Feb. 7, 1928. 1,658,586

T. H. WITTLIFF

LIFTING JACK

Filed June 23, 1923 3 Sheets-Sheet 1

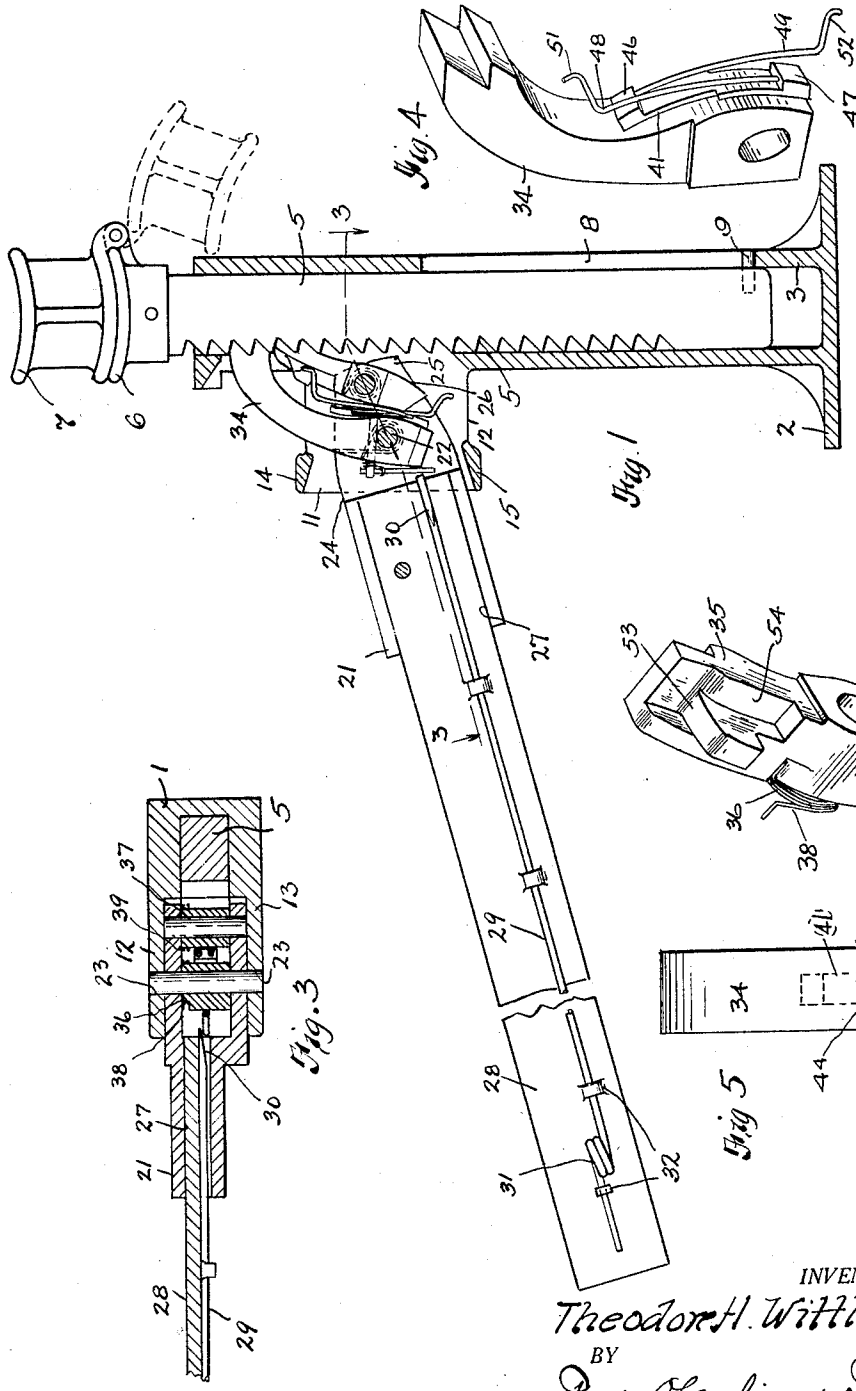

Fig. 1

Fig. 4

Fig. 6

Fig. 5

Fig. 3

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Fig. 7

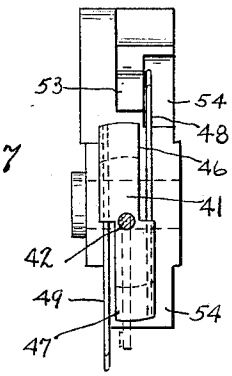
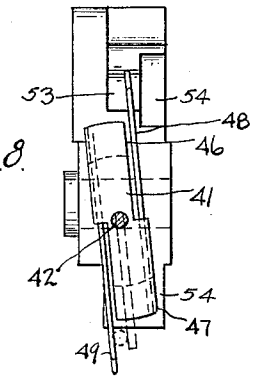


