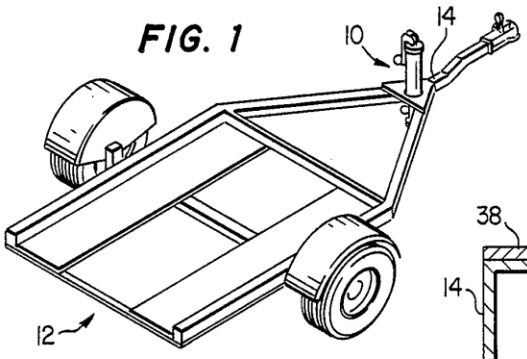


FIG. 1

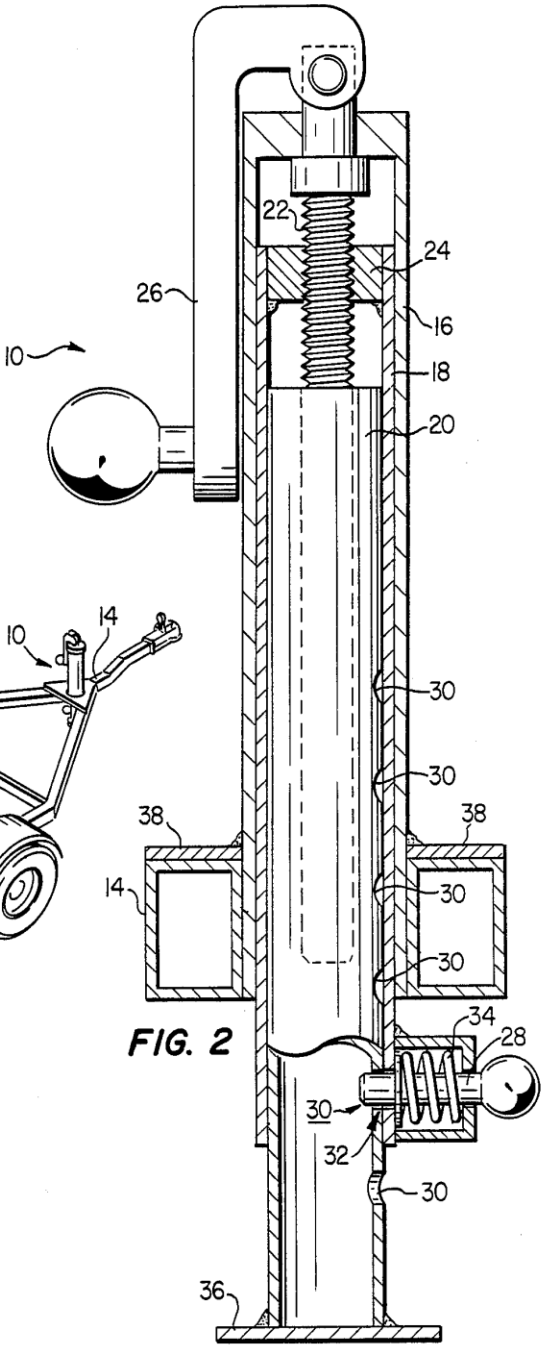


FIG. 2

RAPIDLY EXTENDABLE JACK

BACKGROUND

1. Technical Field

The present invention relates to an improved jack assembly that provides for rapid advance and retraction of an extendable leg and also provides additional height capacity for the jack. The invention comprises the addition of a third extendable leg to a typical two-piece jack construction. The third leg is attached to the jack through use of a coarse adjustment mechanism. such as a spring-loaded pin inserted through holes in the third leg, which secures the leg in relation to the jack and allows rapid advance of the third leg.

2. Background of the Invention

The invention relates to a rapidly extendable jack intended for use with boat trailers, camping trailers, farm equipment and the like. The jack can be rapidly advanced or retracted to a desired height and also possesses additional height capacity over ordinary jacks.

Various types of jacks are known and used throughout the country. A common example is a car jack which consists of a lift device connected to a height adjustment mechanism that is mounted on a standard, and the mechanism allows continuous cranking of the lift device up the standard. Another example is a trailer jack which typically consists of two telescoping pieces with a height adjustment means that extends or retracts one piece in relation to the second. Usually, this height adjustment means is a threaded bolt and nut. The nut is placed in the top end of the inner telescoping piece and the bolt is threadably engaged through the nut and extends inside the telescoping piece. The bolt also extends through the end of the outer piece where it is connected to a handle used to crank the jack. In use, the handle is extended from or retracted into the outer piece. A jack of this type is disclosed in U.S. Pat. No. 3,595,527.

