May 9, 1933. W. B. RUNYAN 1,908,058

JACK

Filed July 14, 1930

Fig. 1.

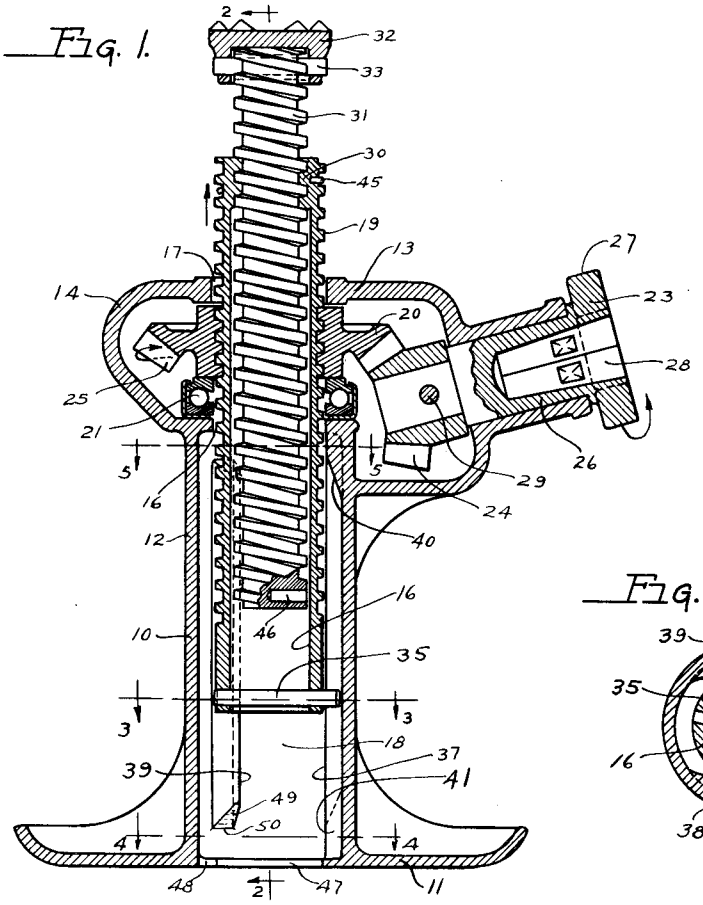


Fig. 3.

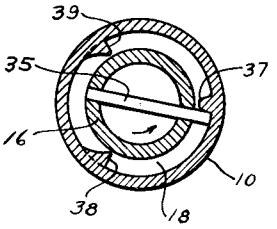


Fig. 2.

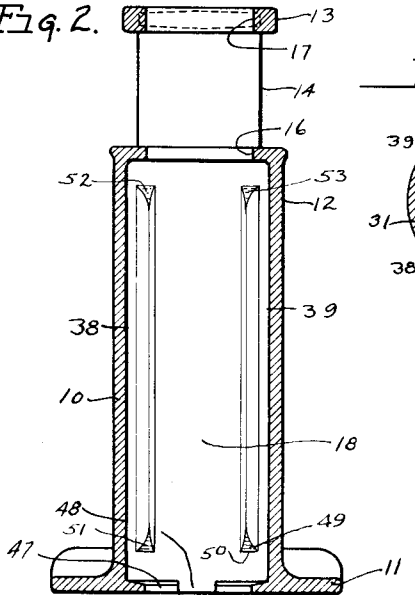


Fig. 5.

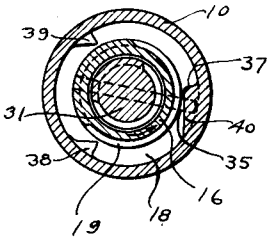
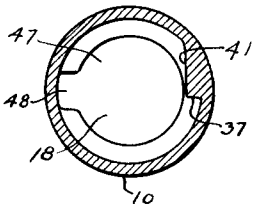


Fig. 4.



Inventor

William B. Runyan

By Marechal & Nes

Attorney

Patented May 9, 1933 1,908,058

UNITED STATES PATENT OFFICE

WILLIAM B. RUNYAN, OF DAYTON, OHIO, ASSIGNOR TO THE DAYTON MALLEABLE IRON COMPANY, OF DAYTON, OHIO, A CORPORATION OF OHIO

JACK

Application filed July 14, 1930. Serial No. 467,662.

This invention relates to lifting jacks.

One object of the invention is the provision of a lifting jack having means of simple and cheap construction and devoid of springs for controlling the rotational and axial movements of a threaded lifting member.

Another object of the invention is the provision of a double screw jack in which the outer threaded lifting member is provided with a slidable pin extending all the way through the lifting member and adapted to cooperate with ribs arranged in angular spaced relationship in the standard, to control the movements of the lifting screw.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawing and the appended claims.