Fig. 8



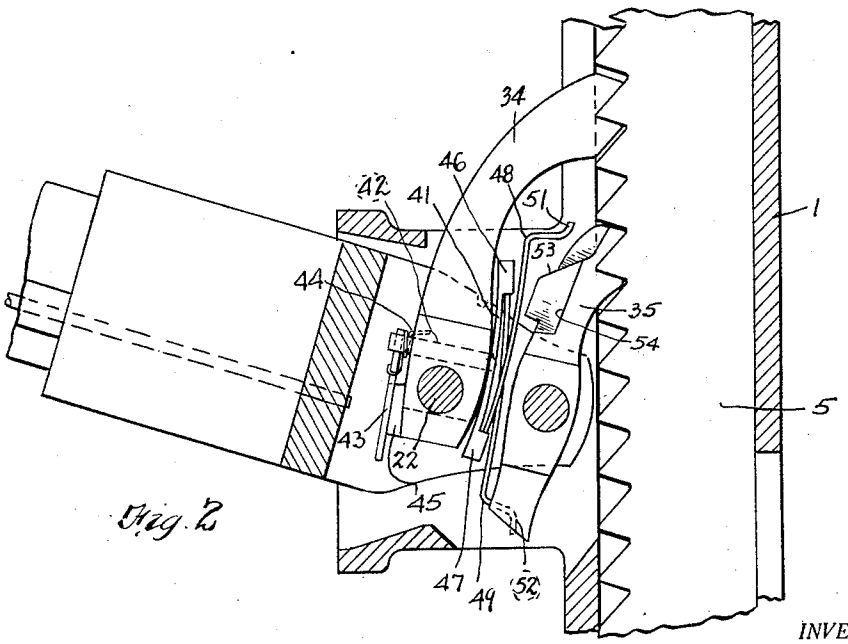


Fig. 2

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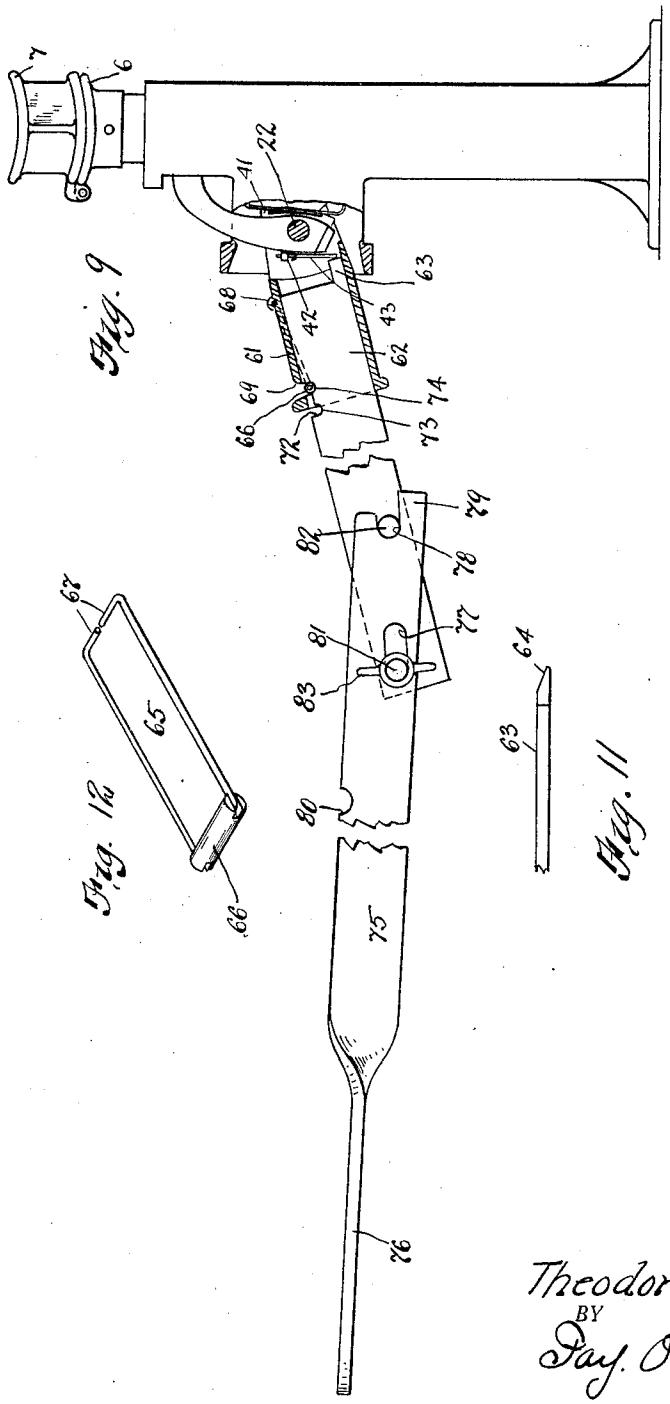