The problem with this type of standard two-piece telescoping jack is that the jack must be cranked continuously from the fully retracted position to the desired extended position, i.e., the nut must be turned down the bolt. In use, the jack typically is extended 12 inches or more requiring 100 to 125 complete turns on the handle for the jack to be the desired height to contact the ground from the tongue of a trailer. Then an additional 20-25 cranks are necessary to further raise the trailer. This cranking must be repeated to retract the jack. This excessive cranking can cause wear and tear on the jack and on the person doing the cranking. Therefore, it would be very desirable to have a jack capable of rapid advance and retraction.

U.S. Pat. No. 3,595,527 discloses a jack assembly somewhat capable of rapid retraction and extension. It discloses the use of a standard two-piece telescoping jack that is inserted through a tubular support. The outer piece of the jack has radial projections along its side that engage within an L-shaped slot in the tubular support. The jack is simply adjusted in relation to the support. Other types of jacks somewhat capable of rapid advance are disclosed in U.S. Pat. Nos. 4,078,774; 4,221,362; 3,957,249; 3,709,467; and 2,529,292. The present invention, however, provides a jack capable of rapid height adjustment that differs from those jacks disclosed in the above-cited patents.

Another problem with the standard two-piece trailer jacks currently in use is the lack of sufficient jack capacity to raise the tongue of the trailer high enough off the ground to clear the knob on the hitch of a truck or other vehicle. For one reason or another, most of the jacks in use require 3-4 inches of blocks under the foot of the jack to provide enough height capacity to raise the trailer tongue to a height sufficient to attach the trailer to a truck. It would be desirable to have a jack with additional capacity to alleviate the need for using blocks.

The present invention provides an extendable jack with rapid advance and retraction that alleviates excessive cranking in the use of the jack. In addition, the present invention provides additional jack capacity of up to 20 inches or more over the standard trailer jack.

SUMMARY OF THE INVENTION

The present invention provides an improved extendable jack capable of rapid extension and retraction and comprising a first elongated tubular member, a second elongated tubular member, a third elongated tubular member, fine adjustment means, and coarse adjustment means. The second tubular member is slidable within the first and its upper end is within the first and its lower end extends beyond the first member. Likewise,

the third tubular member is slidable within the second with its upper end within the second and its lower end extending beyond the second member. The fine adjustment means secure the second member in relation to the first and allows fine positioning in extending or retracting the second member in relation to the first. The coarse adjustment means secures the third tubular member in relation to the second and allows rapid extension and retraction of the third member in relation to the second.

In one embodiment of the invention, the fine adjustment means includes a threaded bolt and nut. The nut is attached to the second tubular member, and the bolt is threadably engaged with the nut. The bolt is engaged with the first tubular member and extends beyond it to allow attachment of a handle.

In a preferred embodiment of the invention, the coarse adjustment means include a pin, a hole near the lower end of the second tubular member and a series of holes along the side of the third tubular member. With the pin removed, the third member is adjusted to substantially the desired extension from the second member, and the pin is inserted through the hold in the second member and the closest corresponding hole in the third member. The pin may be spring-loaded to aid in keeping the pin in place. Other similar devices may also be used for the coarse adjustment means.

The jack of the present invention may further comprise a foot mounted on the lower end of the third tubular member. It may also comprise a mounting plate attached to the first tubular member for mounting the jack to the tongue of a trailer.

The invention further provides a jack extension device for extending the height capacity of a telescoping two-piece jack and providing rapid extension and retraction of the jack. The device includes an elongated tubular member and coarse adjustment means for securing the member in a desired position in relation to the jack and allowing rapid extension and retraction of the member in relation to the jack.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and additional objects and advantages of the invention will be more apparent when the following detailed description is read in conjunction with the accompanying drawings, wherein like reference characters denote like parts in all views and wherein:

FIG. 1 is a perspective view of a trailer with a jack as described by the present invention mounted on the tongue of the trailer; and

FIG. 2 is a partial cross-sectional side view of one embodiment of a jack of the present invention.

DETAILED DESCRIPTION

The present invention provides a readily extendable and retractable jack for use with boat trailers, camping trailers, farm equipment and many other uses requiring an extendable jack. The invention includes the addition of a third extendable leg to a typical two-piece telescoping jack and the addition of a coarse adjustment means for securing the third leg and allowing it to be easily extended or retracted.

