Dec. 31, 1929. W. B. RUNYAN 1,741,793

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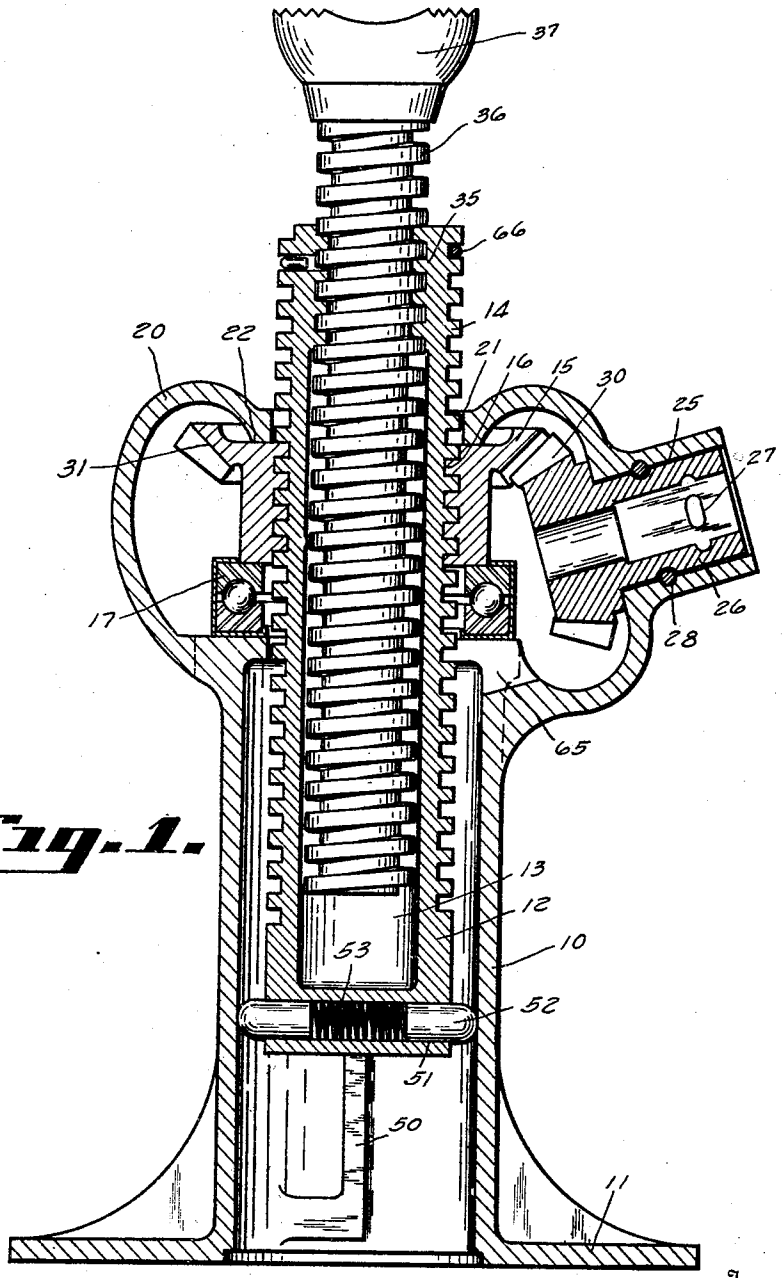


Fig. 1.

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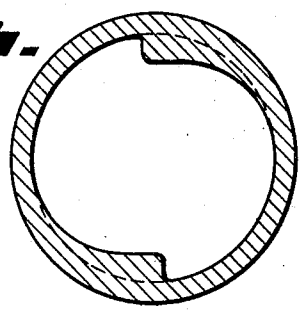
Attorneys

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Fig. 3.



