Oct. 31, 1950

M. B. LUCKER

2,528,011

LIFTING JACK

Filed Nov. 29, 1944

2 Sheets-Sheet 1

Fig. 1.

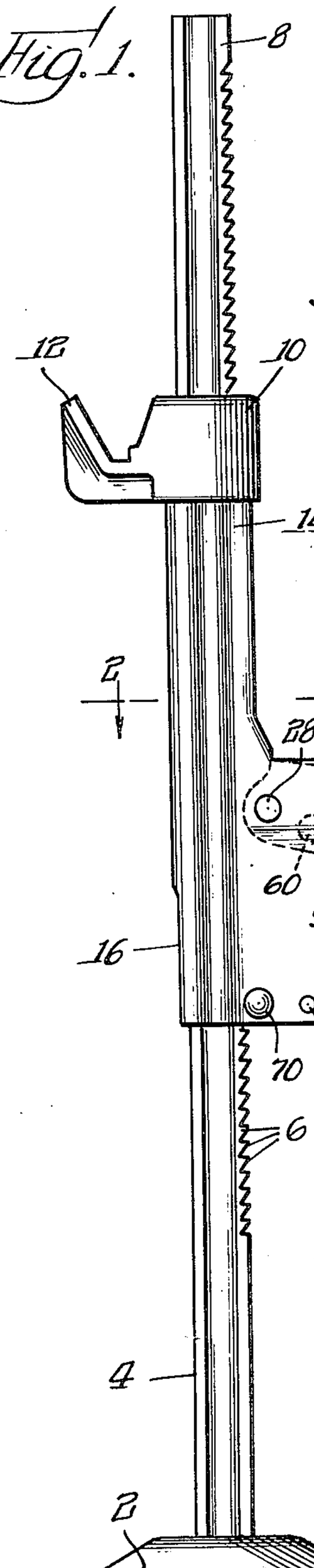


Fig. 2.

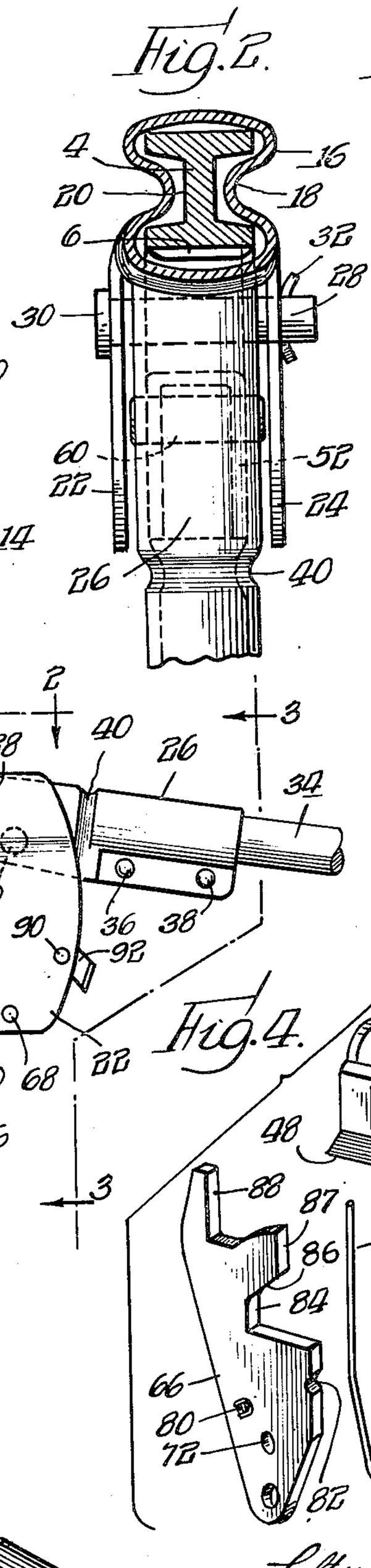


Fig. 3.