Referring to the drawings, FIG. 1 shows a jack 10 as described by the present invention used with a typical flat bed trailer 12. The jack 10 is mounted in the tongue 14 of the trailer 12. FIG. 2 shows a partial cross-sectional and cut away view of one embodiment of the present invention. Jack 10 includes a first elongated tubular member 16, a second elongated tubular member 18, and a third elongated tubular member 20. Thus, the present invention includes an additional extendable member over the typical two-piece jack assembly known previously in the art.

It should be noted, that tubular, as used herein, is not limited to a cylindrical tube configuration, but rather, it includes practically any geometrically-shaped tubing that may be used to construct a jack. Examples of various shaped tubular members include square tubing, triangular-shaped tubing, hexagonal tubing, etc. As known in the art, the tubular members must be sturdy so as to withstand the forces of raising a heavy load.

The three tubular members 16, 18 and 20 are arranged in telescoping fashion such that the second member 18 is slidable within the first member 16, and the third member 20 is slidable within the second member 18. Tubular member 18 is positioned such that its upper end is within tubular member 16 and its lower end extends beyond tubular member 16. Likewise, tubular member 20 has its

upper end positioned within tubular member 18 and its lower end extends beyond member 18. Even when the jack 10 is extended, the tubular members 18 and 20 remain at least partially nested within members 16 and 18, respectively.

Tubular members 18 and 20 are extendable in relation to members 16 and 18. The relative positioning of members 18 and 20, and thus the height of the jack 10, is controlled by the use of two adjustment mechanisms: a fine adjustment mechanism and a coarse adjustment mechanism. In jack 10, the fine adjustment mechanism consists of a threaded bolt 22 and a nut 24 with associated threads. Nut 24 is positioned in the upper end of member 18 and receives bolt 22. Bolt 22 lies substantially within tubular members 16, 18, and 20, and it extends substantially the length of member 16. It should be noted that tubular member 20 has and open upper end allowing bolt 22 to pass inside member 20 without any interconnection. The non-threaded upper end of bolt 22 is mounted in the upper end of tubular member 16 such that it may rotate freely in relation to member 16, and bolt 22 extends external to member 16 to facilitate the attachment of handle 26 to bolt 22. In FIGS. 1 and 2, handle 26 is shown in the down or stored position. When handle 26 is raised to a horizontal position, it may be rotated in a horizontal circular rotation in either a clockwise or counterclockwise direction. Rotating handle 26 causes bolt 22 to turn within nut 24 causing tubular member 18 to move longitudinally within member 16 either extending or retracting in relation to member 16 depending on which way the handle is turned.

As mentioned, the problem with two-piece known jacks that use a similar nut and bolt assembly to that just described is that the jack must be cranked numerous times to achieve any substantial extension or retraction of the jack. Indeed, most two-piece jacks require over 100 cranks to fully extend or retract the jack. The present invention greatly reduces the need for cranking by providing a third piece, tubular member 20, that may be rapidly advanced or retracted using a coarse adjustment means.

In the embodiment of the invention shown in FIGURE 2, the coarse adjustment means include a spring-loaded pin 28 mounted near the lower end of tubular member 18 and a series of holes 30 along the length of tubular member 20. Pin 28 is inserted through a hole 32 in tubular member 18 and through one of the holes 30 in member 20. The loading provided by spring 34 retains pin 28 in position. Thus, tubular member 20 is held in position or secured in relation to member 18 by pin 28. Member 20 may be readily extended or retracted in relation to member 18 by removing the pin 28, adjusting the position of member 20 to the new desired position while matching up hole 32 with one of the holes 30, and reinserting the pin 28 through the associated holes. In this manner, jack 10 may be readily extended or retracted without requiring any cranking of handle 26.

Of course, the coarse adjustment using pin 28 may not be performed with any load on the jack, but rather, the jack 10 is adjusted to approximately the required height using the coarse adjustment means prior to any load being placed on the jack. After a load is placed on the jack, any further adjustments may be made using the fine adjustment means.

It is important that the pin 28 be constructed of high tensile strength materials so as to be capable of withstanding the shear forces imparted by the jack and any load placed on the jack. Also, the arrangement and structure of pin 28 may be varied from that shown in FIG. 2. For example, pin 28 may be extended through both sides of tubular members 18 and 20. Pin 28 may also be replaced by any other mechanism that would hold tubular member 20 in position under load and allow coarse adjustment of member 20 under no load. Examples of such mechanisms might include the combinations of notches and collars, radial projections and slots, slots and plates, etc.

