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(54) Title of the Invention: **Floor jack lockout assembly**  
 Abstract Title: **A floor jack locking assembly with position indicators**

(57) A floor jack locking assembly includes a locking pin 128 to couple a frame 102 and a lifting link arm 126 of a lifting mechanism for lifting arm 106 by means of lock pin holes 130 in the frame 102 with position indicators 136 and corresponding alignment indicators 138 provided on the frame 102 and a handle 104 pivotally coupled to the lifting mechanism. Secondary position indicators 134 may be disposed on the frame 102 proximal to the lock pin holes 130. A pin lifting arm hole in the lifting link arm 126 may receive the locking pin 128. First, second and third lock pin holes 130 may be provided. The locking assembly may be used to mechanically lock out the jack at a specified lift height. The locking assembly may avoid the hydraulic lift cylinder being the only stabilizing component of the jack when supporting a significant load. The locking pin 128 may be coupled to lifting link arms 126, avoiding the need to have the locking pin 128 inserted into or through the lifting arm 106 of the jack.

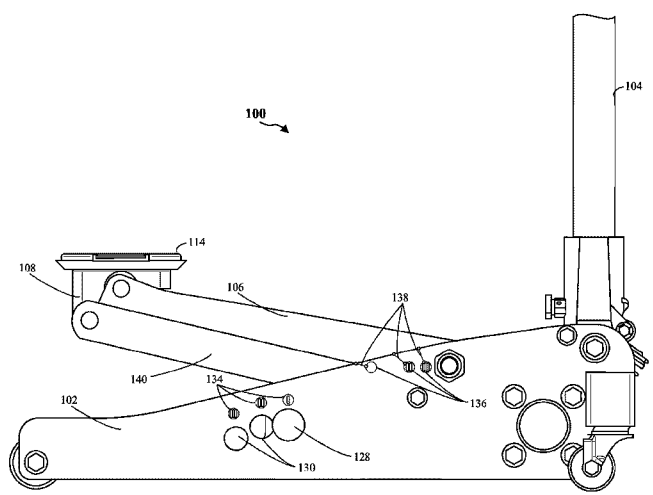


FIG. 5

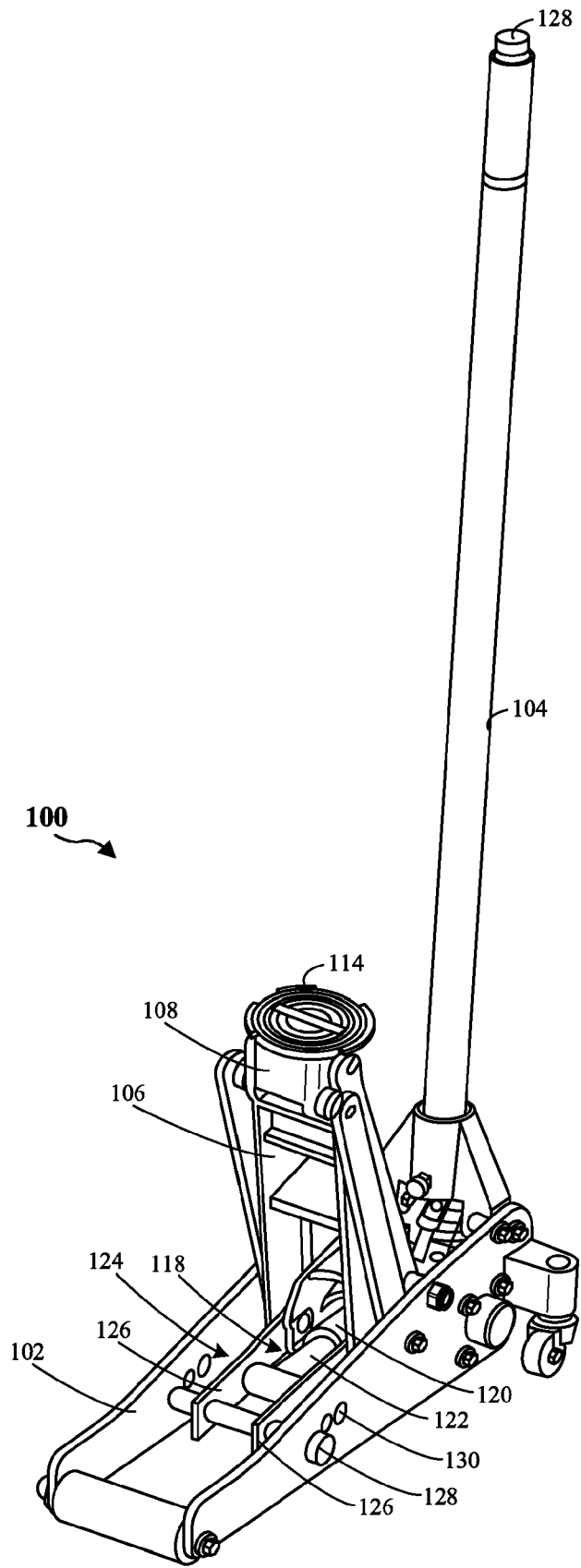


FIG. 1

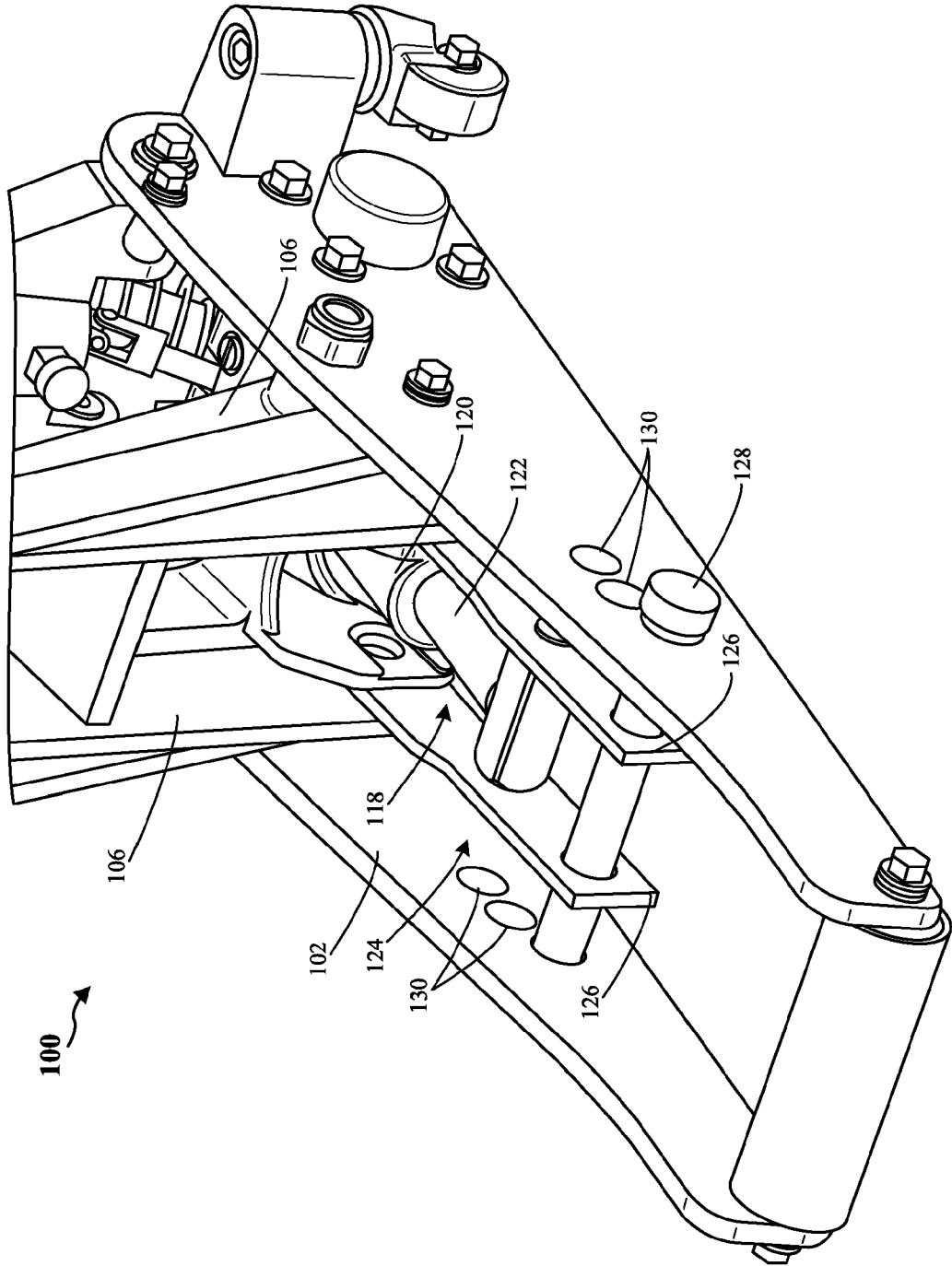


FIG. 2

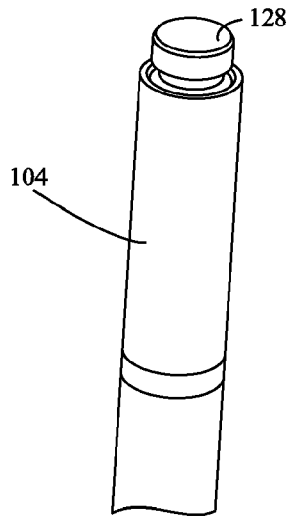


FIG. 3

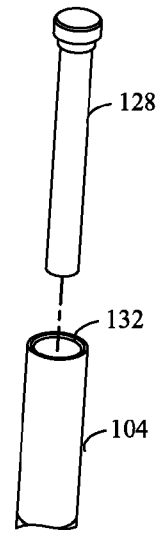


FIG. 4

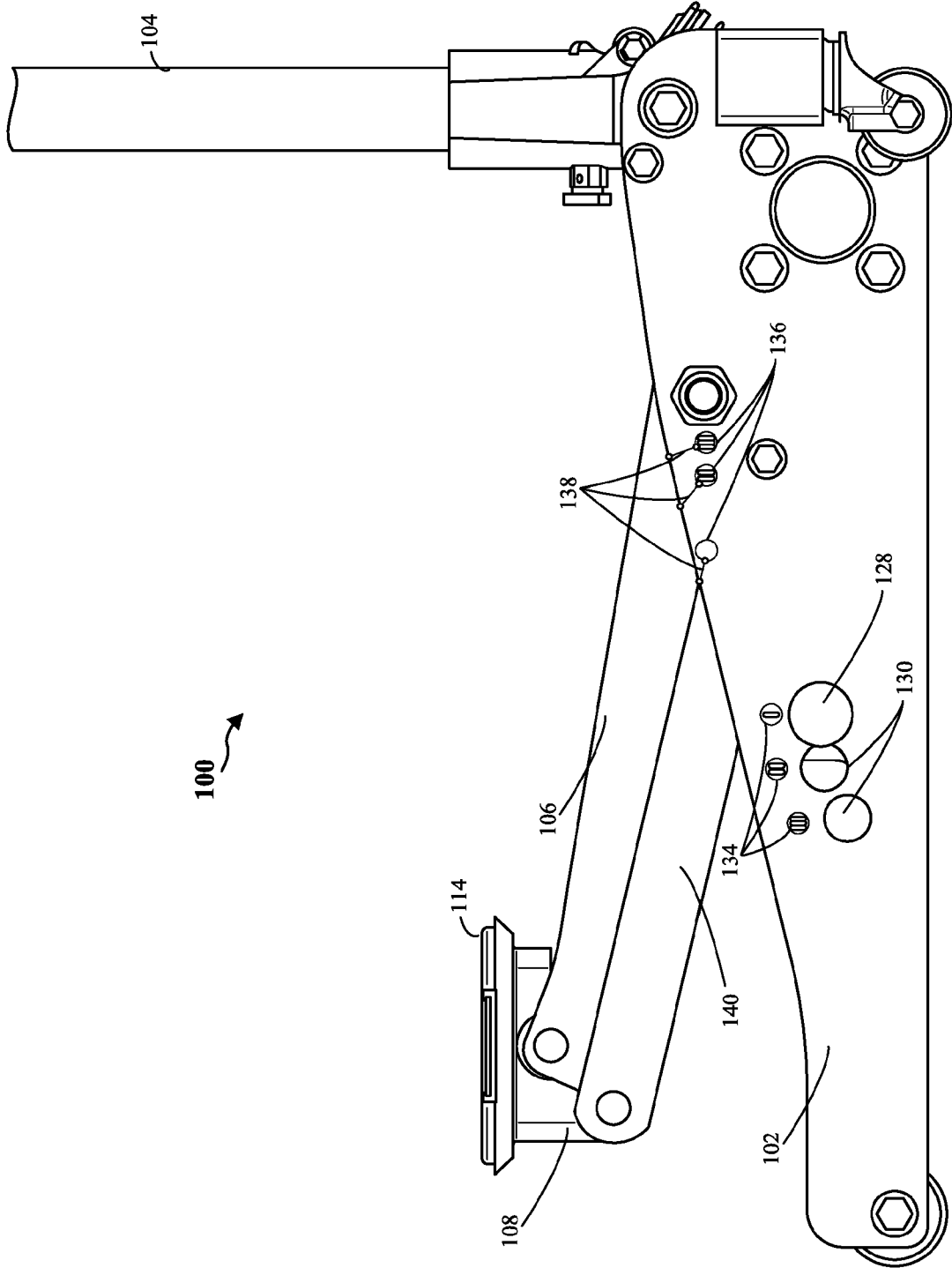


FIG. 5

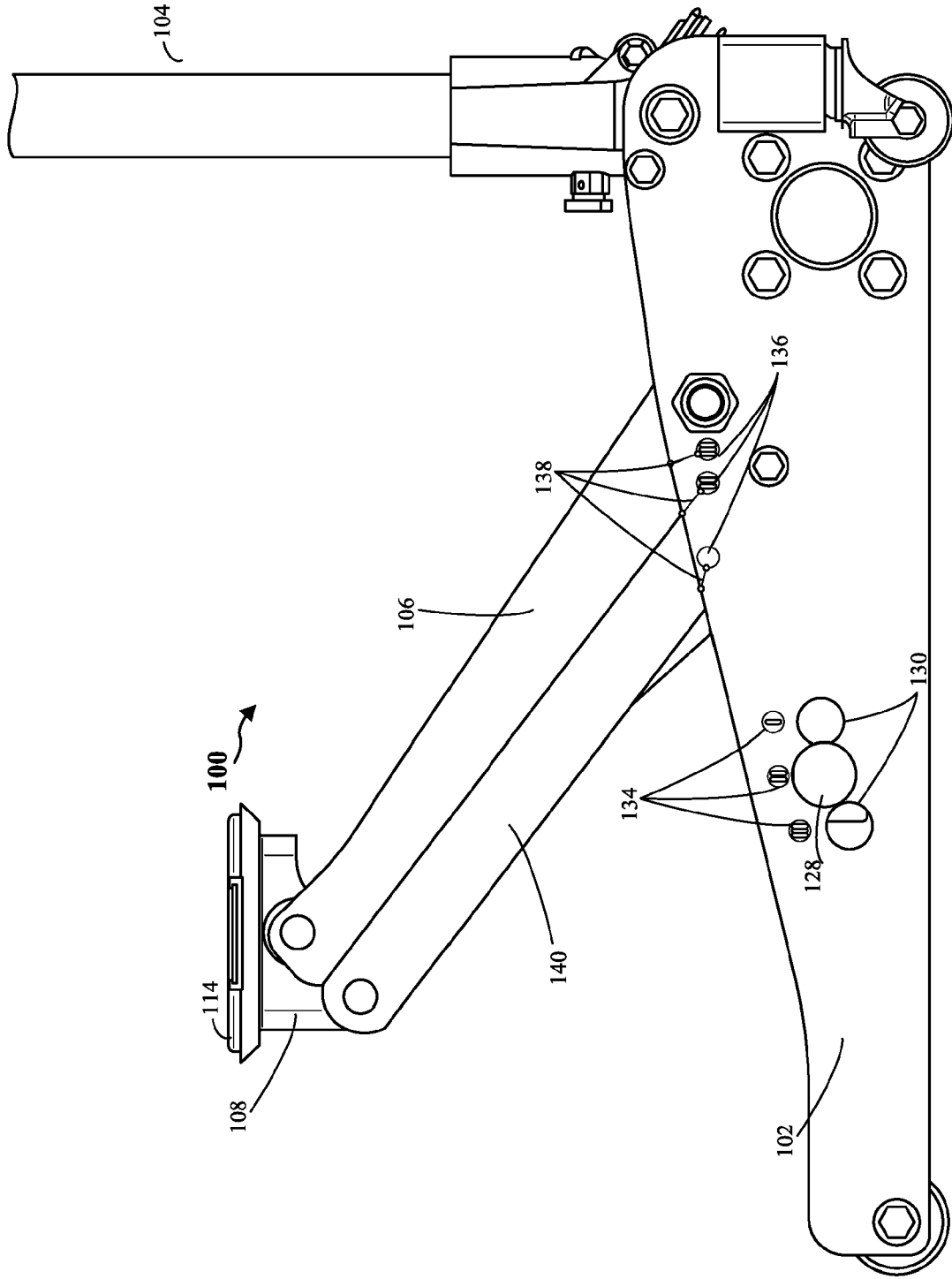


FIG. 6

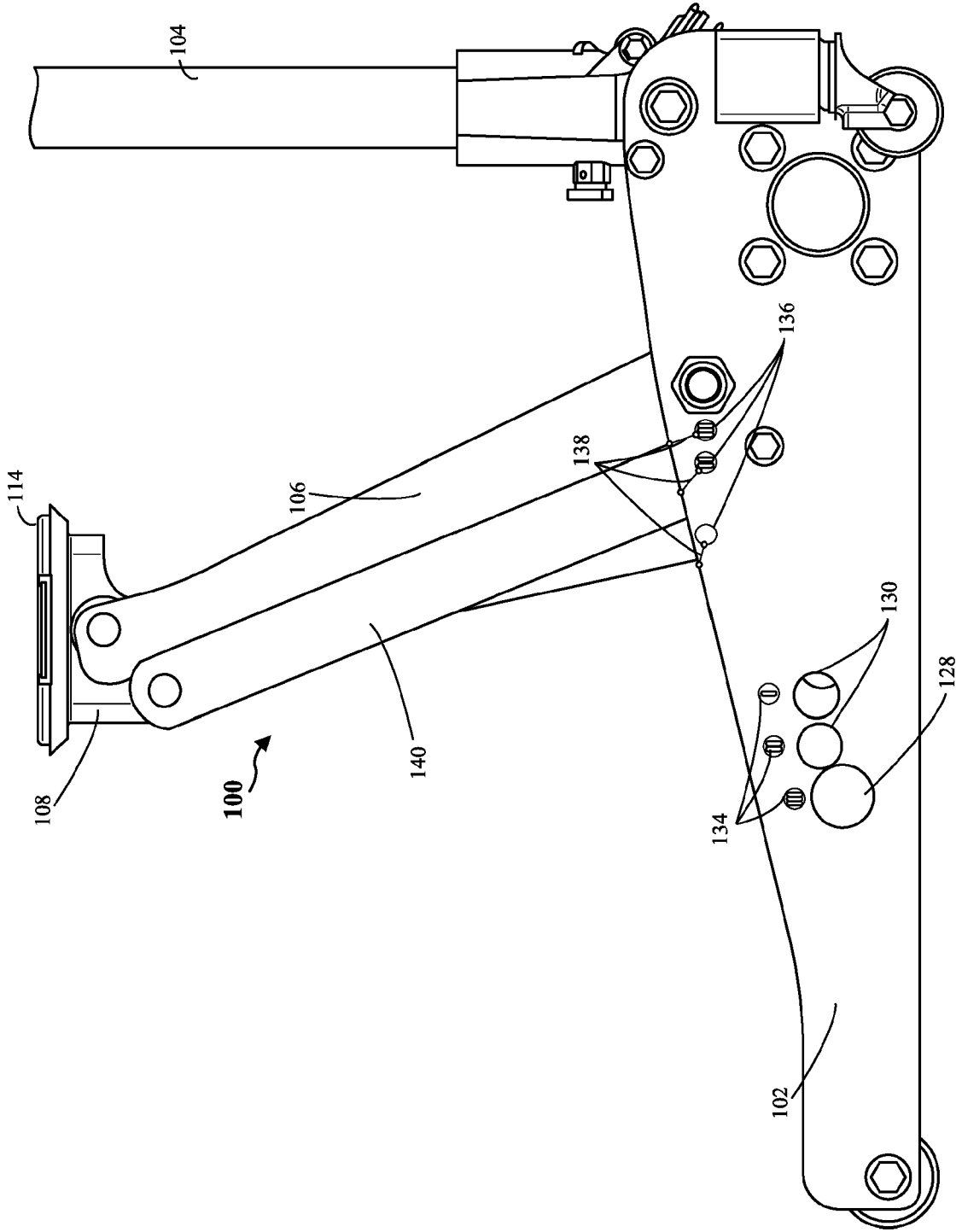


FIG. 7

## **FLOOR JACK LOCKOUT ASSEMBLY**

### Technical Field of the Invention

**[0001]** The present application relates generally to jacks. More particularly, the present invention relates to a lockout assembly adapted to lock a jack securely at multiple operational heights.

