United States Patent [19]

Cameron

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[54] **MECHANICAL JACK**

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[52] **U.S. Cl.** **254/108**

[51] **Int. Cl.** **B66f 1/04**

[58] **Field of Search** 254/45, 86, 108, 112

[56] **References Cited**

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[57] **ABSTRACT**

A camper jack of the kind in which two tubes are provided, the first tube being telescopically movable within the second and having a plurality of regularly spaced axially aligned apertures. A toothed wheel is journalled on the second tube and engages in the apertures in the first tube through a suitable aperture provided in the wall of the second tube so as to prevent relative rotation of the two tubes. Also mounted on the second tube are a latch and means for pivotally mounting a jacking lever carrying a pawl for engagement with the axially aligned apertures to cause extension of the jack.

7 Claims, 8 Drawing Figures

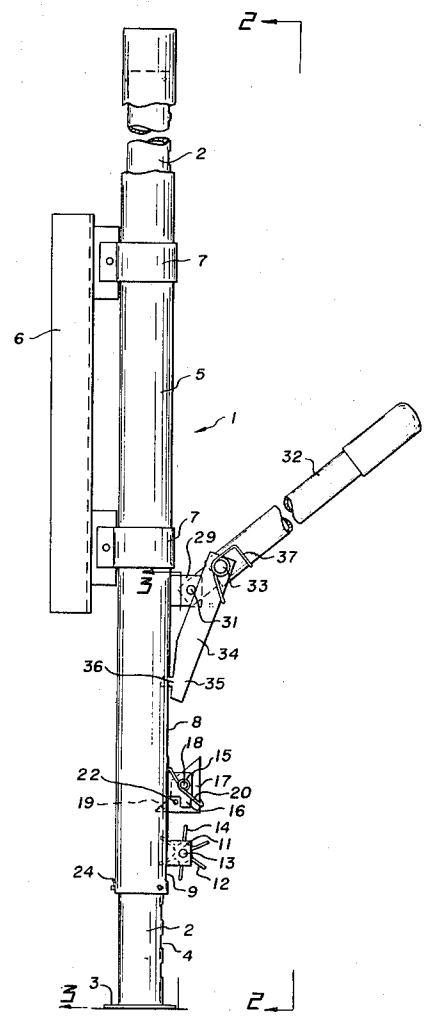


Fig. 2.

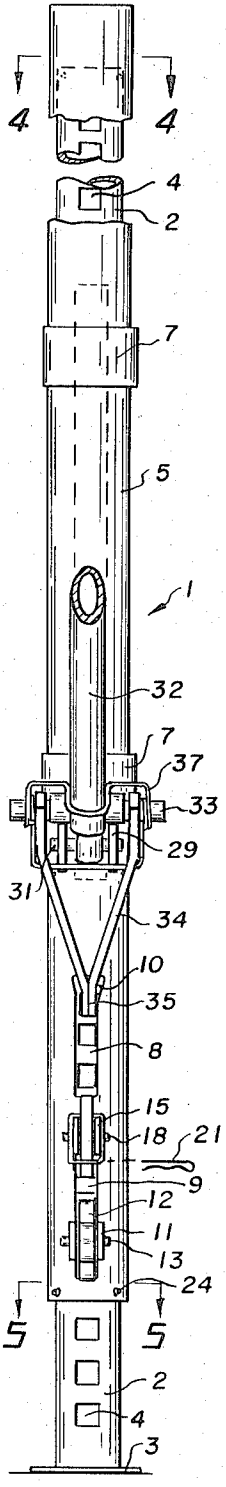


Fig. 1.