Fig. 9

Fig. 12

Fig. 11

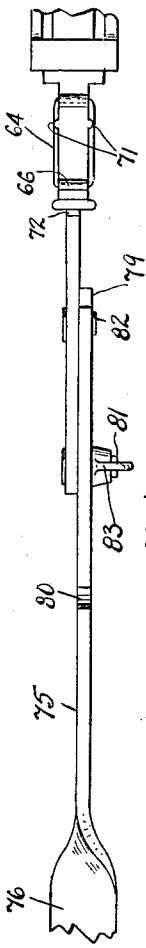

Fig. 10

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UNITED STATES PATENT OFFICE.

THEODORE H. WITTLIFF, OF CLEVELAND, OHIO.

LIFTING JACK.

Application filed June 23, 1923. Serial No. 647,199.

This invention relates to lifting jacks. More particularly it comprises an improved type of lifting jack wherein the lifting bar is raised or lowered by a step by step movement, the actuating mechanism of which is controllable from the operating handle.

Lifting jacks of this character, as heretofore constructed, have not infrequently involved a large number of parts subject to wear and difficult of access.

One of the objects of the present invention is to reduce the number of operative parts to a minimum and to provide a mechanism of simple character which may be easily assembled, and which also may be readily disassembled for repair. Another object of the invention is to provide a controlling mechanism which may be shifted at any time to cause the raising or lowering of the lifting bar and it will automatically cause the pawls to follow the proper course of movement to effect the desired operation. Other objects of the invention will appear in the course of the following description.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:

Fig. 1 is a side elevation partly in section, showing the lifting jack, with the pawls in position to raise the lifting bar, the outer end of the operating handle being lowered; Fig. 2 is an enlarged sectional elevation of the operating pawls in position to raise the lifting bar, the outer end of the operating handle being raised; Fig. 3 is a longitudinal sectional view taken along the line 3—3 shown in Fig. 1, looking in the direction of the arrows; Fig. 4 is a perspective view of the retaining pawl showing the controlling springs and their supporting plate as secured to the under side of the retaining pawl; Fig. 5 is a rearward elevation of the retaining pawl, upon a smaller scale than is shown in Fig. 4; Fig. 6 is a perspective view of the upper side of the actuating pawl; Fig. 7 is a view of the rearward face of the operating pawl with the spring plate and the controlling springs above the same in the position occupied during the lifting operation of the device; Fig. 8 is a view similar to Fig. 7 showing the supporting plate and controlling springs in the position occupied during the lowering operation of the device; Fig. 9 is a side elevation of the jack showing a modified form of handle and operating mechanism; Fig. 10 is a fragmentary top plan view of said handle and operating mechanism; Fig. 11 is a top plan view of the beveled extension of said handle, and Fig. 12 is a perspective view of the spring detent for holding said handle in its inner and outer positions of adjustment, respectively.

