(No Model.)

J. BARRETT.

LIFTING JACK.

No. 455,995. Patented July 14, 1891.

Fig. 2.

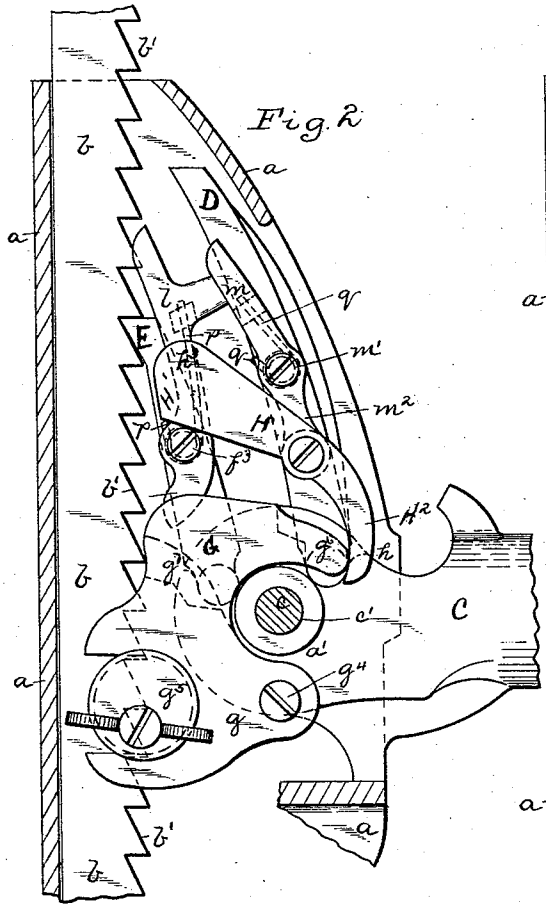


Fig. 1.

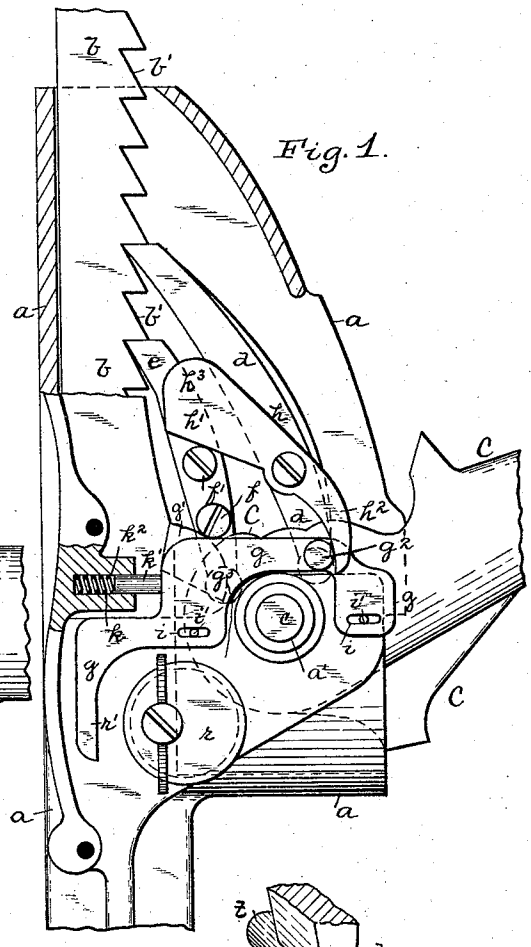


Fig. 3.

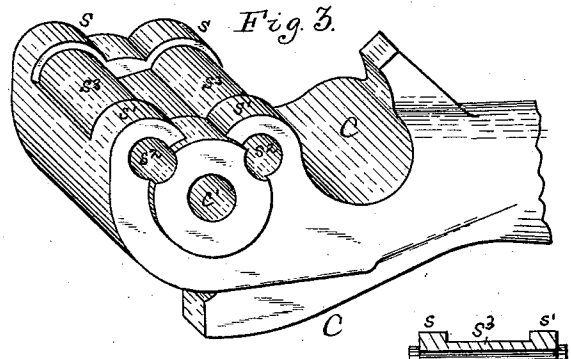


Fig. 4.

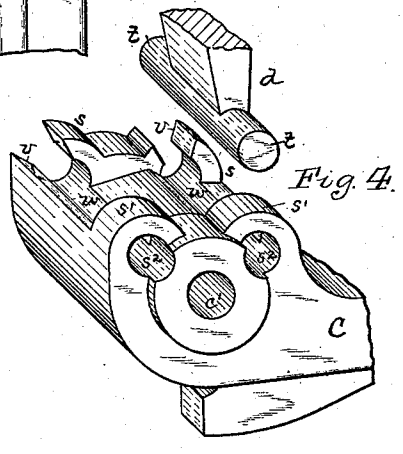
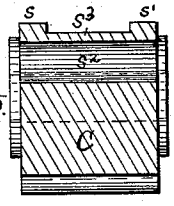


Fig. 5.