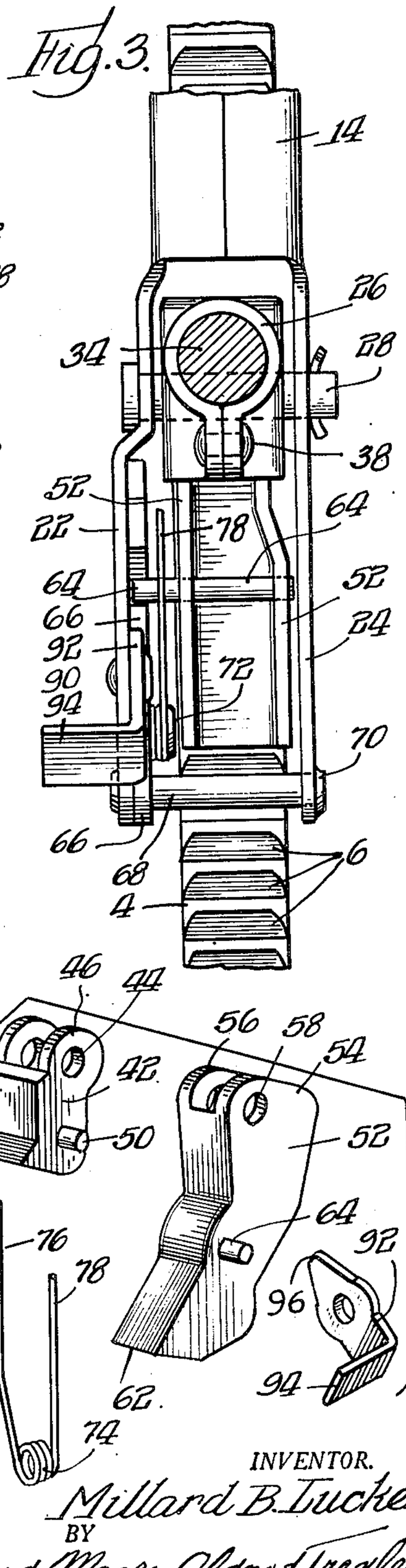
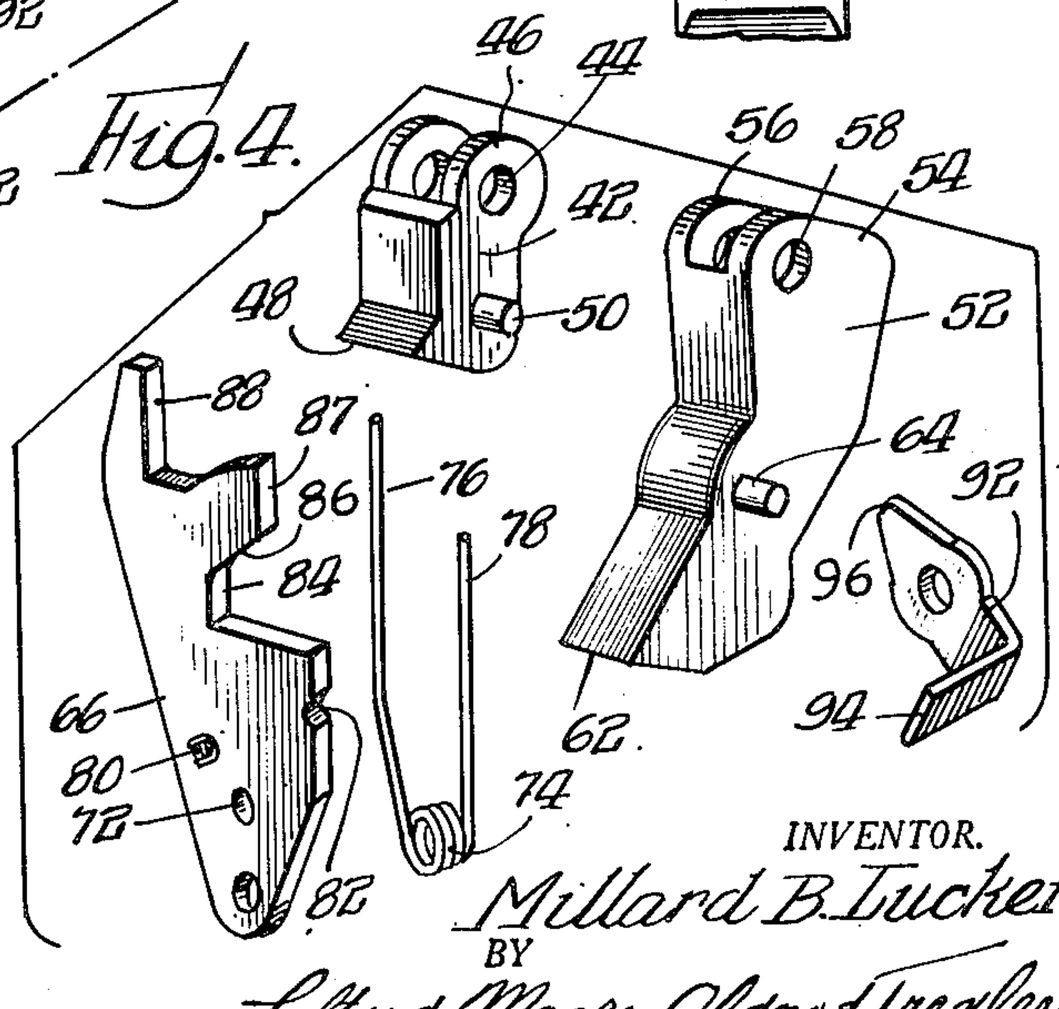