As is clearly shown in Fig. 1, the lifting jack comprises a standard 1 having a base 2 of conventional form and having a central slideway 3 within which the lifting bar 4 is adapted to telescope. The lifting bar is provided with a toothed rack 5 at its rearward edge. Both the front and rearward side edges of the lifting bar are flanged to provide an I-bar cross section for said member. At the upper end of the lifting bar a head 6 of suitable size to engage the object to be lifted is provided and a hinged extension head 7 is provided to engage objects of greater height. The forward face of the standard may be slotted at its lower portion 8 to receive a pin 9 set into the lower end of the lifting bar to limit the movement of the same. The standard is provided adjacent its upper portion with a rearward extension 11 comprising a pair of side plates 12, 13, and upper and lower cross members 14, 15, which constitute a support and partial housing for the operating mechanism. The rearward inner face of the standard terminates at the point of said extension to permit of free contact of the pawls with the rack bar, as will be hereinafter described. An operating handle 21 is pivotally supported upon a pin 22, the ends of which are received in openings 23 in the side plates of the extension. The controlling handle comprises a forward section 24 having a pair of parallel side plates 25 suitably apertured to receive a pivot pin 26 for the actuating pawl, and having a sleeve or socket 27 at its rearward end to receive the handle extension 28, which should be of a length suitable to be controlled by the user of the device at a considerable distance. Upon the extension handle a sliding rod 29 is provided having a beveled cam surface 30 at its forward end. Said rod has

an operating projection 31 at its rearward end which may be formed by coiling the rod upon itself a number of times. A series of loops 32 are formed upon the side of the extension handle to hold said rod in sliding relation thereto. Between the parallel plates 25 of the operating handle the retaining pawl 34 and the actuating pawl 35 are mounted upon the pivot pins 22 and 26, respectively. Each of said pawls is provided at one side with a circular boss 36, 37, respectively, about which coil springs 38, 39, respectively, are swung, the ends of said springs being secured to the adjacent side of the handle and to the body portions of said respective pawl, said springs thus serving to hold the free ends of said pawls in resilient contact with the rack on the lifting bar. Such pawls are each provided with a plurality of teeth at their outer ends, said teeth being spaced the proper distance to engage with correspondingly spaced teeth of the rack. This provides a broader area of contact between the pawls and the rack and prevents damage to one tooth rendering the device inoperative.

The mechanism thus far described is sufficient to carry out the operation of elevating the lifting bar, the springs on the respective pawls holding the same in sliding engagement with the cap and the upper ends of said pawls engaging said rack teeth alternately as the operating handle is moved up and down.

The mechanism for reversing the action of the pawls and holding the retaining pawl away from the rack bar during a portion of the period of engagement of the actuating pawl with the rack bar when the lifting bar is lowered now will be described. This mechanism is best shown in Fig. 2 and comprises a spring supporting plate 41 having a rearwardly projecting stud 42 secured centrally thereof. Said stud extends through an aperture in the pawl 34 adjacent to and transversely of the pivot pin 22. Said stud projects rearwardly a short distance beyond the rearward face of said pawl and is provided with a depending pin 43 secured to said rearward end. A coil spring 44 is mounted upon said stud between the depending pin and the rearward face of the pawl 34 and has one end engaged in the body of said pawl and the other end hooked over said depending pin. Through the action of this spring the depending pin is normally held in a vertical position, its intermediate portion resting against a shoulder 45 formed on the rearward face of said pawl 34.

The forward face of the spring supporting plate is provided with enlargements 46, 47, the respective ends of which are suitably recessed to receive the ends of the pawl controlling springs 48, 49, respectively.

As is more particularly shown in Figs. 4, 7 and 8, the pawl controlling springs lie upon opposite sides of the supporting plate, the two halves of which are off-set in opposite directions from a median line so as to give the ends of said respective springs freedom of motion past the side edges of the ends of the plate opposite from the point of attachment. The outer ends of the controlling springs are each bent downwardly and outwardly to form the pawl contacting terminals 51, 52, of said respective springs. As is clearly shown in Fig. 6, the actuating pawl 35 is provided on its rearward face with the upper and lower cam extensions 53, 54. Adjacent the cam extension 53 a depressed or cut away portion 55 is provided against which the contact terminal 51 of the spring 48 rides when the spring supporting plate is in alignment with the axes of the operating pawls. Adjacent the cam extension 54 the pawl 35 is cut away to provide space for the free movement of the contact terminal 52 when the spring supporting plate is in its central position.