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UNITED STATES PATENT OFFICE.

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LIFTING-JACK.

SPECIFICATION forming part of Letters Patent No. 455,995, dated July 14, 1891.

Application filed April 30, 1891. Serial No. 391,067. (No model.)

To all whom it may concern:

Be it known that I, JOSIAH BARRETT, a resident of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Lifting-Jacks; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to what might generally be termed "jacks"—that is, to power mechanism in which a step-by-step movement back and forth is obtained, said mechanism being actively operative in one direction to move or raise a load, and being passively operative in the other direction to control the movements of the load, such as lowering a load lifted by the jack. By such terms it is of course to be understood that the invention includes any device embodying this principle, whether the power is exerted in a vertical, horizontal, or other line.

My invention relates more particularly to that class of lifting-jacks described in Letters Patent No. 312,316, granted to me February 17, 1885, and in application filed by me February 13, 1891, Serial No. 381,275, in which jacks the operating-lever carries two pawls, one on each side of the fulcrum-point, both of which are adapted to engage with a bar having a toothed face on one side only, so as to impart a movement to the movable part of the jack on both the upward and downward or forward and backward movements of the operating-lever, and both said jacks providing for the reverse movements of the parts by mechanism which raises one pawl from engagement from the bar while the other pawl engages therewith and permits the retrograde movement, the pawl free from the bar passing one tooth thereon and taking into the next tooth, so that the load may be lowered or the movement of the load be controlled after the power has been applied thereto to raise or move the load, as may have been desired. In such Patent No. 312,216 this operation is obtained by spring-actuated levers pivoted to the pawls and engaging with a stationary shoulder or shoulders adapted to compress the spring, and as soon as the pawls are free through such spring-actuated levers draw the pawls from engagement with the toothed bar. In the said application, filed February 13, 1891, the said action is obtained by means of rigid pins or fingers on the pawl engaging with a shouldered tripping-plate, which is yielding, and so yields when one of said fingers comes in contact therewith, but, as soon as the pawl is free from the pressure of such yielding tripping-plate, draws the pawl from engagement with the toothed bar.

The object of the present invention is to improve these classes of jacks in certain particulars, especially as to the power employed for lifting the upper or outer pawl and as to the construction of handle to be employed with the jack.

The main point of the invention desired to be covered consists, generally stated, in the combination, with the bar having teeth on one face thereof, of the operating-lever, of two pawls pivoted thereto and engaging the toothed bar, and a tripping-lever carried by the outer pawl and having one end bearing on a pin or finger of the inner pawl, while the other end bears against a shoulder, so that when the inner pawl is raised and the outer pawl lowered the upward movement of the inner pawl and downward movement of the outer pawl and the lever carried thereby will, through such lever, cause an outward movement of the outer pawl, and so free it from the toothed bar.

The other points of the invention will be hereinafter more particularly set forth and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view, partly broken away, showing the operative parts of one form of the jacks; and Fig. 2 is a like view of the modification. Fig. 3 is a perspective view of the lower end of the operating-lever as cast. Fig. 4 is a like view of the lever as finished, and Fig. 5 is a sectional view through such lever.

Like letters of reference indicate like parts in each.

The jack has the body or frame *a*, and the bar *b* has teeth *b'* on one face thereof the con-

struction of the lower ends of these parts not being illustrated, as it is not considered of importance, and for the ordinary jack has been shown in the Letters Patent and in the application above referred to. The toothed bar, where it is the movable element and raises the load placed upon it, is mounted in a rectangular or other shaped passage formed in the frame *a*, such passage being open at the back of the frame, so as to permit the raising of the foot of the jack. The frame *a* has the bearing *a'* for the reception of the inner end of the operating or hand lever C, and pivoted to said operating-lever are the two pawls *d e*, which engage with the teeth of the bar *b* on the one face thereof, and which act to raise or lower the load, according to the movement of the hand-lever, the inner pawl *e* being pivoted forward of the fulcrum-pin *c*, and hence being adapted to engage with and raise the toothed bar when the hand-lever is lowered, and the outer pawl *d* being pivoted back of the fulcrum-pin *c*, and being of greater length than the pawl *e*, so that it engages with the toothed bar above the same and is adapted to engage with and raise the toothed bar when the hand-lever C is raised.

In the construction of these jacks two points are found desirable: First, that the mass of the lifting action shall be obtained when the hand-lever is pressed down—that is, through the operation of the inner pawl—as more power can be exerted by the operator in the downward or pushing stroke than in the upward or lifting stroke of the hand-lever, and, secondly, that the pawls shall operate as nearly in a line with the toothed bar as practicable, the latter point making the raising of the load easier on account of the more direct action of the pawls upon the toothed bar. It has not been found practicable, however, to so arrange the pawls, especially for a jack, which operates vertically, as the pawls would not be so liable to take into the toothed bar, and for this reason it has been found necessary either to pivot the inner pawl, so as to give to it a considerable inclination toward the teeth and not have quite so great lifting power, or to provide the pawl with a counter weight or spring. It was also necessary to pivot the outer pawl further out from the toothed bar, so as to get a longer stroke to compensate for the loss of stroke in the inner pawl. By the present invention I find that I am enabled to get a sufficiently long stroke of the inner pawl to relieve the outer pawl of the necessity of so great a stroke, as I provide means for forcing inwardly the inner pawl, and that at the same time I can pivot the outer pawl nearer to the toothed bar, so getting a more direct action thereof, and reducing its stroke so that the operation of lifting the hand-lever is not so severe as in the ordinary jack. These advantages I obtain on account of the improvements forming the subject-matter of the present application, and I have illustrated the pawls as pivoted in such positions as to obtain the results above stated.