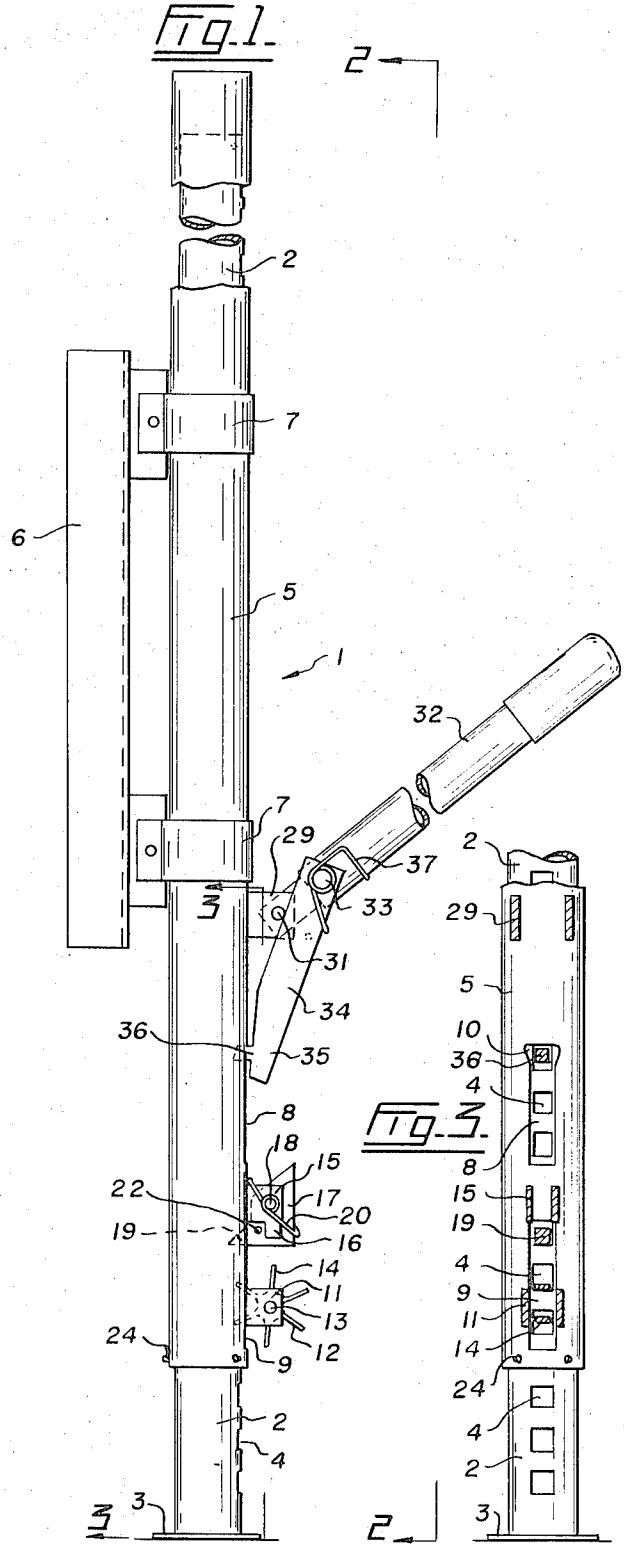


Fig. 3.

Fig. 4.

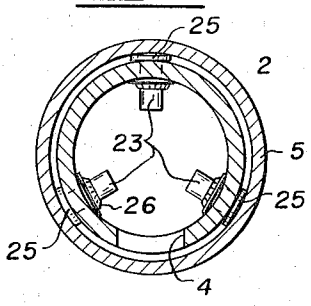


Fig. 5.

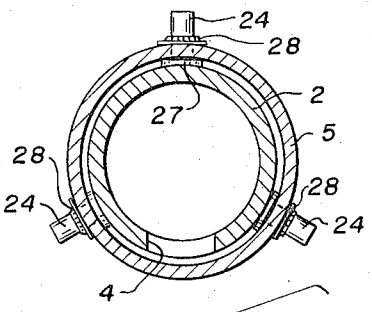


Fig. 6.

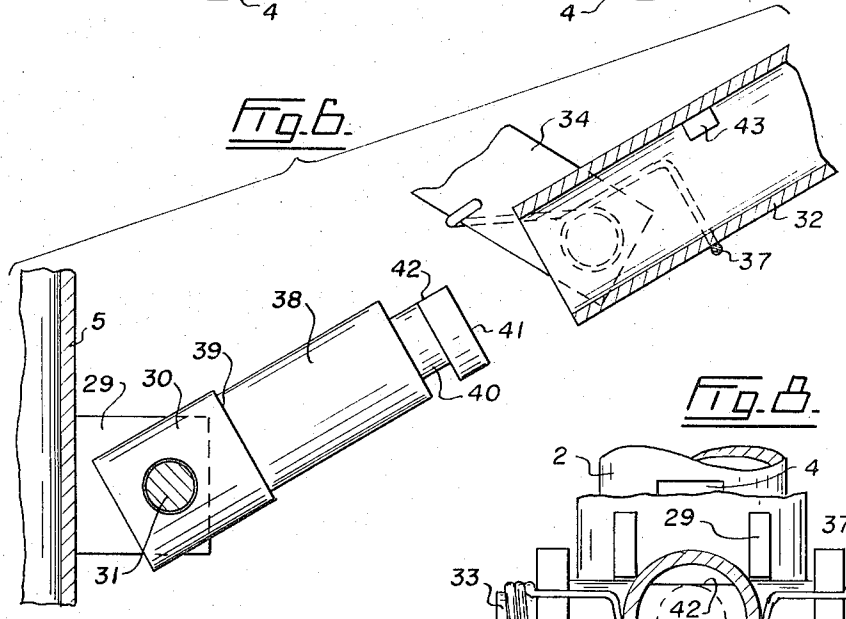


Fig. 8.