It will be noted from the several figures of the drawing that when the sliding rod 29 is in retracted position, the spring supporting plate occupies its normal position in alignment with the central axes of the pawls and that when said rod is moved forward the beveled terminal at its inner end will engage the depending pin 43 and move the same away from the shoulder 45 on the rearward face of the retaining pawl. The lower end of the retaining pawl is suitably slotted to receive the end of the rod when it is projected to its full forward position.

When the rod is so projected and the pin 43 is turned, it will rotate the stud, together with the supporting plate 41 secured thereto. Such rotation of the plate will tend to swing the ends of the controlling springs to a position in alignment with the cam extensions 53 and 54 of the operating pawl 35. The springs may not immediately move to said position if their contact terminals 51 and 52 are disposed within the recessed or cut away portions of the pawl at the time when the slide rod is shifted. However, upon the actuation of the operating lever and the rocking of the pawls upon their pivots, said terminals will be carried beyond the ends of said cam faces during a portion of such rocking motions of the pawls and will then automatically swing to a position in which their contact terminals 51, 52, are located in alignment with the respective cam extensions 53 and 54.

The operation of raising the actuating or lifting bar of the jack, as has already been indicated, takes place when the spring supporting plate occupies a position in alignment with the median line of the pawls. The operation of lowering the lifting bar occurs when the spring supporting plate

is rotated about its supporting stud and the controlling springs are placed in cam contacting position. When so adjusted, the action of the pawls is reversed. Thus, when the outer end of the extension handle is lowered, the contact terminal 52 rides against the cam extension 54 on the pawl 35 and holds its top engaging end free of the rack for a distance of one rack tooth. As it clears said tooth, the contact terminal 51 engages the cam extension 53 and forces the engaging end of the pawl 35 into engagement with the rack. The operating handle is then in a substantially horizontal position. Upon further depressing the outer end of the operating handle, the contact terminal 51 rides over the cam extension 53 and places tension upon the spring 48 so that it tends to throw the retaining pawl 34 in a rearward direction. The pawl 34 will not move free of the rack teeth until the lifting bar has been slightly elevated to relieve its forward end from the weight of the load. When the pawl is so relieved it will move rearwardly out of engagement with the rack teeth and will be held clear of the rack until the operating handle has assumed an approximately horizontal position in its return, while its outer end is being moved back to an extreme upward position. During this last half of the upward movement of the outer end of the operating handle the upper end of the retaining pawl 34 will be restored to rack engaging position and as the outer end of the handle approaches its upper limit of motion, the contact terminal 52 of the controlling spring 49 will be brought against the cam extension 54 of the actuating pawl and move the same outwardly as soon as the upper end of said pawl is relieved of the weight of the load through the engagement of the upper end of the retaining pawl therewith.

In the modified form of construction illustrated in Figs. 9 to 12, inclusive, the body of the jack and the lifting bar and the pawls and the pivoted spring supporting plate are identical with the structure heretofore described. In place, however, of using a sliding rod having a beveled cam surface at its forward end for rotating the spring supporting plate, a portion of the handle is arranged to be bodily shiftable to serve this function. Thus the forward section of the handle 61 is pivoted upon the pin 22 and a slidable section of the handle 62 is telescopically engaged within said pivoted section of the handle. Said sliding section is provided at its forward end with an extension 63 having a beveled face 64 for engagement with the depending pin 43 attached to the rearwardly projecting stud 42 upon which is secured the spring supporting plate 41. Said beveled face acts in exactly the same manner as the beveled face on the sliding rod and when said portion of the handle is retracted it permits the pawls to act normally in causing the jack to raise the load, while when said section of the handle is projected said beveled face swings the spring supporting block to bring the springs carried thereby into a central position whereby the action of the pawls may be reversed and the jack caused to lower the load. In order to retain the sliding section of the handle in either of its adjusted positions a spring detent 65 is provided. Said detent comprises a section of wire bent in the form of an elongated rectangle, as is clearly shown in Fig. 12, and having a notched tubular spacing member 66 at its forward portion. The rearward portion of said loop comprises the terminal ends of the wire 67 which are adapted to be engaged into recesses 68 formed in the pivoted section 61 of the handle. When so engaged the tubular spacing member 66 is adapted to engaged a notch 69 formed in the rearward portion of the pivoted section of the handle and the sides of said detent member are adapted to engage beneath a pair of lateral ears 71 formed upon said pivoted section of the handle. The upper edge of the sliding section of the handle is provided with a recessed portion 72 provided with two spaced seats 73, 74, of a size suitable to receive said tubular spacing member 66. When said member is engaged in the seat 74 the sliding section of the handle will be in its rearward position and the jack will be adapted for elevating the load. When the sliding section of the handle is shifted forwardly and the member engaged in the seat 73, the mechanism of the jack will be adapted for lowering the load. It will be noted that the seats 73 and 74 are spaced from each other and that when the detent is engaged in either of said seats there is no tension upon the handle, inasmuch as when the seat 73 is engaged by the detent the depending pin 43 has passed over the beveled face and is resting against the flat side of the forward extension of the handle 63.