In the drawing—

Fig. 1 is a vertical section through a lifting jack embodying the present invention;

Fig. 2 is a vertical section through the jack standard on the line 2—2 of Fig. 1;

Fig. 3 is a horizontal section through the jack taken on the line 3—3 of Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 1; and

Fig. 5 is a section on the line 5—5 of Fig. 1.

As illustrating a preferred embodiment, the invention is shown as incorporated in a double screw jack especially adapted for use with balloon tires which require extra lift, but, of course, the invention may be incorporated in other adaptations thereof.

As shown in the drawing, the jack comprises a hollow standard 10, having a base 11. The standard is preferably a metal casting of integral construction, the main body portion 12 of which is connected to the top portion 13 by an integral connecting yoke portion 14.

Loosely mounted within the standard is a hollow threaded lifting screw 16, the externally threaded portion of which is of such diameter that it may freely pass through the circular bores 16 and 17 of the standard and through the hollow passage 18 in the body portion of the jack. A threaded engagement with the external screw threads 19 on this lifting screw is a rotatable operating collar or nut 20, this collar being held against upward endwise movement by the upper portion 13 of the standard. The lower side of this collar bears against a suitable antifriction bearing or similar thrust member 21 which rests on top of the lower body portion 12 of the standard. Rotational movements of the collar 20 may be effected by an actuating member 23 which is rotatably mounted in the yoke 14, the inner end of this actuating member having suitable gear teeth 24 or the like engaging corresponding teeth 25 on the collar. As shown the actuating member 23 embodies a bearing part 26 having a hexagonal grip portion 27 socketed at 28 to receive the end of an operating tool, not shown. This bearing portion 23 is attached to the actuating gear by means of a cross pin 29 or the like, the gear and the grip 27 cooperating to prevent axial movements of the actuating member.

The lifting screw 16 is internally threaded at 30 so it telescopically receives the externally threaded inner lifting member 31. This inner member, like the outer lifting screw 16, is of about the same height as the total overall height of the standard so that when the various parts of the jack are extended, the lift exceeds the height of the standard. On the upper end of the inner lifting member 31 there is a saddle 32, connected in place by a through pin 33 or any other suitable means. This saddle is adapted to receive a load such as the axle of an automobile.

Novel means of very simple construction are provided whereby extension of the lifting members is obtained when the collar is rotated. This means embodies a pin 35 slidingly received for endwise movement diametrically of and at the lower end of the outer screw 16. This pin, which has a length somewhat exceeding the outside diameter of the lifting screw 16, cooperates with guide ribs within the standard so that during raising movements of the load, the outer lifting screw is positively held against rotational movements and caused to move axially up out of the standard until it reaches its upper limit of movement, after which it is per-

mitted to rotate freely with the operating collar so that the inner lifting member which is held from rotation by its engagement with the load, is screwed out of the outer screw. As shown, the two screws 16 and 31 both have left-hand threads so that movements of the parts in the direction of the arrows in Fig. 1 take place during extension of the jack.

In accordance with the preferred embodiment of the invention there are a plurality of the guide ribs mentioned, extending up within the standard and designated 37, 38 and 39. The rib 37 is of a height substantially equal to or slightly exceeding the total range of movement of the outer screw 16. Both sides of this rib are provided with stop surfaces which prevent the pin 35 from moving by, during the raising or lowering movements of the outer screw. At the upper end of the rib 37 there is an inclined cam surface 40 on one side only of the rib, as shown in Fig. 5, which pushes the pin 35 towards the other side of the lifting screw and thus permits rotational movements of the screw 16 in a counterclockwise direction, see Fig. 5, when the screw 16 is at its upper limit of movement. The pin 35 is long enough to extend clear through the lifting screw 16 and project at one side thereof, and is entirely devoid of any springs or the like, being merely mounted freely so that it may be pushed from one side to the other when it engages inclined surfaces on the guide ribs. At the lower end of the rib 37 is another inclined cam surface 41 which permits rotational movements of the lifting screw 16 in a clockwise direction (see Fig. 4), but prevents contrary movements thereof. Between these two cam surfaces 40 and 41 the sides of the rib extend substantially radially so that when they are engaged by the end of the pin 35, any further rotational movements of the outer screw 16 are prevented and the outer screw must move axially when the collar is operated until it reaches one or the other of its limiting positions, after which it can only move rotationally in the desired direction to permit the inner screw member 31 being withdrawn or extended from the outer screw.