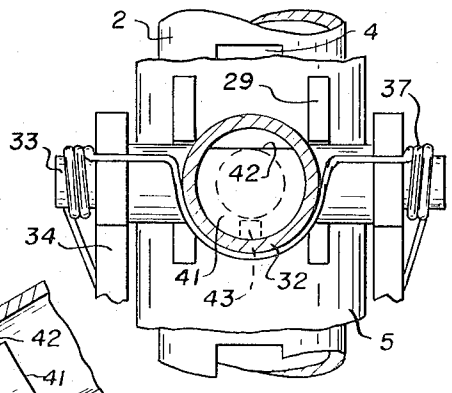
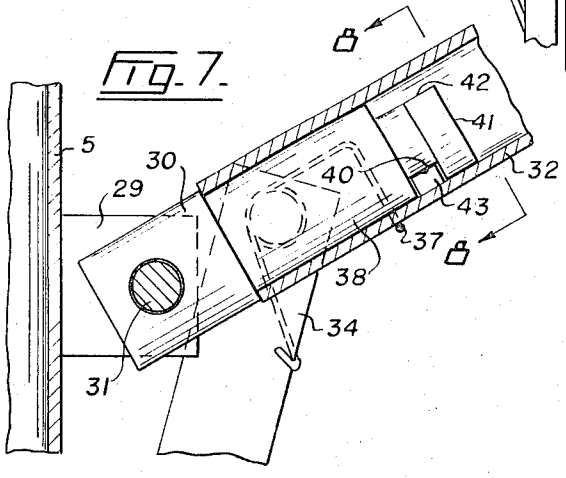


Fig. 7.



MECHANICAL JACK

The invention relates to mechanical jacks of the kind having a first tube telescopically movable within a second tube and in which it is necessary to prevent relative rotation of the two tubes during actuation. The invention is particularly suited for use with lever operated camper jacks but is not restricted to such use.

In one kind of lever operated camper jack at present in use relative rotation of the two tubes is prevented by a projection formed on the inner surface of the second tube and engaging in a longitudinal groove extending the full length of the first tube. For such an arrangement to work satisfactorily, the clearance between the two tubes must be small and in practice is about 20 thousanths of an inch. The requirement for such a small clearance leads to disadvantages both in manufacture and in use of the jack. The commercially available tubing from which the jack is manufactured is subject to substantial variation in wall thickness, which leads to considerable difficulties and expense in providing the desired clearance in the jacks during manufacture. In use, the projection on the outer tube tends to wear and after a certain amount of use permits the inner tube to rotate sufficiently to jam. Also, when the jack is mounted on a camper, road dust and other detritus can enter the space between the tubes and cause jamming when the jack is operated.

It is among the objects of the present invention to provide a mechanical jack of the kind having one tube movable within another and in which relative rotation of the tubes is prevented whilst the above disadvantages are overcome.

The invention therefore provides a mechanical jack comprising a first tube for ground engagement, and formed with a plurality of regularly spaced axially aligned apertures, a second tube within which said first tube is located for axial movement, and a control device including a toothed wheel journalled on said second tube for engagement on said spaced apertures in said first tube, whereby rotation of said first tube relative to said second tube is limited.

Preferably, said jack further comprises a second control device including latching means mounted on said second tube for releasably latching said first tube against sliding movement into said second tube, and means on said second tube for mounting a lever for pivotal movement in a plane including the common axis of said first and second tubes, whereby a third control device, comprising an actuating pawl pivoted on said lever, can sequentially engage said spaced apertures, during repeated pivotal movement of the lever, to cause extension of the jack, said second tube being apertured to permit the engagement of at least two of said control devices in the apertures formed in said first tube.