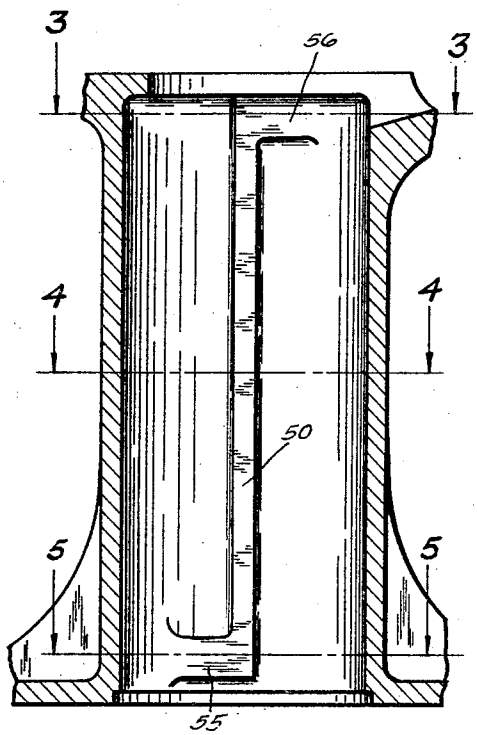


Fig. 2.

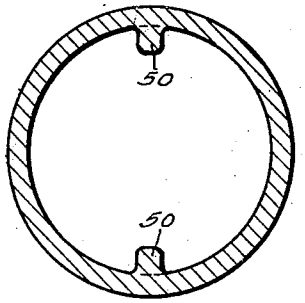


Fig. 4.

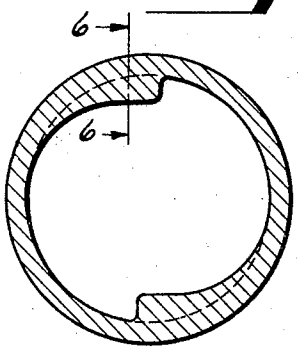


Fig. 5.

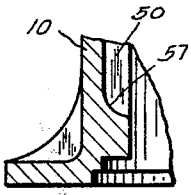


Fig. 6.

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UNITED STATES PATENT OFFICE

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JACK

Application filed January 19, 1925. Serial No. 3,358.

This invention relates to lifting jacks.

One of the principal objects of the invention is to provide an improved form of screw jack, which is simple in construction and effective in operation.

Another object of the invention is to provide a screw jack with suitable means for controlling the movement of the screw within the housing, to limit its lifting or retracting movement.

Other objects and advantages will be apparent from the description set out below when taken in connection with the accompanying drawings.

In the drawing, in which like characters of reference designate like parts throughout the several views thereof—

Fig. 1 is a vertical sectional view through a jack constructed in accordance with this invention;

Fig. 2 is a fragmentary vertical sectional view through the jack standard, showing certain details of construction, the section being in substantially the same plane as the section of Fig. 1;

Fig. 3 is a cross sectional view through the standard along the line 3—3 of Fig. 2;

Fig. 4 is a cross sectional view through the standard along the line 4—4 of Fig. 2;

Fig. 5 is a cross sectional view through the standard along the line 5—5 of Fig. 2; and

Fig. 6 is a fragmentary vertical sectional view through the base of the standard, along the line 6—6 of Fig. 5.

As illustrating a preferred embodiment, the invention is shown as incorporated in a double screw jack such as is now coming into use for balloon tires, which require an extra lift; but, of course, the invention may be incorporated in other adaptations thereof.