Fig. 4.



INVENTOR.

Millard B. Lucker

BY

Loftus, Moore, Olstow & Trexler

attys.

Oct. 31, 1950 M. B. LUCKER 2,528,011

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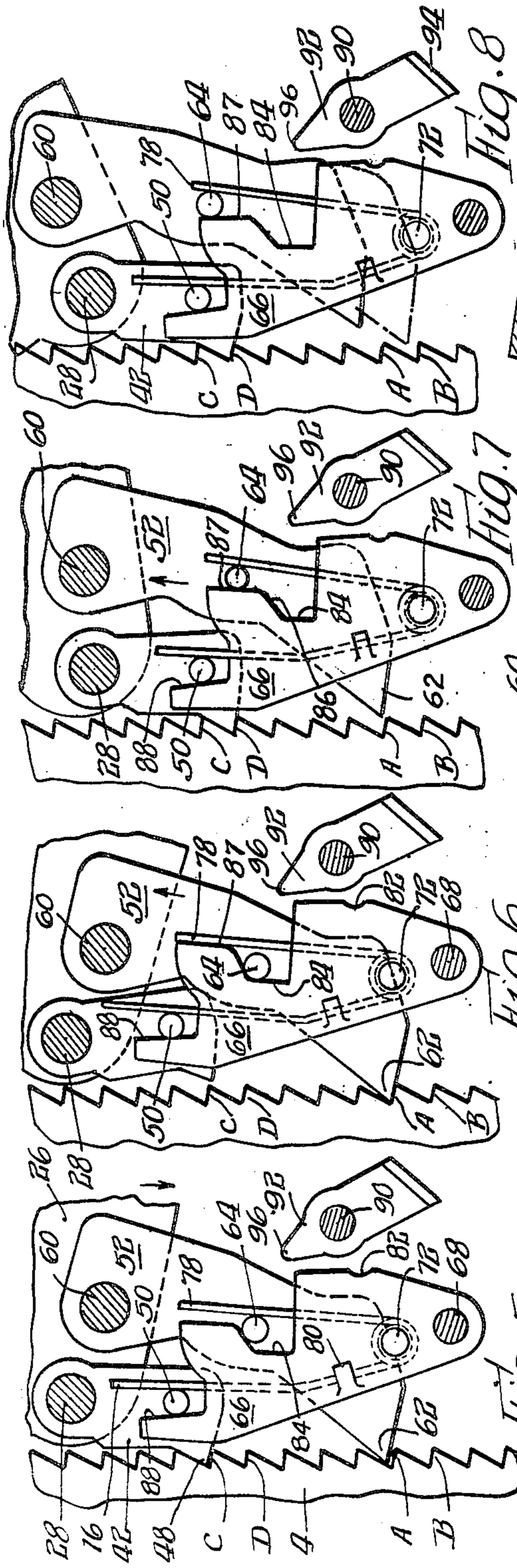
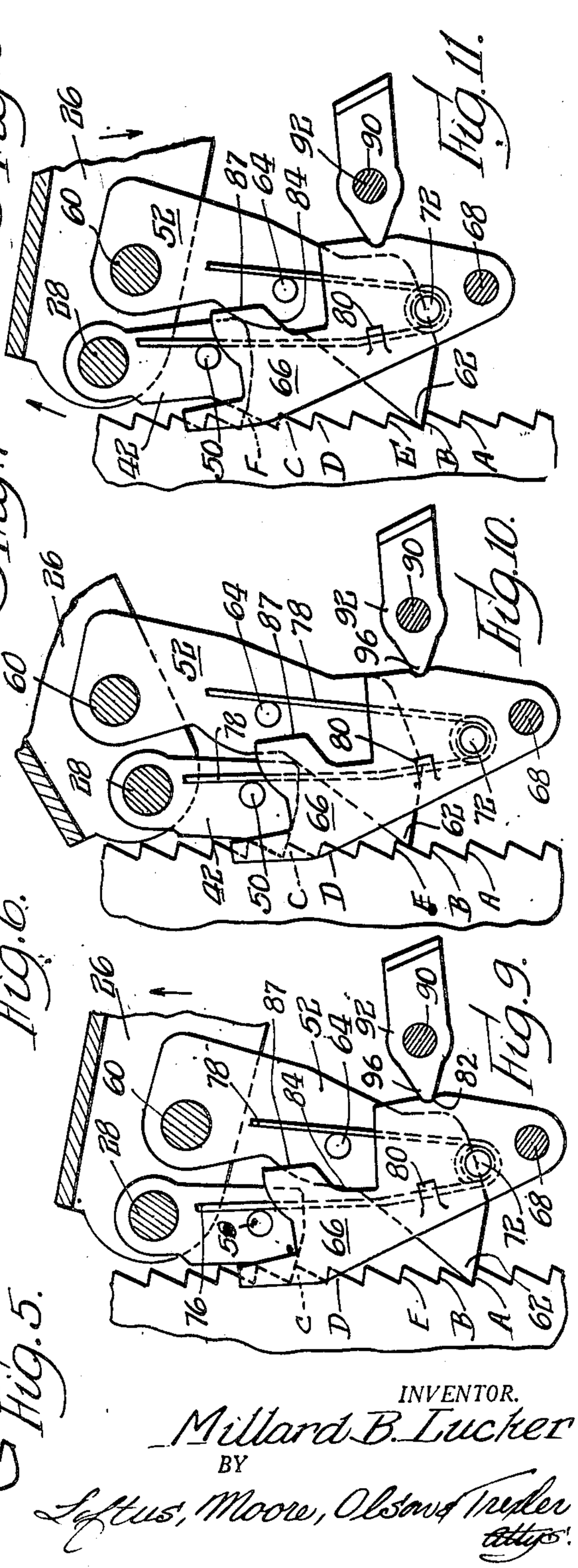
Filed Nov. 29, 1944 2 Sheets-Sheet 2