One embodiment of the invention will now be described with reference to the accompanying drawings in which

FIG. 1 is a side elevation on a jack according to the invention,

FIG. 2 is a front elevation of the jack on the line 2—2 of FIG. 1,

FIG. 3 is a sectional elevation of the jack on the line 3—3 of FIG. 1,

FIGS. 4 and 5 are sectional plan views on the lines 4—4 and 5—5 respectively of FIG. 2,

FIG. 6 is an exploded elevation, partially in section, of a detail of FIG. 1, showing an arrangement for connecting a lever to the jack,

FIG. 7 is a view similar to FIG. 6 showing the lever connected to the jack and,

FIG. 8 is a sectional elevation on the line 8—8 of FIG. 7.

Referring first to FIGS. 1 to 3 of the drawings, the jack 1 comprises a first tube 2 having a foot plate 3 for engagement with the ground and formed with a plurality of regularly spaced axially aligned rectangular apertures 4. The tube 2 is received within an outer tube 5 on which a bracket 6 is secured by means of circlips 7 extending around the tube and bolted to the bracket.

As best seen in FIG. 3, the lower end of the second tube 5 is formed with axially aligned upper and lower slotted apertures 8 and 9, the upper end of the upper slotted aperture 8 being cut away to a slightly increased width at 10 for a purpose to be described below. Towards the lower end of the lower slotted aperture 9, a pair of journal plates 11 are welded one on each side of the aperture. A toothed wheel 12 is journalled for rotation on a pin 13 extending between the two plates 11 so that the teeth 14 of the wheel extend through the slot 9 and engage in the apertures 4 in the first tube.

Immediately above the upper end of the slotted aperture 9, a second pair of journal plates 15 are mounted on the second tube, each plate 15 having a dependent lug 16 spaced from the tube. A substantially triangular latching plate 17 is journalled for rotation on a pin 18 extending between the plates 15. The latching plate 17 has a spur 19 which extends through the upper portion of the slotted aperture 9 to engage with one of the slots 4 in the first tube 2. A wire spring 20, engaging between the tube 5, the pin 18 and the outer edge of the plate 17, normally biases the plate so that the spur 19 engages in one of the apertures 4. A spring clip 21 (see FIG. 2) is engageable in a hole 22 (see FIG. 1) provided between the lug 16 and the tube 5 so as to retain the spur 19 in latching engagement.

Referring now to FIGS. 4 and 5, the tubes 2 and 5 are maintained in concentric relation by two sets of three flat headed brass pins 23 and 24 respectively. The set of pins 23 is provided at the upper end of the inner tube 2, with the pins being in equiangular relation. Each pin 23 extends radially outwardly through the tube 2 with its flat head 25 located between the two tubes, the pin being retained in position by a friction washer 26 engaging over the other end of the pin. The set of pins 24 is provided at the lower end of the tube 5 in equiangular relation. Each pin extends inwardly through the tube 5 with its head 27 located between the two tubes, and is retained in position by a friction washer 28 engaging the other end of the pin.

Referring again to FIG. 1, at a position above and spaced from the slotted aperture 8, a third pair of journal plates 29 are provided on the tube 5. A cylindrical bar 30 is pivoted on a pin 31 extending between the plates 29 and receives thereon a manually operable lever 32. The lever 32, which is retained on the bar 30 in a manner described below with reference to FIGS. 6 to 8, is provided at its end with a pair of diametrically oppositely extending bearing pins 33. Each pin 33 has one arm 34 of a Y-shaped pawl carrier 35 pivoted thereon, the arms 34 being brought together at their ends and formed with a projecting pawl 36 which engages with one of the apertures 4 through the slotted

aperture 8. A wire spring 37 has a coil mounted on each of the pins 33 and is engaged with the lever 32 and the arms 34 to bias the pawl 36 in a clockwise direction about the pins 33.

Referring now to FIGS. 6 to 8, the bar 30 is formed with a portion 38 of reduced diameter so as to define a step 39. At its free end, the bar is formed with an annular recess 40 whereby a head 41 is formed. At its uppermost side, the head 41 is cut away to form a flat 42 to the depth of the recess 40. The lever 32 is tubular and of an internal diameter for effecting a slide fit over the portion 38 of the bar 30. At a distance from the end of the lever 32 equal to the length of the portion 38 of the bar, a retainer lug 43 is provided on the inner wall of the lever.