In order to facilitate the manipulation of the jack from a position beyond the body of an automobile or under similar conditions, an extension handle may be provided. As is clearly shown in Figs. 9 and 10, said extension handle 75 may be provided at its rearward end with a hand grip 76 formed by turning the rearward end of the bar of said extension at right angles to the main body portion thereof. The forward section of said extension is provided with an oblique slot 77 and a notched forward end 78. The lower portion of said handle adjacent the notch is extended to form a projecting tongue 79 for a purpose to be hereinafter explained. The sliding section of the handle is provided with two laterally project-

ing studs 81 and 82, the stud 81 being located at the rearward end of said sliding section and being adapted to be engaged through the slot of the handle extension. A wing nut 83 is screw-threadedly engaged upon the stud 81 and permits the handle extension to be rigidly secured to the sliding section of the handle. It will be obvious that by releasing the tension upon the wing nut the extension of the handle may be moved rearwardly with respect to the sliding section thereof a distance sufficient to permit the disengagement of the notch from the stud 82. This will permit the handle to be folded when the sliding section of the handle is detached from the jack. In folding the extension upon the sliding part of the handle the small semicircular notch 80 in the upper edge of the extension permits said two handle sections to be brought into parallel relation. The projecting tongue 79 acts as a stop to assist in engaging the stud 82 with the notch in the extension handle when the parts are restored to operative position.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. A lifting jack comprising in combination a standard, a lifting bar slidably mounted in said standard, a rack formed on one side of said lifting bar, a pair of operating pawls disposed one behind the other adjacent to and in contact with said rack, a rotatable spring block mounted upon one of said pawls, a pair of oppositely directed controlling springs mounted upon said spring block, and means for rotating said spring block together with said springs to move the latter into and out of controlling position with respect to said pawls.

2. A lifting jack comprising in combination a standard, a lifting bar slidably mounted in said standard, a rack formed on one side of said lifting bar, an operating handle pivotally supported upon said standard, an actuating pawl carried at the forward end of said operating handle, a plurality of cam faces upon said actuating pawl, a retaining pawl mounted upon said standard, pawl controlling means mounted upon said retaining pawl, and means associated with said handle for shifting the position of said controlling means.

3. A lifting jack comprising in combination a standard, a lifting bar slidably mounted in said standard, a rack formed on one side of said lifting bar, an operating handle pivotally supported upon said standard, an actuating pawl carried at the forward end of said operating handle, a plurality of cam faces upon said actuating pawl, a retaining pawl mounted upon said standard, pawl controlling means pivotally mounted upon said retaining pawl, means carried by said controlling means for contacting with said cam surfaces on the actuating pawl, and means associated with said operating handle for shifting the position of said pawl controlling means.

4. A lifting jack comprising in combination a standard, a lifting bar slidably mounted in said standard, a rack formed on one side of said lifting bar, a pair of operating pawls disposed one behind the other adjacent to and in contact with said rack, means for controlling said operating pawls mounted upon one of said pawls, an operating handle having a pivoted and a slidable section, a beveled extension upon said slidable section of the handle for shifting the position of said controlling means, a spring detent on said pivoted section of said handle, and a pair of spaced seats engaged by said detent for holding said sliding section of said handle at load-elevating or load-lowering adjustment, respectively.

5. An operating handle for a lifting jack comprising in combination a section pivotally secured to the main body of the jack, a single sliding section engaged within and reciprocable with respect to said pivoted section, an extension section pivoted to said sliding section, and means to firmly lock said extension section with said sliding section to hold said extension at an upward angle to said sliding section and to permit the folding of said extension section in parallel relation with said sliding section.

Signed by me, this 20th day of June, 1923.

THEODORE H. WITTLIFF.