As shown the jack comprises a substantially cylindrical hollow standard 10, having a base 11. Loosely mounted within this standard is a hollow or cup shaped member 12, provided with a cylindrical bore or passage 13. This member 12 is exteriorly threaded, as indicated by the numeral 14, and is threadedly received within a rotatable sleeve 15, which is interiorly threaded, as indicated by the numeral 16 to correspond with the threads 14 of the member 12. This sleeve 15 is rotatably supported upon the upper end of the standard 10, a suitable ball bearing, or other equivalent bearing, 17, being preferably interposed between the lower end of the sleeve 15 and the upper end of the standard 17, to insure relatively easy rotation of the sleeve 15 with respect to the standard. The standard is provided adjacent its upper end with a yoke 20, having an opening 21 therein, through which the member 12 may readily move, the yoke being provided, surrounding this opening, with a down turned flange 22, which cooperates with the upper end of the sleeve 15 to restrain upward movement of the sleeve, thus maintaining the sleeve in operative position. The yoke 20 is also provided with a flanged opening or passage 25, within which is rotatably mounted the socket member 26, having a socket 27 therein, adapted to receive the correspondingly shaped end of an operating handle, not shown. A retaining ring 28 is provided for holding the socket member within the passage 25 in such wise as to permit free rotary motion thereof but to prevent axial motion. The socket member 26 carries upon the inner end thereof a bevelled pinion 30, which meshes with a correspondingly bevelled gear 31, carried by the sleeve 15; this arrangement being such that upon rotating the socket member 26, through the medium of a suitable operating handle, the gear 31 will be actuated to cause rotation, in one direction or the other, of the sleeve 15.

Adjacent the upper end of the bore 13 the inner wall of the member 12 is provided with internal screw threads, as shown by the numeral 35. Threadedly received within the bore 13 is a threaded stem or screw 36, the threads of which cooperate with the threads 35 of the member 12, so that upon relative rotation of the stem 36 with respect to the member 12 the stem will move, in one direction or another, relative to the member 12. The stem 36 is provided upon its upper end with a saddle or cap 37, which is adapted to receive the load, such as the axle of an automobile, this cap being preferably rigidly

secured to the stem 36, by means of a pin or otherwise.

This construction, as this far defined is such that upon rotation of the sleeve 15, relative to the member 12, movement of the member 12 either up or down,— in extending or retracting direction—, within the sleeve, will result. And also relative rotation of the member 12 and the stem 36 will result in movement of the stem 36 either up or down within the member 12. The telescoping arrangement is such that additional lift is secured without making the jack unduly high when in full retracted position. There would be no trouble in making a single screw jack so as to give the lift needed for use with an automobile provided with balloon tires; but this might require such a long screw that the jack might not be sufficiently low, when in full retracted position, to slide under the axle of the automobile when the tire is flat. Consequently the jack is made with a plurality of elevating screw members which may be collapsed, or telescoped, one within the other, so that when in retracted position it is of small height when compared to its maximum extended position.

Preferably means is provided whereby the member 12 and the threaded stem 36 are elevated, or lowered successively; one of these members being first raised its maximum amount, and if this does not sufficiently elevate the load bearing cap 37, then the other member is elevated the additional amount which may be necessary to secure the desired lifting of the automobile axle, or other load.

As shown this desired result is accomplished by providing the lower end of the member 12 with a locking-escapement means whereby the member 12 and the screw 36 will rotate together with respect to the sleeve 15 under certain operating conditions, but will rotate relative to each other during certain other operating conditions. During extending operation the member 12 and the threaded stem 36 are first moved together until the member 12 has been extended the maximum amount, after which the sleeve 15 and the member 12 rotate together to cause further extension of the threaded stem 36. When it is desired to retract the jack, the member 12 and the threaded stem 36 are at first relatively stationary, the sleeve 15 rotating with respect to them, and when the member 12 has been fully retracted, the sleeve 15 and the member 12 are then rotated together with respect to the threaded stem 36 to effect additional retraction of the stem 36.