In addition to the rib 37 there are other ribs preferably two in number, but so arranged that no two of the various ribs are diametrically opposed to one another. Thus the three ribs 37, 38 and 39 may be mounted substantially 120° apart. The two adjacent sides of the two ribs 38 and 39 are preferably inclined throughout the entire extent of these ribs so that the pin will be cammed over towards the other side of the lifting screw when it engages these inclined surfaces. The other two sides of these two ribs, however, extend substantially radially throughout the height of these ribs and, when engaged by the pin, the radial side of the rib 38 prevents clockwise movement of the screw 16 while counterclockwise movement thereof is prevented by the radial side of the rib 39. The two ribs 38 and 39 are considerably shorter than the rib 37 and do not extend to the limiting height positions of the pin 35.

It will now be apparent that as no two of the ribs are diametrically opposed, and as there is substantial clearance between the outside of the lifting screw 16 and the internal diameter of the standard between the rib positions, the pin 35 may be pushed from one side to the other as it engages the inclined surfaces of ribs 38 and 39; or when the lifting screw is at one or the other of its limiting positions it may be pushed back and forth by the inclined cam surfaces 40 and 41. Thus at a limiting position, somewhat less than 180° travel of the lifting screw 16 is permitted upon reversal of direction of rotation of the operating nut or collar 20 after which the projecting end of the pin positively engages a radially extending stop side on the rib 37. During intermediate positions of the lifting member considerably less than 180° movement of the outer screw is permitted as a projecting end of the pin may engage with either the stop 37 or the radial side of the ribs 38, and 39. Thus as shown in Fig. 3, corresponding to the position of the parts shown in Fig. 1, with the gear parts 24 and 25 moving in the direction as shown by the arrow in Fig. 1, axial raising movements of the outer screw take place, the outer screw having moved counterclockwise (see Fig. 3), until it strikes against the rib 37. Only axial movements of the outer screw can then take place, until the upper limiting position thereof is reached. Suppose, however, that it is desired to lower the load before the upper limiting position of the screw 16 is reached, then the outer screw 16 would tend to be rotated clockwise from the position shown in Fig. 3, and it would do so until the projecting end of the pin strikes the radial side of the rib 38 after which only axial movements of the screw would occur as the pin rides down along this rib surface. If for any reason the pin projects between the ribs 38 and 39, rotational movements of the lifting screw in either direction would cause the pin to be pushed over to the other side of the lifting screw due to the inclined sides extending throughout the length of these ribs, where it would be in a position to engage any of the ribs.

The upper and lower end portions of the two ribs 38 and 39 are inclined in such a way as to cam the pin 35, when in engagement therewith, during vertical or axial movements of the lifting screw 16. As shown in Figs. 1 and 2, the lower end of the rib 39 has an inclined end surface 49 which merges with the cylindrical hollow passage 18 of the standard along the line 50. The surface 49 thus inclines downwardly and outwardly so that

it may cam the pin 35 away from it if the pin is engaged therewith. It will be obvious that as there is no rib diametrically opposite the rib 39 this camming action may take place, the other end of the pin being forced out toward the opposite portion of the passage 18. Suppose the screw 16 is near its lower limiting position so that the pin 35 projects out just below the bottom of the rib 39. If the load is engaged, and is to be lifted, it is quite possible that the screw 16 might not rotate when the gears are operated, due to binding of the parts or for other reasons. The projecting end of the pin 35 would thus tend to travel vertically and jam against the bottom of the rib 39, but the inclined end portion 49 of the rib 39 would prevent this and cause the pin to be cammed diametrically of the screw, so that it would be in position to engage the stop surfaces on the rib 37. The lower end of the rib 38 is provided with an inclined end portion 51, the two ribs being symmetrically formed, and the upper ends of the two ribs 38 and 39 are also provided with inclined end portions 52 and 53 respectively the upper ends of which merge with the cylindrical surface of the hollow passage 18 in the standard. It will be apparent that the inclined end portions 52 and 53 of these two ribs prevent any jamming tendencies of the pin, during lowering movements of the jack should the end of the pin come opposite one of these ribs during axial movements of the screw while lowering the load.

The lower limiting position of the outer screw 16 is determined by a stop spring wire 45 which is received in one of the threads at the upper end of this screw so that it may engage with the upper side of the collar 20 when the outer screw 16 is fully retracted within the standard, in which position the pin 35 is somewhat above the lower end of the standard and on the level of the cam side 41 of the rib 37. A stud 46 fixed in one of the threaded grooves at the lower end of the inner lifting member 31 limits the upward movement of this member with respect to its carrying screw 16, and the pin 35 itself limits the upward movement of the screw 16 with respect to the standard when it engages the flange at the lower end of the bore 17. The two screws are assembled into the standard through an opening 47 in the lower end thereof, one side of the opening being extended at 48 so that the pin 35 may be received when the screws are inserted up through the lower end of the standard. This opening 47 may be closed by removable plate, not shown, after the screws have been assembled in the jack standard.