INVENTOR.
Millard B. Lucker
BY
Lyon, Moore, Olson & Snyder
Attys.

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2,528,011

LIFTING JACK

Millard B. Lucker, St. Joseph, Mich., assignor to Auto Specialties Manufacturing Company, St. Joseph, Mich., a corporation of Michigan

Application November 29, 1944, Serial No. 565,647

3 Claims. (Cl. 254—111)

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This invention relates to pawl and ratchet jacks.

Among the objects of the present invention are to provide a mechanism wherein a shiftable cam is utilized for cooperating with portions of a spring and with portions on the holding and lifting pawls for lowering the jack, and which cam is thrown out of position and out of cooperation with the holding and lifting pawls when effecting the raising of the jack; to provide a ratchet type jack having holding and lifting pawls and ratchet teeth wherein a simple sheet metal cam is associated with the holding and lifting pawls, and substantially U-shaped springs wherein the cam walls on the cam cooperate with pins upon the holding and lifting pawls and the legs of the spring to accomplish certain of the operational movements of the jack, particularly the lowering movements of the jack; to provide a simplified type of spring comprising a substantially U-shaped spring to cooperate with the holding and lifting pawls; to provide a pawl and ratchet cam wherein the spring is not directly connected to the holding and lifting pawls but herely acts through a pressing contact against certain portions of the holding and lifting pawls to effect their required shifting movement in the lowering and raising movements of the jack; to provide a positively actuated cam mechanism for positively shifting the holding and lifting pawls out of engagement with the teeth of the rack to accomplish the actuating movements of the jack; to provide these and other objects of invention, as will be apparent from a perusal of the following specification when taken in connection with the accompanying drawings, wherein:

Figure 1 represents a vertical front elevational view of the jack;

Figure 2 is a partial plan section taken on the line 2—2 of Figure 1;

Figure 3 is a partial end view of the jack taken on the line 3—3 of Figure 1;

Figure 4 are perspective views of associated parts of the lifting mechanism;

Figures 5, 6, 7 and 8 are successive views showing positions of the parts when the jack is being lowered; and

Figures 9, 10 and 11 are successive views showing the parts when the jack is being raised.