For accomplishing this, the inner wall of the standard is provided with two vertical ribs 50, which extend substantially the entire length of the interior of the standard, and are diametrically opposed as shown most clearly in Fig. 4. One rib will accomplish the desired results but two are preferable. The lower end of the member 12 is provided with a transverse passage 51, within which are mounted two plungers 52 a spring 53 being also mounted within the passage 51, between the plungers, and adapted to urge them outwardly into contact with the inner wall of the standard. Because of this construction the member 12 may rotate only a part revolution, so long as the plungers 22 are positioned to contact with the rib 50; for as soon as this member rotates until these plungers contact with the opposite ribs 50 further rotation will be prevented. The standard is provided, on its inside wall, at the top and bottom thereof, with oppositely disposed cam members 55 and 56 respectively, each of which cams is cooperatively connected to the adjacent end of one of the ribs 50, as shown in Figs. 2, 3 and 5. The upper surface of each of the lower cams 55 and the lower surface of each of the upper cams 56,— that is, the surface of each of the cams with which the plungers 52 first contact as the plungers move up or down with the member 12—, are curved as shown most clearly by the numeral 57, in Fig. 6. As a result, as the plungers ride either upwardly or downwardly along the ribs 50, each plunger will be retracted, as it rides along this curved surface 57 so that it will move onto the respective cam, and, upon continued rotation of the member 12 will thus slide past the ribs, the motion being such that the plungers ride along the cams and over the ribs when the member 12 is rotated in one direction; but are prevented from reverse motion. By means of this construction the ribs 50 will restrain the member 12 from rotation so long as this member is being moved toward either extended or retracted position. But when the member 12 has been moved to fully extended position it will be allowed to freely rotate, through the action of the cams 55 upon the plungers 52. Likewise when the member 12 has reached lowermost position, it will be allowed to freely rotate due to the effect of the cams 55 acting upon the plungers 52 so that rotation of the member 12 to effect retraction of the stem 36 may be had. But at both lowermost and uppermost position rotation of the member 12 in only one direction may be had because of the restraining effect of the ribs 50.

As a result of this construction, so long as the parts of the jack are so arranged that the member 12 is not fully extended, rotation of the sleeve 15 to effect further extension of the member 12 will result in relative rotation of the sleeve 15 and the member 12, the member 12 and the threaded stem 36 thus being non-rotatable with respect to the standard and to each other and moving upwardly together. Rotation of the member 12 is prevented during this time because of the restraining influence of the ribs 50 with respect to the plungers 52. As soon as the member 12

has moved upwardly to such a distance that the plungers 52 are moved into the zone of the cams 56, the restraining means will be rendered inoperative to prevent further rotation in the same direction and the member will therefore rotate with the sleeve 15, due to frictional resistance between the cooperating threads on these two members. But the stem 36 is held against rotation because of the load upon the cap 37. And further rotation of the sleeve 15 in extending direction will result in the sleeve 15 and member 12 rotating together to cause extending movement of the stem 36. And conversely with the members fully or partly extended, as shown in Fig. 1, retracting rotation of the sleeve 15 will cause the sleeve 15 and the member 12 to rotate relative to each other due to the restraining influence of the ribs 50 upon the plungers 52; the member 12 and the threaded stem thus rotating together at this time. But when the member 12 has moved downwardly until the plungers are brought within the zone of the cams 55, then the restraining means will be rendered inoperative to prevent further rotation in the same direction and the sleeve 15 and the member 12 will rotate together in the retractive direction, the member 12 and the threaded stem 36 then rotating relatively with respect to each other to cause further retraction of the stem 36.

In assembling the device the member 12 is passed upwardly through the standard from the bottom end, through the ball bearing 17, and the threaded sleeve 15, the socket member 26 having been previously mounted within the passage 25. In order to permit ready insertion of the socket member 26 the standard is cut away to one side as indicated by the numeral 65, to provide the necessary clearance. The member 12 having been threaded through the sleeve 15 a spring member 66 is mounted within the thread at the upper end of the member 12, to serve as a stop to limit downward movement of the member 12, to prevent this member 12 from being given sufficient retractive movement to cause the device to become disassembled. The threaded stem 36 is then threadedly mounted within the bore of the member 12. If desired the lower end of the member 12 need not be fully closed, but may be provided with an opening whereby a pin may be inserted within the lower end of the threaded stem 36 to prevent this stem from moving sufficiently in extended position to become separated from the member 12. This need not be accomplished by means of a pin, as the same thing may be accomplised by properly upsetting the lower end of the thread, or in any other suitable way.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A lifting jack comprising a standard, an internally threaded operating sleeve mounted thereon, means for causing rotation of said sleeve; a lifting member threadedly mounted within said sleeve, means for restraining rotation of said lifting member with respect to the said standard comprising a vertical rib within said standard, a spring pressed plunger carried by said lifting member and adapted to cooperate with said rib to prevent rotation of the threaded member in either direction, and spaced cam means associated with the said rib each constructed for rendering the spring pressed plunger inoperative to prevent rotation in one direction, while leaving it operative to prevent rotation in the opposite direction, when the threaded member has reached a predetermined vertical positioning with respect to the standard.