Jack 10 as shown in FIG. 2, has a foot 36 mounted on the lower end of tubular member 20 adapted for contacting the ground and providing a stable base for the jack. Jack 10 may also include a mounting plate 38 welded to tubular member 16 allowing jack 10 to be mounted onto the tongue 14 of a trailer using bolts or other attachment means.

Jack 10 may also include a means (not shown) to prevent tubular member 20 canting relative to tubular member 18, such as a bearing or the like.

The present invention provides a jack that has additional height capacity of up to 20 inches or more over ordinary two-piece jacks. This is important because it avoids the need to use blocks in jacking up a trailer or other device.

It also allows the jack to be mounted on the tongue of a trailer higher above the ground thereby lessening the chance that the jack might hit an obstruction on the ground and break off.

From the foregoing detailed description, it is apparent that the invention describes an improved jack that is rapidly extendable and retractable. Having described only a preferred embodiment, it will be apparent to those skilled in the art that various modifications may be made without departing from the scope of the invention.

I claim:

1. A jack comprising:

a first elongated tubular member capable of rigid attachment to the tongue of a trailer;

a second elongated tubular member slidable within the first member and having an upper end positioned within the first member and a lower end extending beyond the first member;

fine adjustment means for securing the second member in a desired position in relation to the first member and allowing fine adjustment of the position of the second member in relation to the first member;

a third elongated tubular member slidable within the second member and having an upper end positioned within the second member and a lower end extending beyond the second member; and

coarse adjustment means for securing the third member in a desired position in relation to the second member and allowing rapid extension or retraction of the third member in relation to the second member.

2. The jack of claim 1 wherein the fine adjustment means include a threaded bolt and nut with the nut being attached to the second member and the bolt rotatably engaged with the first member and the bolt being threadably engaged with the nut.

3. The jack of claim 1 wherein the coarse adjustment means include a pin, the second member having a hole for the insertion of the pin near its lower end, and the third member having a series of holes substantially along its length of the insertion of the pin.

4. The jack of claim 3 wherein the pin is springloaded.

5. The jack of claim 1 further comprising a foot mounted on the lower end of the third member and being adapted to provide a stable base when contacting the ground.

6. The jack of claim 1 further comprising a mounting plate attached to the first member for mounting the jack to the tongue of a trailer.

7. A jack comprising:

a first elongated tubular member capable of rigid attachment to the tongue of a trailer;

a second elongated tubular member slidable within the first member and having an upper end positioned within the first member and a lower end extending beyond the first member;

a threaded nut mounted radially within the upper end of the second member;

a threaded bolt held longitudinally within the first member and rotatably engaged with the first member such that the bolt may rotate within the first member, and a portion of the bolt extending beyond the first member, and the bolt being threadably engaged with the nut such that when the bolt is rotated it causes the second member to extend or retract in relation to the first member;

a third elongated tubular member slidable within the second member and having an upper end positioned within the second member and a lower end extending beyond the second member; and

coarse adjustment means for holding the third member in a desired position in relation to the second member and allowing rapid extension or retraction of the third member in relation to the second member.

8. The jack of claim 7 wherein the coarse adjustment means comprise a pin, the second member having a hole for the insertion of the pin near its lower end, and the third member having a series of holes substantially along its length for the insertion of the pin.

9. The jack of claim 8 wherein the pin is spring-loaded.

10. The jack of claim 7 further comprising a foot mounted on the lower end of the third member and adapted to provide a stable base when contacting the ground.

11. The jack of claim 7 further comprising a mounting plate attached to the first member for mounting the jack to the tongue of a trailer.

12. In a jack assembly comprising a first elongated tubular member capable of rigid attachment to the tongue of a trailer, a second elongated tubular member slidable within the first member, the second member having an upper end positioned within the first member and a lower end extending beyond the first member, and a threaded bolt and nut means for adjusting longitudinally the second member relative to the first, the improvement comprising a third elongated tubular member adapted to slide within the second tubular member and having an upper end positioned within the second member and a lower end extending beyond the second member, and a coarse adjustment means for securing the third member in a desired position in relation to the second member and for allowing rapid extension or retraction of the third member in relation to the second.

13. The jack of claim 12 wherein the coarse adjustment means comprise a pin, the second member having a hole for the insertion of the pin near its lower end, and the third member having a series of holes substantially along its length for the insertion of the pin.

14. The jack of claim 12 further comprising a foot mounted on the lower end of the third member and being adapted to provide a stable base when contacting the ground.

15. The jack of claim 12 further comprising a mounting plate attached to the first member for mounting the jack to the tongue of a trailer.