As best seen in FIG. 6, the position of the lug 43 is such that it can be slid over the flat on the head 41 when the lever is rotated through 180° to the position shown in FIG. 1. In order to secure the lever on the bar 30, the tubular lever 32 is slid over the bar 30 until the end of the tube engages the step 39 after which the lever 32 is rotated through 180° so that the lug 43 moves around the recess 40 and engages behind the head 41. In this position, the pawl 36 engages through the slotted aperture 8 with one of the apertures 4 and removal of the lever from the bar 30 is prevented by the lug 43.

In order to operate the jack with the lever mounted on the bar 30 as above described, the spring clip 21 is first removed and the latching plate 17 rocked anticlockwise against the bias of spring 20 to release the inner tube 2. The tube 2 moves downwardly under gravity until the foot plate 3 engages the ground after which the latching plate 17 is released. The jack can now be operated by vertical pivotal movement of the lever 32 to urge the tube 2 downwardly relative to the tube 5. During each pivotal movement, the pawl 36 is maintained in engagement with one of the apertures 4 by the spring 37. During the operation of the jack concentricity of the tubes is maintained by the set of pins 23 and 24, and the alignment of the apertures 4 with the latch plate 17 and the pawl 36 is maintained by the engagement of the toothed wheel 12 in the apertures 4. The portion 10 of increased width, provided at the top of the slotted aperture 8, provides for a limited amount of rotation of the tube 2 relative to the tube 5 to cater for wear, whilst still permitting engagement of the pawl 36 in one of the apertures 4.

I claim:

1. A mechanical jack assembly, comprising

a first tube having a foot plate for engagement with the ground and formed with a plurality of regularly spaced axially aligned rectangular apertures,

a second tube within which said first tube is located for axial sliding movement, said second tube being formed with axially aligned slot means,

means mounted on said first and second tubes for maintaining said tubes in substantially coaxial relation, a toothed atoothed wheel journalled on said second tube for engagement with said rectangular apertures in said first tube through said slot means to prevent relative rotation of said tubes, the teeth on said toothed wheel being of substantially the same width as but substantially thinner than the height of said slots,

a spring loaded latching pawl plate journalled on said second tube for engagement with one of said rectangular apertures through said slot means,

a bar pivoted at one end to said second tube for movement in a plane including the axes of the tubes and provided with interlocking means at the other end for engagement with cooperating means provided on a lever, and

a tubular lever having means at one end for cooperation with said interlocking means at the other end of said bar to retain the lever on the bar, and having an actuating pawl pivoted diametrically thereto for engagement with said rectangular apertures through the said slot means, spring means being provided on said lever for urging said actuating pawl into engagement with said rectangular apertures whereby pivotal movement of said tubular lever causes repetitive engagement with said apertures to cause extension of the jack.

2. An extensible support post for use, in cooperation with a pawl pivotally mounted on a lever, as a mechanical jack, said support post comprising

a first tube formed with a plurality of regularly spaced, axially aligned parallel sided apertures,

a second tube within which said first tube is located for relative axial movement of the tubes,

latching means mounted on said second tube for releasably latching said first tube against said relative movement in a direction to contract the post,

fulcrum means on said second tube for engagement by said lever so as to permit pivotal movement of the lever in a plane including the common axes of said first and second tubes, whereby repeated pivotal movement of the lever causes sequential repeated engagement of the pawl in said apertures to extend the jack,

journal means mounted on said second tube, and

a star wheel journalled for rotation in said journal means, said star wheel having teeth meshing with said apertures, with each tooth being of substantially the same width as an aperture but having a thickness substantially less than the height of an aperture,

whereby arcuate movement of the teeth into and out of the first tube through said apertures is permitted and relative rotation of the tubes is prevented during extension or retraction of the post.

3. An extensible support post as claimed in claim 2, wherein said latching means are engageable in said apertures.

4. A mechanical jack as claimed in claim 2 and further comprising means for maintaining said first and second tubes in substantially coaxial relation, said maintaining means comprising at least one set of two or more circumferentially arranged pin members extending radially from one of said tubes into end engagement with the other tube.

5. A mechanical jack as claimed in claim 4, wherein each pin member has a head bearing on said other tube and a shank located in an aperture provided in said one of said tubes, said pin member being retained in position by a friction washer engaging over said shank.

6. A mechanical jack as claimed in claim 4, wherein a first set of said pin members is provided on the first tube at one end thereof for centering engagement with the second tube and a second set of said pin members is provided on the second tube for engagement with the first tube at the end thereof remote from said first set.

7. A lever operated jack as claimed in claim 4, wherein said pins are made of brass.

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