2. A lifting jack comprising a standard, an internally threaded operating sleeve mounted thereon, means for causing rotation of said sleeve; a lifting member threadedly mounted within said sleeve, spring pressed means for restraining rotation of said lifting member with respect to the said standard, and means for rendering the said restraining means inoperative when the threaded member has reached a predetermined positioning comprising a vertical rib within said standard, oppositely directed cam means associated respectively with the upper and lower ends of said rib, the lower of said cam means having its upper face inclined, and the upper of said cam means having its lower face inclined, the construction being such that when the threaded member is moved to a predetermined vertical positioning with respect to the upper and lower end of the standard, the cooperating cam means will render the said spring presser restraining means inoperative to prevent rotation of the threaded member in one direction.

3. A lifting jack comprising a standard, a threaded sleeve rotatably supported by said standard, means for rotating said sleeve; a threaded member rotatably mounted within said threaded sleeve; a threaded stem rotatably mounted within said threaded member; spring pressed means carried by said threaded member, and cooperating restraining means carried by the said standard, for controlling movement of the said threaded member and threaded stem with respect to each other, to effect successive raising and lowering of the said members with respect to the standard, and means carried by said standard for rendering the said restraining means inoperative when the said threaded

member has reached a predetermined vertical positioning relative to the standard.

4. A lifting jack comprising a standard, a threaded sleeve rotatably supported by said standard, means for rotating said sleeve; a threaded member rotatably mounted within said threaded sleeve; a threaded stem rotatably mounted within said threaded member; spring pressed means carried by said threaded member, and cooperating restraining means carried by the said standard, for controlling movement of the said last named members with respect to each other, to effect successive raising or lowering of the said members with respect to the standard, and means carried by the said standard, and associated with said restraining means at each end of said means, for rendering said restraining means inoperative as the threaded member is moved toward either the upper or the lower end of said standard.

5. A jack, comprising main and secondary screws, a standard for said screws, a rotatable nut for the main screw, a shiftable pin carried by the main screw, and stop and cam means within said standard at its upper and lower ends, engageable by said pin adapted to withhold the main screw from rotation during part of its travel and to permit rotation thereof at the end of its travel.

6. A jack, comprising a standard and a pair of telescopic screws mounted thereon, a rotatable nut adapted to raise and lower said screws, a spring-pressed pin carried by one of said screws, and said standard having a guide and eccentric surfaces at its upper and lower ends adapted to be engaged by said pin in raising and lowering said screws.

7. A jack, comprising a hollow standard having guides extending longitudinally thereof and reversely-related cam surfaces at opposite ends of said standard, a rotatable nut supported upon said standard telescopic screws supported by said nut, and spring pressed pins carried by one of said screws adapted to engage said guides and cam surfaces.

8. A jack, comprising a standard having a round chamber formed with a vertical guide between its ends and an eccentric wall at its lower end, a pair of telescopic screws and an operating nut supported upon said standard, and a shiftable pin upon one of said screws adapted to engage said guide and eccentric wall.

9. A jack, comprising a standard having a chamber reduced at its upper end and formed with an eccentric surface at its lower end and provided with a guide rib between said ends, a double screw and an operating nut therefor supported upon said standard, and a spring-pressed pin upon one of said screws within said chamber.

10. A jack, comprising a hollow standard having internal guide ribs, longitudinally thereof and eccentric walls at the upper and lower ends of said ribs, a pair of telescopic lift screws and operating means therefor supported upon said standard, and a pin shiftably confined within the lower end of one of said screws adapted to control the reciprocable and rotatable movements of said screws by engagement with said ribs and eccentric walls.

In testimony whereof I hereto affix my signature.

WILLIAM B. RUNYAN.