Oct. 29, 1940. A. J. RHODES 2,219,455

LIFTING JACK

Filed May 23, 1940

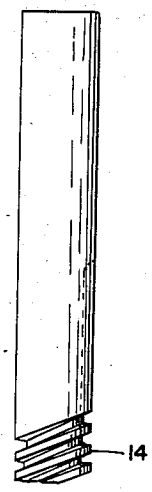


FIG.2.

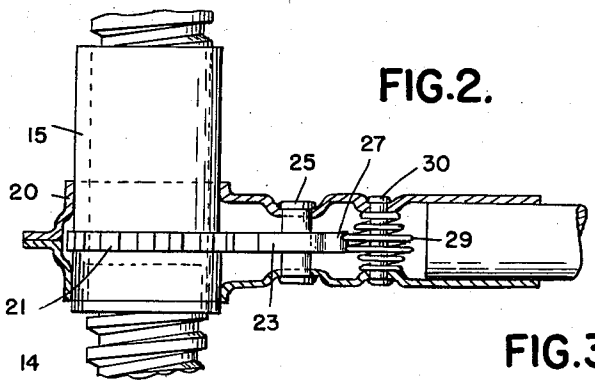


FIG.3.

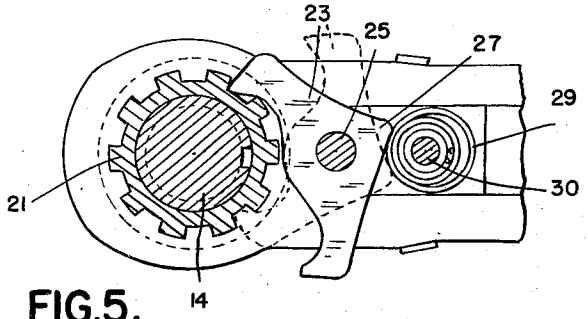


FIG.5.

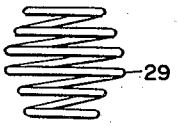


FIG.4.

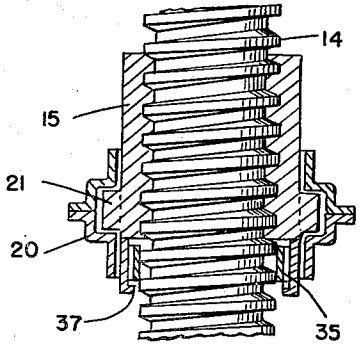


FIG.1.

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LIFTING JACK

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5 Claims. (Cl. 74—157)

This invention relates to lifting jacks, and more particularly to improvements in lifting jacks of the type disclosed in the co-pending application of Walter S. Saunders, Serial No. 312,030, filed January 2, 1940.

Jacks of the type in question incorporate a fixed screw shaft and a traveler nut adapted to be intermittently rotated to move the same therealong, actuation of the traveler being through the agency of a pawl and ratchet mechanism. Since it is necessary that the mechanism provide for positive actuation of the traveler in each direction, a reversible pawl must be provided, adapted to be set to drive the traveler in either direction and incorporating spring means adapted to retain it in either position. The spring means must permit ready reversal of the pawl and its action, yet must maintain the pawl in either set position with great security, inasmuch as any failure of the spring might cause the traveler to move in the wrong direction. It is also important that the spring allow easy movement of the pawl during normal operation of the ratchet, since undue friction between the pawl and ratchet has also been found to cause unwanted retrograde movement of the traveler. The present invention accordingly aims to provide spring means for the reversible pawl of a jack of the indicated type, which spring means is virtually indestructible, and so mounted that it cannot be distorted permanently by any unusual operation of the pawl.

Other objects and advantages will be apparent from the following description, wherein reference is made to the accompanying drawing illustrating a preferred embodiment of my invention and wherein similar reference numerals designate similar parts throughout the several views.

In the drawing:

Figure 1 is a side elevational view of a lifting jack for incorporating the principles of the present invention, the screw shaft being centrally broken away.

Figure 2 is a view partly in side elevation, and partly in vertical section, and on a somewhat larger scale, showing the traveler nut, cage and adjacent portions of the screw shaft and handle.

Figure 3 is a horizontal section taken substantially on the line 3—3 of Figure 1 and looking in the direction of the arrows.

Figure 4 is a substantially diametrical vertical section of the traveler nut and adjacent portions of the cage and screw shaft, showing the friction means for the traveler and screw shaft, and

Figure 5 is an elevational view of the pawl and spring.

Referring now to the drawing, reference character 10 designates the base of my improved lifting jack, which is provided with a socket portion 12 adapted to support in upright position the screw shaft 14. The traveler nut 15 is threaded upon the screw shaft and rotatable in the cage 17. The cage is supported by the nut and slidable along the screw shaft, and rotatable independently of both the nut and shaft. The load carrying arms 19 project laterally from the cage, and are formed integrally therewith, the cage assembly being comprised of sheet metal, wrapped to tubular form to encircle the screw shaft, while its portions defining the arm 19 and projecting laterally from the screw shaft are riveted or otherwise secured together. The traveler is encircled by a casing assembly 20, which is rotatable but held against longitudinal movement with relation thereto, by overengaged relation with respect to the ratchet toothed portion 21, which projects circumferentially from the traveler. Pivotally mounted within the cage and engageable with the ratchet teeth is a pawl, generally designated 23, opposite ends of which are engageable with the ratchet teeth when it is desired to drive the same in opposite directions. The pawl is pivoted on a pin 25, and a rearwardly projecting pointed cam section 27 thereof is engageable with a helico-spiral over-center spring 29, which yieldably maintains in engagement with the ratchet teeth whichever end of the pawl is thrown toward the teeth far enough to cause the cam section to pass over center with respect to the spring.