### Background of the Invention

**[0002]** Floor jacks are used in repair shops to lift a vehicle from the ground. An operator positions the floor jack underneath a lift point and raises the vehicle at that point. Floor jacks can be powered by manual or automated means, and have become important to the automotive repair industry.

**[0003]** Shop floor jacks are required to withstand large weights, such as that of a vehicle. The majority of floor jacks are hydraulic or air-over-hydraulic actuated devices. It is a recommended practice that after a vehicle is raised into position using a jack, one or more jack stands are placed under the vehicle and the vehicle is lowered onto the stand(s). Stands are typically telescoping tube designs held at height with a cross pin. The use of stands replaces the use of fluids holding the load in place with mechanical steel pins. This approach, however, relies on the jacks to raise vehicles at the same point the jack stand needs to be placed.

### Summary of the Invention

**[0004]** The present invention relates broadly to a floor jack locking assembly with a locking pin used to mechanically lock out the jack at a specified lift height. The locking assembly may include a locking pin used to mechanically lock out the jack at a specified lift height. The locking assembly may avoid the hydraulic lift cylinder being the only stabilizing component of the jack



when supporting a significant load. The locking pin may be coupled to lifting link arms, avoiding the need to have the locking pin inserted into or through the lifting arm of the jack.

**[0005]** The locking assembly may avoid the hydraulic lift cylinder being the only stabilizing component of the jack when supporting a significant load.

**[0006]** In an embodiment, the present invention relates broadly to a floor jack. The floor jack includes a frame including lock pin holes, a lifting arm pivotally coupled to the frame, a lifting mechanism coupled to the lifting arm, and a locking assembly. The locking assembly may include a lifting link arm coupled to the lifting mechanism, a locking pin adapted to couple the lifting link arm and the frame through at least one of the lock pin holes, and a handle pivotally coupled to the lifting mechanism.

**[0007]** In another embodiment, the present invention relates broadly to a floor jack. The floor jack includes a frame including lock pin holes, a lifting arm pivotally coupled to the frame, a lifting mechanism coupled to the lifting arm, a lifting link arm coupled to the lifting mechanism, wherein the lifting arm includes a pin lifting arm hole. A lock pin is adapted to engage the frame and the lifting link arm through at least one of the lock pin holes to mechanically lock the lifting mechanism, and a handle is pivotally coupled to the lifting mechanism.