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, a lifting screw rotatable in the standard, operating means threaded on said screw, a pin slidable diametrically in said screw and of a length exceeding the outside diameter of the screw, and guide means on the standard cooperating with said pin and effective during various conditions of use between the upper and lower limiting positions of the screw for preventing rotational movements of said screw while permitting axial movements thereof, said guide means having inclined end portions to prevent the pin from jamming against the ends of the guide means at a limiting position of the screw.

2. A lifting jack comprising a standard, a lifting screw rotatable in the standard, operating means threaded on said screw for causing rotational and axial movements thereof, ribs within said standard, a pin slidably mounted in the lower end of said screw and having a length exceeding the outside diameter of said screw by an amount approximately equal to the depth of said ribs, said ribs having end portions for camming said pin diametrically of said screw.

3. A lifting jack comprising a standard, a lifting screw rotatable in the standard, operating means threaded on said screw for causing rotational and axial movements thereof, a plurality of ribs within said standard none of which are diametrically opposite one another, a pin slidably mounted in the lower end of said screw and having a length exceeding the outside diameter of said screw by an amount approximately equal to the depth of said ribs, said ribs having end portions for camming said pin diametrically of said screw.

4. A lifting jack comprising a standard, a lifting screw rotatable in the standard, an operating device threaded on said screw, means for rotating said device, a pin slidably mounted for endwise movement diametrically of the lower end of said screw, ribs within said standard of substantially similar vertical extent having pin stopping surfaces, one of said ribs having a gradually curved side to cam the pin away from said rib, the length of the pin exceeding the diameter of the lifting screw.

5. A lifting jack comprising a standard, a lifting screw rotatable in the standard, an operating device threaded on said screw, means for rotating said device, a pin slidably mounted for endwise movement diametrically of the lower end of said screw, a plurality of ribs within said standard adapted to cooperate with said pin during various conditions of use between the upper and lower limiting positions of the screw, one of said

ribs having pin stopping surfaces along both sides thereof and another one of said ribs having one stopping surface along one side thereof while the other side is gradually curved throughout its entire length to cam the pin away from said rib, the length of the pin exceeding the diameter of the lifting screw.

6. A lifting jack comprising a standard, an externally threaded lifting screw rotatable in the standard, an operating collar threaded on said lifting screw, means for operating said collar, a second lifting member threaded within said lifting screw, a slidable pin freely supported for endwise movement across the lower end of the lifting screw and having a length exceeding the diameter of the screw, and a plurality of ribs effective during various conditions of use between the upper and lower limiting positions of the screw for camming said pin and extending up within the standard and located angular distances apart so that none of the ribs are diametrically opposed.

7. A lifting jack comprising a standard, a threaded lifting screw rotatable in the standard, a second lifting member rotated in said lifting screw, a rotatable collar threaded on said lifting screw, means for operating said collar, a single integral stop member extending diametrically of the lifting screw at the lower end thereof, and a plurality of upwardly extending ribs within said standard, one of said ribs having a length substantially equivalent to the total axial movement of said lifting screw and having means at its upper and lower ends for camming said stop member to permit rotational movements of the lifting screw in one direction only at the upper end of travel and in the other direction only at the other limit of travel, and another of said ribs having a length substantially shorter than the total axial travel of the screw so as to be ineffective at the upper and lower limiting positions of the lifting screw and having one side gradually curved to cam the stop member therefrom, the length of the stop member exceeding the external diameter of the screw but being less than any diametrical distance across the interior of the standard throughout the range of movement of said stop member.

8. A lifting jack comprising a standard, an externally threaded lifting screw rotatable in the standard, an operating collar threaded on said lifting screw, means for operating said collar, a second lifting member threaded within said lifting screw, a slidable pin freely supported for endwise movement across the lower end of the lifting screw, and a plurality of ribs extending up within the standard and located angular distances apart so that none of the ribs are diametrically opposed, some of the ribs being substantially less in length than the total lifting movements of the lifting screw while another rib has a length substantially equivalent to the total lifting movements of the lifting screw, said other rib having inclined end portions at its upper and lower ends for pushing said pin diametrically of the lifting screw to permit rotation of the lifting screw only in the desired direction when in its limiting positions, the ribs which are less in length than the total lifting movements of the lifting screw having inclined end portions for camming the pin when in engagement therewith during axial movement of the lifting screw.

In testimony whereof I hereto affix my signature.

WILLIAM B. RUNYAN.