In general the jack comprises any type of basal support 2 to which is secured in any desired manner the upright post 4 carrying a vertical series of transversely extending ratchet teeth 6. The top portion of the support 4 as

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at 8 is preferably formed so that an upper collar 10 which carries the lifting hook 12 will not pass off the top end of the post 4. This lifting support comprises in addition to the lifting hook 12 the preferably sheet metal housing 14 which has a portion such as 16, the walls of which snugly embrace the H-shaped post 4 so that this housing 14 will slide longitudinally over and along the post 4. Preferably the walls as at 18 and 20 of this housing 16 are indented to fit well within the opposed recesses of the post 4 opposite the web of the H-shaped post. At the lower portion of the housing 14 it is provided with two outstanding parallel cheeks 22 and 24, the front ends of which are open to permit reciprocation of a lever 26 which is pivoted as at 28 to the parallel sides 22 and 24 of the housing. This is preferably done by means of the usual pivot pin having a head 30 at one end fastened in place by means of the usual cotter pin 32 at the other. This lever 26 is hollowed at its outer end to receive any type of wooden or metal rod 34 whereby it may be oscillated. This socket member 26 is preferably formed of sheet metal and is bent around as shown in Figures 1 and 3 and fastened together by the rivets 36 and 38. In addition it is formed with an inwardly extending rib 40 which forms a stop for the end of the actuating handle 34.

The actuating mechanism which is disposed within the parallel cheeks 22 and 24 of the housing is shown in Figure 4 and also more particularly in Figures 5 to 11 inclusive. The mechanism comprises a holding pawl 42 preferably of the form shown in Figure 4, the same being provided with spaced ears 44 having the registering perforations 46 whereby the holding pawl may be pivotally secured in position on the pivotal pin 28. The holding pawl is provided with the sharp tooth 48 shown, to provide engagement with the teeth 6 of the support and is likewise provided with a laterally extending pin 50 for purposes hereinafter described. In addition, there is a lifting pawl 52, preferably of the shape shown in Figure 4, which is provided with the opposed ears 54 and 56 having registering perforations 58 whereby the same is pivotally mounted by means of the pin 60 on the socket handle or lever 26. It will be noted that the pivotal point 60 is outwardly disposed with respect to the pivotal pin 28. In other words, when the handle socket 26 is shifted about its pivot 28 the pivotal pin 60 will move arcuately about the pin 28 as a center, thereby oscillating the lifting pawl 52. In addition the pawl 52 is

provided with the relatively sharp edge 62 for engaging the teeth 6 of the toothed post, and is likewise provided with an outstanding pin 64 for the purposes hereinafter set forth.

In addition, the mechanism comprises the cam plate 66 pivoted by means of the pin 68 on the plate 22 of the housing, as shown in Figures 1 and 3. A spacing pin 70 provided with rivets on its opposed ends serves to keep the plates 22 and 24 in assembled position. The plate 66 is provided with a pin 72 about which the coiled portion 74 of a spring passes. The spring 74 has two relatively long, extending arms 76 and 78, one of which is adapted to be mounted to the right of the pin 64. The other arm 76 of the pin at its lower end is fixed as at 80 to the cam plate 66. This is preferably accomplished by punching the lug 80 out of the plate 66, slipping the spring thereunder, and then pinning the metal of the lug over the spring portion 76 to hold it in place. The outer end of the spring 76 lies to the right, as shown in Figures 5 to 11 inclusive, of the pin 50 which is carried by the holding pawl 42. The cam plate 66 is provided with a notch 82, a vertical stop face 84, an upwardly inclined cam face 86, and a stop cam face 88, all as shown particularly in Figures 4 to 11 inclusive. These faces cooperate with the pins 50 and 64 and the spring arms 76 and 78, as will hereinafter be described.

In addition, the pivotally mounted release dog 92, pivotally mounted on the front plate 22 as at 90, has an outer right angularly disposed actuator 94 to be operated by the finger of the user and provided with an innermost tooth 96 for engaging the notch 82 in the cam plate 66, as hereinafter described.