#### Brief Description of the Drawings

**[0008]** For the purpose of facilitating an understanding of the subject matter sought to be protected, there is illustrated in the accompanying drawing embodiments thereof, from an inspection of which, when considered in connection with the following description, the subject matter sought to be protected, its construction and operation, and many of its advantages, should be readily understood and appreciated.

[0009] FIG. 1 is a perspective view of a jack incorporating a locking assembly according to an aspect of the present disclosure.

[0010] FIG. 2 is an expanded perspective view of the jack of FIG. 1 according to an aspect of the present disclosure.

[0011] FIG. 3 is a perspective view of a jack handle with stored locking pin according to an aspect of the present disclosure.

[0012] FIG. 4 is an exploded view of jack handle of FIG. 3.

[0013] FIG. 5 is a side view of the jack of FIG. 1 in a first locking position according to an aspect of the present disclosure.

[0014] FIG. 6 is a side view of the jack of FIG. 1 in a second locking position according to an aspect of the present disclosure.

[0015] FIG. 7 is a side view of the jack of FIG. 1 in a third locking position according to an aspect of the present disclosure.

#### Detailed Description

[0016] While this invention is susceptible of embodiments in many different forms, there is shown in the drawings, and will herein be described in detail, a preferred embodiment of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the broad aspect of the invention to embodiments illustrated. As used herein, the term “present invention” is not intended to limit the scope of the claimed invention and is instead a term used to discuss exemplary embodiments of the invention for explanatory purposes only.

[0017] The present invention broadly relates to a floor jack and a multi-height locking assembly. The multi-height locking assembly provides additional security to prevent the

hydraulic from being the only locking mechanism on the jack. According to one aspect, the locking assembly disclosed herein may allow the jack to be locked mechanically to further protect against a failure in the hydraulic system of the jack while under a load. Additionally, in circumstances in which a significant load, such as a vehicle, would normally be transferred to a jack stand after lifting, the locking assembly disclosed herein may allow a mechanical lockout of the hydraulics and eliminate the need for the jack stand at the lift point of the load.

**[0018]** While the jack and locking assembly described herein may be described in connection with lifting a vehicle as the load, one skilled in the art will recognize that aspects of the present disclosure may be implemented to support any load. Referring to FIGS. 1 and 2, a jack 100 includes a handle 104 operably coupled to a lifting arm 106 that is coupled to and movable relative to the frame 102 in response to motion of the handle 104. A saddle base 108 is coupled to the lifting arm 106 and moves with the lifting arm 106 in response to motion of the handle 104, allowing the saddle base 108 to raise the vehicle. The saddle base 108 may support a saddle 114 on a vehicle-facing surface of the saddle base 108 to help avoid marring or damaging the vehicle. The saddle base 108 and/or saddle 114 may be changeable to accommodate different types of lift points, depending upon the vehicle.

**[0019]** The hydraulics of the jack 100 are part of a power unit 118. The power unit 118 may include a lift piston 122 that is slidable within a lift-piston assembly 120 of the power unit 118, and that may be coupled to a locking assembly 124. Locking assembly 124 may include lifting link arms 126. A locking pin 128 may be inserted into one of a number of lock pin holes 130 and pin lifting arm holes in the link arms 126. The lock pin holes 130 are disposed on opposing sides of the frame 102. For example, the frame 102 may include first and second side portions. The

first side portion includes first lock pin holes 130, and the second side portion includes second lock pin holes 130 that align with the first lock pin holes 130, respectively.

**[0020]** When the locking pin 128 is inserted into one of the first lock pin holes 130, extended through the pin lifting arm holes in the lifting link arm 126 and across the frame 102, and inserted into the corresponding second lock pin hole 130, the hydraulics from the power unit 118 become mechanically locked in place. The lock pin 128 maintains the lateral position of the lift piston assembly 120 and therefore will lock the lifting arm 106 in place. The locking pin 128 prevents the lateral movement of the lifting link arms 126 regardless of the hydraulics in the power unit 118. That is, the lifting arm 106 is not dependent on the hydraulics for maintaining the jack height. The lock pin 128 provides a mechanical locking solution that is stable and capable of withstanding significant weight from the load. As mentioned above, this may eliminate the need for additional support structures, such as jack stands, and the substitution of those supports under a vehicle for the jack.

**[0021]** Referring to FIGS 3-4, the handle 104 of the jack 100 may include a storage location for the locking pin 128. According to one aspect of the disclosure the handle 104 may include a recess 132 or cavity in a proximal end to receive the locking pin 128. The locking pin may be sized and shaped to be just smaller than the recess 132 to form a friction fit securing the locking pin 128 in the recess 132 of the handle 104. Alternative securing mechanisms may be implemented, including gaskets, O-rings, flanges, spring, push-button, or the like, that allow the locking pin 128 to be securely stored in the handle 104, yet easily removable by a user.