The spring is mounted on a pin 30 which extends through the cage in parallel relation to the pin 25, and pins 25—30 may serve as rivets to assist in holding together the two sheet metal sections of which the cage is formed. The turns of the spring decrease in diameter toward the ends, the smaller convolutions at the ends fitting the pin snugly and serving to position the spring, while the larger central turns are engageable with the pointed cam section 27 of the pawl to urge the same in either direction, as clearly indicated in full and dotted lines in Figure 3. Due to the smoothly rounded nature of the spring and the wiping action of the cam section as it passes over center, the pawl may easily be thrown from one position to the other, yet it is normally held resiliently in engagement

with the ratchet teeth. Since the central turns of the spring act laterally and are flexed only a relatively short distance with relation to the dimensions of the spring itself, the spring material is not deflected to a point even remotely approaching its elastic limit. Its resistance accordingly does not change materially during normal movement of the pawl, for which reason the spring may be considerably softer than would otherwise be practicable. Easy operation and reduced frictional engagement between the pawl and traveler result, and consequently the tendency on the part of the pawl to turn traveler backward during return movements of the handle is also greatly reduced.

Predetermined minimum friction between the traveler and screw shaft is imposed by a flat spring element 33, trapped in an undercut slot 37 near the lower end of the traveler and bearing inwardly against the tops of the screw threads and outwardly against the interior of the traveler in the manner best shown in Figure 4. Due to the reduced frictional engagement between the pawl and traveler, made possible by the spring 29, the band spring 35 need impose but slight resistance upon the traveler, and the spring 35 accordingly does not appreciably increase the effort required to operate the jack.

While it will be apparent that the illustrated embodiment of my invention herein disclosed is well calculated to adequately fulfill the objects and advantages primarily stated, it is to be understood that the invention is susceptible to variation, modification and change within the spirit and scope of the subjoined claims.

What I claim is:

1. In a lifting jack construction, in combination with a substantially vertical fixed screw shaft, a traveler threaded upon said screw shaft and rotatable thereabout to move the same therealong, said traveler having peripheral ratchet teeth concentric with the screw shaft, and means for turning said traveler, comprising a casing rotatable about the common axis of the screw shaft and traveler but independently of both, and ratchet and spring means carried by said casing, comprising a pawl pivoted in the casing adjacent said teeth upon an axis substantially parallel to the aforementioned common axis, opposite ends of said pawl being movable into and from operative engagement with said teeth to permit rotation of said traveler in opposite directions, a rearwardly projecting cam portion integral with said pawl and projecting away from said ratchet teeth, and a spring also housed within said casing and disposed upon an axis lying farther from the first mentioned common axis but substantially parallel thereto and to the pivot axis of the pawl, all of said axes lying substantially in a common plane, said spring means comprising a substantially helical wire spring, supported at its ends and having central convolutions freely flexible laterally of its axis of support, said central convolutions engaging said cam portion and normally urging either end of said pawl toward the ratchet teeth, but permitting said pawl to be rocked overcenter.

2. In a pawl and ratchet mechanism, in combination with a ratchet, a double ended pawl pivoted intermediate its ends and having a nose portion at either end operatively engageable with the ratchet, said pawl also having a laterally projecting overcenter cam portion, and spring means for urging either end of said pawl into engagement with said ratchet while permitting said pawl to be swung overcenter with relation thereto, comprising a coiled wire spring of generally helical, double spiraled form, the convolutions of which decrease in diameter toward opposite ends thereof, supporting means for said spring engaging with end convolutions thereof and positioning the same in substantially axially parallel relation with respect to the pivot axis of said pawl, medial convolutions of said spring being of greater diameter, and being flexible in a direction perpendicular to the axis of the spring, said medial convolutions being wipingly engaged by said cam portion when the pawl is swung overcenter, and bearing laterally against said cam portion to yieldably maintain the same upon whichever side of center it may be positioned, thereby yieldably maintaining the corresponding end of said cam in engagement with the ratchet.

3. Means as set forth in claim 2 in which said ratchet is of arcuate form, and the axes of said spring, ratchet and pawl are substantially aligned in a common plane.

4. Means as set forth in claim 2 in which said ratchet is comprised of circularly disposed teeth having abutments upon each side, the pawl being of generally triangular contour and disposed between the ratchet and spring, said cam portion comprising one of the angles of said triangular contour and projecting away from said ratchet and toward said spring, the axes of the ratchet and spring being substantially parallel to and lying in a common plane with the pivot axis of the pawl.

5. In a pawl and ratchet mechanism, in combination with a ratchet element, a pawl pivoted intermediate its ends and having a nose portion at either end swingable to and from operative engagement with the ratchet element, by rocking about said pivot, and overcenter spring means permitting such swinging movement to cause either of said nose portions to be held in yieldable engagement with the ratchet element, comprising a pin-like support extending substantially parallel to the pivot axis of the pawl, and a helico-spiral spring having its turns near each end engaged with said pin to position the spring and its central turns of greater diameter than the pin to permit yieldable lateral displacement of such turns, the pawl having an overcenter cam portion with which such central turns of the spring normally engage, the spring thereby yieldably maintaining the pawl in engagement with the ratchet element, said cam portion being movable overcenter when sufficient effort is applied to the pawl, whereby it may lie upon the opposite side of said central turns to be urged in the opposite direction thereby.

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