In the operation of the mechanism of this jack, presuming that the load support 12 is in an elevated position and it is desired to lower the jack, the dog 92 is thrown to the position shown in Figure 5 wherein the tooth 96 is free of the notch 82. When the actuating handle is in the position shown in Figure 5, which is substantially horizontal, the weight of the load is carried by the tooth 48 of the holding pawl contacting the upper horizontal edge of a ratchet tooth 6, as shown in Figure 5. The first movement of the handle 26 is in a downward direction. Due to the fact that the lifting pawl 52 is carried by the pivotal pin 60 at a point outwardly of the pivotal pin 28 about which the handle lever shifts, the lifting pawl 52 is carried downwardly. Pin 64 on this lifting pawl necessarily moves downwardly with the lifting pawl and hence this pin 64 will come opposite the recess 84 on the cam. Spring 76 through its connection 80 with the cam plate 66 and leg 76 of spring contacting pin 50 is tending to swing the cam plate 66 to the right and therefore the recess 84 in this cam plate coming abreast of the pin 64 on the lifting pawl 52 will permit the cam plate 66 to be shifted, by the leg 76 of the spring, to the right. Since the cam plate 66 now shifts to the right, the upper cam surface 88 of this cam plate 66 will push the pin 50 on the holding pawl to the right to release it from the tooth C of the teeth 6 on the upright post 4. This is shown in Figure 6. Prior to this occurring, the lifting pawl 52 has been moved downwardly from the position shown in Figure 5 to the position shown in Figure 6, where it engages snugly against the lower horizontal surface of the tooth A.

Figure 6 shows the bottommost position of the

lowering stroke of the socket handle or actuating lever 26 with the tooth 62 of the lifting pawl 52 in engagement in the tooth A of the teeth 6 of the post and the holding pawl 88 free and out of contact with the tooth C of the teeth of the vertical post 4. In this condition if the handle lever or socket 26 is now raised instead of lowered it will now begin to pivot about the pivotal point 60. This is due to the fact that the lifting pawl is engaging the tooth A and is functioning to hold the load. As the handle socket starts to move upwardly about the pivot 60 the pivot 28 moves downwardly carrying the holding pawl below the level of the tooth C and into and against the horizontal surface of the tooth D which is the tooth next below the tooth C on the upright post see Figure 7. The instant that the tooth 48 of the holding pawl 42 seats against the tooth D of the stationary post, the pivot 28 of the holding pawl then becomes the stationary pivot and as the lever socket 26 continues to rise, then the pivotal point 60, which just previously was the stationary pivotal point, causes the outer end of the lever 26 to shift upwardly carrying with it the lifting pawl 52. This raising of the lifting pawl 52 carries with it the integral pin 64 which now wipes upwardly against the inclined cam face 86 of the cam. This causes the tooth 62 of the lifting pawl to shift to the right, away from the tooth A of the upright bar 4. This raising action of the actuating lever 26, and hence the lifting pawl 52, continues until the pin 64 on the lifting pawl comes opposite the vertical cam face 87 on the cam see Figures 7 and 8 so that the lifting pawl 52 is pushed outwardly and maintained outwardly of the teeth 6 of the post 4, sufficiently far so that upon the subsequent lowering action of the lever 26 the tooth 62 of the lifting pawl will be carried below the former tooth A and downwardly into contact with the tooth B. The tooth engaging position of pawl 52 is shown in Figure 5, which starts a repetition of the cycle, including continuation of this downward movement of the handle 26. Hence it will be seen that in this lowering operation of the jack the pivotal points 28 and 60 alternately function as fulcra, the pivot 60 of the lifting pawl on the socket lever 26 operating at one instant as a stationary fulcrum about which the innermost end of the lever handle 26 carrying the holding pawl 88 shifts downwardly and the other pivot 28 at other periods of time operating as a stationary fulcrum about which the pivotal point 60 moves.

As the lever 26 raises and pivots about the now stationary pivot pin 60, the holding pawl 42 lowers relatively to the stationary toothed post 4 and as the holding pawl 42 lowers it carries with it its pivot 28 which is mounted upon the housing. Therefore the entire housing lowers bodily relatively to the post 4. When the housing lowers it also lowers the cam plate 66 which is carried by the housing. As cam plate 66 lowers relatively to the stationary pin 64 upon the lifting pawl 52, the inclined cam surface 86 of the cam plate wipes against the stationary pin 64 on the lifting pawl and hence shifts the cam plate to the left. This movement of the cam plate 64 to the left, through the connection 80 with the spring 76, presses the leg 76 of the spring to the left against the pin 50 of the holding pawl to thus press the holding pawl against the teeth of the upright bar 4 while the holding pawl is lowering so that the tooth 48 of the hold-