**[0022]** FIGS 5-7 depict side-views of the jack 100 in various positions of lift height. According to one aspect, the jack may have multiple sets of first and second lock pin holes 130 to receive the locking pin 128, each set of first and second locking holes representing a different

height of the lifting arm 106. The lock pin holes may include labels 134 on the jack frame 102 indicating a numbered position or other indicator of locked position. Exemplary labels may include, without limitation, I, II, III; low, middle, high; min, mid, max; or the like. FIG. 5 depicts the jack 100 in a first height position, depicted as position I at the lowest locking height. The jack frame 102 may also include corresponding secondary position labels 136 that align with a line or surface of a support bar 140 coupled to the saddle base 108. Alignment lines 138 may extend from the secondary position labels 136. The alignment lines 138 may be sized and shaped to align with the support bar 140. The labeling scheme shown in FIGS. 5-7 provide a visual indicator to the user of the position of the jack that will allow the jack to engage the mechanical locking assembly. As the user actuates the jack 100, causing the lifting arm 106 to rise and lower the load, the user may visually monitor the alignment of the support bar 140 with the alignment lines 138 and secondary position indicators 136. When the support bar aligns with the alignment line 138 of the desired position, the user may insert the locking pin 128 in to the corresponding first and second lock pin holes 130 with the corresponding label 134.

**[0023]** FIG. 6 depicts the jack 100 in a second height position, labeled position II. The support bar 140 now aligns with the alignment line 138 corresponding to the secondary position label 136, labeled position II. FIG. 7 depicts the jack 100 in a third height position, labeled position III. The support bar 140 now aligns with the alignment line 138 corresponding to the secondary position label 136, labeled position III. When the user desires to lower the jack, the locking pin 128 may be removed and stored in the handle 104, and the jack may be lowered.

**[0024]** The locking assembly of the present disclosure is advantageous over traditional jacks in that the locking assembly provides a secure mechanism to lock the jack mechanically without relying on, or stressing the hydraulics. The locking assembly also provides for multiple locking

positions and a user-friendly manner of indicating to a user when the jack is in a locking position.

**[0025]** From the foregoing, it can be seen that there has been described improved jack with a trunnion block assembly that includes one or more trunnions coupled to a block such that upon actuation of a power unit, including a piston, the trunnion block assembly displaces connection plates coupled to a lifting arm of the jack. The multi-component trunnion block assembly provides a structural advantage over a unitary body trunnion block with the trunnions formed as part of the body.

**[0026]** As used herein, the term “coupled” and its functional equivalents are not intended to necessarily be limited to direct, mechanical coupling of two or more components. Instead, the term “coupled” and its functional equivalents are intended to mean any direct or indirect mechanical, electrical, or chemical connection between two or more objects, features, work pieces, and/or environmental matter. “Coupled” is also intended to mean, in some examples, one object being integral with another object. As used herein, the term “a” or “one” may include one or more items unless specifically stated otherwise.

**[0027]** The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only and not as a limitation. While particular embodiments have been shown and described, it will be apparent to those skilled in the art that changes and modifications may be made without departing from the broader aspects of the inventors’ contribution. The actual scope of the protection sought is intended to be defined in the following claims when viewed in their proper perspective based on the prior art.

The following section comprises numbered clauses which are not claims, but are additional statements of the invention.

1. A floor jack, comprising:
  - a frame including lock pin holes;
  - a lifting arm pivotally coupled to the frame;
  - a lifting mechanism coupled to the lifting arm;
  - a locking assembly including:
    - a lifting link arm coupled to the lifting mechanism; and
    - a locking pin adapted to couple the lifting link arm and the frame through at least one of the lock pin holes; and
    - a handle pivotally coupled to the lifting mechanism.
2. The floor jack of clause 1, wherein the lifting link arm includes a pin lifting arm hole adapted to receive the locking pin.
3. The floor jack of clause 1, further comprising first position indicators disposed on the frame.
4. The floor jack of clause 3, further comprising alignment indicators, wherein each of the alignment indicators corresponds to one of the first position indicators.
5. The floor jack of clause 4, further comprising secondary position indicators disposed on the frame proximal to the lock pin holes, wherein each of the secondary position indicators corresponds to one of the first position indicators.
6. The floor jack of clause 1, wherein the lock pin holes includes first, second, and third lock pin holes, the first lock pin hole corresponding to a first locked position, the second pin hole

corresponding to a second locked position, and the third lock pin hole corresponding to a third locked position.

7. The floor jack of clause 6, further comprising
  - a first set of position indicators disposed on the frame;
  - a first set of alignment indicators disposed on the frame proximal to the first set of position indicators;
  - a secondary set of position indicators disposed on the frame proximal to the lock pin holes;
  - wherein the locking pin is adapted to be disposed in the first lock pin hole when a support bar of the floor jack is aligned with a first alignment indicator at a first position indicator.
8. The floor jack of clause 1, wherein the lock pin holes include a first set of lock pin holes and a second set of lock pin holes, the first set of lock pin holes disposed on an opposite side of the frame from the second set of lock pin holes.
9. The floor jack of clause 8, wherein the lock pin is adapted to be disposed in the first and second set of lock pin holes.
10. The floor jack of clause 1, wherein the handle includes a recess adapted to receive the lock pin.
11. A floor jack comprising:
  - a frame including lock pin holes;
  - a lifting arm pivotally coupled to the frame;
  - a lifting mechanism coupled to the lifting arm;
  - a lifting link arm coupled to the lifting mechanism, wherein the link arm includes a pin lifting arm hole;



a lock pin adapted to engage the frame and the lifting link arm through at least one of the lock pin holes to mechanically lock the lifting mechanism; and

a handle pivotally coupled to the lifting mechanism.

12. The floor jack of clause 11, further comprising first position indicators disposed on the frame.

13. The floor jack of clause 12, further comprising alignment indicators, wherein each of the alignment indicators corresponds to one of the first position indicators.

14. The floor jack of clause 13, further comprising secondary position indicators disposed on the frame proximal to the lock pin holes, wherein each of the secondary position indicators corresponds to one of the first position indicators.

15. The floor jack of clause 11, wherein the lock pin holes includes first, second, and third lock pin holes, the first lock pin hole corresponding to a first locked position, the second pin hole corresponding to a second locked position, and the third lock pin hole corresponding to a third locked position.

16. The floor jack of clause 15, further comprising

a first set of position indicators disposed on the frame;

a first set of alignment indicators disposed on the frame proximal to the first set of position indicators;

a secondary set of position indicators disposed on the frame proximal to the lock pin holes;

wherein the locking pin is adapted to be disposed in the first lock pin hole when a support bar of the floor jack is aligned with a first alignment indicator at a first position indicator.

17. The floor jack of clause 11, wherein the lock pin holes includes a first set of lock pin holes and a second set of lock pin holes, the first set of lock pin holes disposed on an opposite side of the frame from the second set of lock pin holes.
18. The floor jack of clause 17, wherein the lock pin is adapted to couple the lifting link arm and the frame through the first and second sets of lock pin holes.
19. The floor jack of clause 11, wherein the lifting mechanism includes a hydraulic piston.
20. The floor jack of clause 11, wherein the handle includes a recess adapted to receive the lock pin.

## CLAIMS

1. A floor jack, comprising:
  - a frame including lock pin holes;
  - position indicators disposed on the frame;
  - alignment indicators disposed on the frame, wherein each one of the alignment indicators corresponds to one of the position indicators;
  - a lifting arm pivotally coupled to the frame;
  - a lifting mechanism coupled to the lifting arm;
  - a lifting link arm coupled to the lifting mechanism; and
  - a locking pin adapted to couple the lifting link arm and the frame through at least one of the lock pin holes; and
  - a handle pivotally coupled to the lifting mechanism.
2. The floor jack of claim 1, wherein the lifting link arm includes a pin lifting arm hole adapted to receive the locking pin.
3. The floor jack of claim 1, further comprising secondary position indicators disposed on the frame proximal to the lock pin holes, wherein each of the secondary position indicators corresponds to one of the position indicators.
4. The floor jack of claim 1, wherein the lock pin holes includes first, second, and third lock pin holes, the first lock pin hole corresponding to a first locked position, the second lock pin hole corresponding to a second locked position, and the third lock pin hole corresponding to a third locked position.

5. The floor jack of claim 4, wherein the locking pin is adapted to be disposed in the first lock pin hole when a support bar of the floor jack is aligned with a first alignment indicator of the alignment indicators corresponding to a first position indicator of the position indicators.

6. The floor jack of claim 1, wherein the lock pin holes include a first set of lock pin holes and a second set of lock pin holes, the first set of lock pin holes disposed on an opposite side of the frame from the second set of lock pin holes.

7. The floor jack of claim 6, wherein the locking pin is adapted to be disposed in the first and second sets of lock pin holes.



**Application No:** GB2108054.4

**Examiner:** Mr Karl Whitfield

**Claims searched:** 1 to 7

**Date of search:** 25 November 2021

## Patents Act 1977: Search Report under Section 17

### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	GB 2309020 A (HUNG) shaft 8
A	-	US 5984270 A (HUSSAINI et al.) rods 66 & 78

### Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>X</sup> :

Worldwide search of patent documents classified in the following areas of the IPC

B66F

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, Patent Fulltext

### International Classification:

Subclass	Subgroup	Valid From
B66F	0005/04	01/01/2006
B66F	0003/25	01/01/2006
B66F	0003/30	01/01/2006