ing pawl will now engage in the next lower tooth D of the teeth 6 of the post 4 and therefore act to carry the load. The instant that the holding pawl carries the load on the tooth D the fulcrum 60 becomes released and the fulcrum 28 now becomes a stationary fulcrum for the outstanding handle lever 26. When the pivot 28 becomes the fulcrum for the lever 26, and as the handle 34 in the socket 26 is continued upwardly, the pivot 60 now begins, for the first time of this cycle, to raise. This moves the lifting pawl 52 upwardly. The pin 64 moves against the inclined cam face 86 of cam 66 to move the pin 64 to the right against the tension of the spring leg 78. Movement of the pin 64 to the right shifts the lefting pawl so that the tooth 62 thereof is shifted to the right sufficiently far so that after the completion of the upstroke of the handle 26 and the beginning of the succeeding downstroke of the handle 26, as shown in Figure 5, the tooth 62 of the lifting pawl will be carried below the tooth A and will be opposite tooth B so that upon the front downward movement of the actuating handle the tooth 62 of the lifting pawl will be carried into engagement with the next lower tooth B. This is shown in dotted lines in Figure 8. Thus as the handle 26 is lowered from the position shown in Figure 8 to that of Figure 5, the pin 64 is moved into the recess 84 of the cam 66 due to the tension of the spring 78 which causes the tooth 62 of the lifting pawl to contact this next lower tooth B. Then when the holding pawl is released, as hereinbefore pointed out the lifting pawl in this new lowered position in contact with the tooth B holds the load for the initiation of the next cycle, as hereinbefore pointed out.

When it is desired to raise the jack the dog 92 is thrown to the position shown in Figure 9 where it positions the cam to the extreme left, where the cam is inoperative to have its cam surfaces 88 and 86 act upon the pins 50 and 64 of the holding and lifting pawls. In this position, and referring to Figures 9, 10 and 11 which illustrate the cycle of operations for raising the jack, this is accomplished first by shifting the dog 92 to the position shown in Figure 9 wherein the tooth 96 engages the notch 82 of the cam 66 thereby positioning it out of engagement with either one of the pins 50 and 64. In the position of Figure 9 it will be noted that the pawl edge 62 of the lifting pawl engages a tooth A of the teeth 6 of the upright 4 and that the tooth 48 of the holding pawl engages a tooth 6 of the upright 4. Upon raising of the handle 26 the lifting pawl is pulled upwardly as shown in Figure 10, wherein the tooth portion 62 is raised substantially above the tooth B but not into tooth E. The edge 62 just follows along the edge of the tooth B and the spring 78 forces the pin 64, which is part of the lifting pawl 52, thereby forcing the pawl 52 into contact with the surface of the tooth B. At this time the holding pawl 42 is supporting the load through the pivot 28. As seen in Figure 10 the handle has been raised to its uppermost position and in the following Figure 11 the handle is shown moving down, wherein the lifting pawl 52 has engaged the tooth B which is the next following tooth after A and forms the support for the load while the holding pawl is being raised about the pivot 60 and is being forced along upwardly and into engagement with the inclined surface of the tooth C due to the contact of the spring 76 against the pin 50. As soon as the holding pawl tooth 48 clears the upper edge of the tooth C it will snap into the space formed by the next above tooth D and therefore complete the cycle of operation.

The invention has been made more positive by utilizing a cam for shifting the holding and lifting pawls through the instrumentality of pins on the lifting and holding pawls engaging cam surfaces of the cam, and providing springs for pushing the pawls through the instrumentalities of the pins.

Obviously the invention is not limited to the specific details of construction disclosed herein but is capable of other modifications and changes without departing from the spirit and scope of the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

1. In a pawl and ratchet jack, in combination with a base, an upstanding toothed post mounted on the base, a housing slidable on the toothed post and carrying a load support, an actuating lever pivotally mounted at its inner end on the housing, a relatively short holding pawl pivotally mounted upon the pivotal axis of the actuating lever and having a laterally extending portion, and a lifting pawl substantially longer than the holding pawl and pivotally mounted upon the actuating lever at a point spaced from and between the point of pivot of the holding pawl and the free end of the actuating lever, said lifting pawl having a laterally projecting portion, the lower end of said lifting pawl extending substantially below the lower end of the holding pawl and both of said pawls depending from said lever, an actuating cam pivotally mounted upon the housing at a point below the lower end of the lifting pawl, said cam having a recessed portion and adjacent cam faces for engaging said laterally projecting portion upon the substantially central part of the lifting pawl, and said actuating cam having an upper abutment face for engaging said laterally extending portion on the holding pawl, and spring means carried by the actuating cams and having resilient arms extending upwardly, one arm in the path of the lateral projection on the holding pawl and the other arm in the path of the lateral projection on the lifting pawl, said laterally extending portion of the holding pawl lying between the abutment face of the cam and one of the spring arms of the spring means, and the laterally projecting portion on the lifting pawl lying between the recess and its adjacent cam faces and the opposite resilient arm of the spring means, and a release dog adapted in one position to throw the cam faces of the cam out of actuating position with the holding and lifting pawls, whereby upon actuation of the lever the jack may be raised by the interaction of the holding and lifting pawls with the teeth of the post.

2. A ratchet jack comprising a base, an upright post carrying a vertical series of teeth, a housing vertically shiftable on the post and carrying a load support, an actuating handle pivotally mounted at its inner end on the housing, a holding pawl pivotally mounted on said pivotal axis of the actuating handle and depending downwardly from said pivotal axis, a substantially longer lifting pawl having a pivotal axis on the actuating handle at a point spaced outwardly of the pivotal inner end of the handle but relatively adjacent said pivotal inner end of

the handle, said lifting pawl depending downwardly from the actuating handle, an actuating cam pivotally mounted on the housing slidable on the post, said cam being so pivotally mounted at a zone below the lowermost portion of the lifting pawl, said holding pawl having a laterally extending pin disposed substantially centrally of and adjacent the lower portion of said holding pawl, and said lifting cam having a laterally extending pin extending in the same direction as said first mentioned pin, said last mentioned pin being stationed substantially centrally of said lifting pawl, said actuating cam lying adjacent to and parallel to the holding and lifting pawls, and said cam having a recessed portion and an upper adjacent inclined cam face terminating in a substantially vertical cam face, and said cam having spaced therefrom and thereabove a second substantially vertical cam face, said second mentioned vertical cam face lying in the path of movement of the lateral pin extending from the holding pawl, and said recess at its adjacent inclined face and connected vertical face being disposed to lie in the path of movement of the laterally extending pin on the lifting pawl, a coil spring mounted upon the actuating cam and having two upwardly, vertically extending arms, one of said arms lying in the path of movement of the vertical pin extending from the holding pawl, and the other of said spring arms lying in the path of movement of the lateral pin extending from the lifting pawl, and a release dog adapted in one position to throw the cam faces of the actuating cam out of actuating position with the holding and lifting pawls whereby upon actuation of the lever the jack may be raised by the interaction of the holding and lifting pawls with the teeth of the post.

3. A ratchet jack comprising a base, an upright post carrying a vertical series of teeth, a housing vertically shiftable on the post and carrying a load support, an actuating handle pivotally mounted at its inner end on the housing, a holding pawl pivotally mounted on the pivotal axis of the actuating handle and depending downwardly therefrom, a lifting pawl pivotally mounted to the handle at a point spaced outwardly of the pivotal mounting of the handle, said lifting pawl depending downwardly from said handle, an actuating cam pivotally mounted on the housing at a point below the holding and lifting pawls and extending upwardly substantially a greater part of the length of the lifting pawl and extending well above the bottom of the holding pawl, said holding and lifting pawls each having a member extending laterally therefrom, and said cam member having an abutment face in the path of movement of the laterally extending member of the holding pawl and having a recess and adjacent cam faces extending in the path of movement of the laterally extending member on the lifting pawl, and spring means mounted on the cam member and having a pair of spring arms each one lying in the path of action of the laterally extending member on the two holding pawls, and means for shifting the cam to a position such that the cam faces on the cam are out of effective engagement with the holding and lifting pawls.

MILLARD B. LUCKER.

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The following references are of record in the file of this patent:

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Certificate of Correction

Patent No. 2,528,011 October 31, 1950

MILLARD B. LUCKER

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 1, line 25, for "herely" read *merely*; column 5, line 12, after the syllable "wardly" and before the period insert *and hence the pin 64 thereon is also moved upwardly*; line 16, for "lefting" read *lifting*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of January, A. D. 1951.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.