In Fig. 1 I have illustrated the invention as applied to such a jack as forms the subject-matter of the above-mentioned application, filed February 13, 1891. The inner pawl carries thereon a finger or projection *f*, which engages with the yielding tripping-plate *g*, said tripping-plate having a shoulder *g'* with which said finger engages, the finger preferably extending down, so that the necessity of carrying the tripping-plate higher up to engage with the finger is overcome, while the power for withdrawing the pawl is exerted at the proper point. The tripping-plate has also the shoulder g^2, which engages with the tripping-lever *h*, which is shown as pivoted direct to the outer pawl *d*. This lever *h* has one arm *h'* thereof, which extends at a forward and upward inclination over to the pawl *e*, and engages with the shoulder or projection on said pawl, such as the shoulder *f'* of said finger *f*, or a separate shoulder on said pawl *e*, while the lower arm h^2 of the tripping-lever extends down into the course of the tripping-plate *g*. In the construction shown in said Fig. 1 the tripping-plate *g* slides in guideways on the frame, the plate having the horizontal slots *i i* therein, through which bolts *i' i'* pass, said plate being cut out, as at g^3, to pass around the bearing *a'*, and having also the arm *r'*, with which the cam *r* engages to press back the tripping-plate. On said tripping-plate is a pin *k'*, extending out parallel with the movement of the plate, and in line with this pin is a seat k^2, into which the pin *k'* enters and within which is inclosed the spring *k*, which, by pressing out the pin, operates the sliding tripping-plate, so that the tripping-plate may yield when necessary, said spring being compressed, and as soon as the parts are free the spring forcing the tripping-plate back to its normal position, and so imparting the necessary motion of the pawls to withdraw them from engagement with the toothed bar. In the case of the inner pawl *e* the finger *f*, engaging with the shoulder *g'*, will force back the tripping-plate until the pawl is free to be withdrawn, when said tripping-plate will force out the pawl through pressure on the said finger. It is found that this operates well with the inner pawl; but where the outer pawl is arranged closer to the toothed bar it is desirable to give it a longer stroke than in withdrawing can well be obtained by simple direct contact of a finger thereon with the tripping-plate. During the lowering operation, therefore, as the inner pawl *e* is raised it will force up the tripping-lever *h*, its shoulder *f'* traveling along the lower inclined face of the arm *h'* thereof, which extends over and bears on top of the shoulder *f'*, while the lower arm h^2 of the lever will bear upon the yielding tripping-plate *g* and compress the spring *k* until the outer pawl is free to be withdrawn, when as the inner pawl is raised and the outer pawl is lowered the downward

movement of the tripping-lever, which bears upon the inner pawl, combined with the upward movement of the inner pawl and the outward pressure of the tripping-plate, will impart all the motion necessary to withdraw the outer pawl, said motion being sufficient to carry it free from the toothed bar and hold it in that position until the tripping-lever *g* is freed from contact with the tripping-plate, so that the pawl may again engage with the toothed bar. During this operation it will be seen that the tripping-lever *h* is always bearing upon the inner pawl, and that it is through the pressure upon such inner pawl and upon the tripping-plate that the necessary force to withdraw the outer pawl is obtained. The result of this is that said tripping-lever acts to force inwardly the inner pawl and to cause it to engage with the toothed bar as soon as it is freed from the tripping-plate, and consequently even in a vertically-operating jack the inner pawl may be drawn more into line with the toothed bar without employing counter-weights, as above described. In the lifting operation the tripping-lever always bears upon the inner pawl, and to insure its being forced into engagement with the toothed bar the upper arm of this tripping-lever may be weighted, as shown at h^3.

In Fig. 2 I have illustrated my invention as applied to the construction of jacks such as shown in said Patent No. 312,316, in which Fig. 2 each pawl D E carries a spring-actuated lever *m l*, respectively, the lever *l* on the inner pawl being pivoted at f^3 and being substantially of the same construction as described in said patent, and the tripping-plate G being illustrated as pivoted at g^4 to the jack-frame and being positively controlled, so as to be held rigidly either in the position to act with the mechanism to withdraw the pawls or drawn free from such mechanism by means of the cam or eccentric g^5, pivoted to the jack-frame. In order to obtain the advantages of the present invention in this construction of jack I mount the spring-actuated lever *m* on the outer pawl at the point *m'*, said lever having the arm m^2 extending down below such pivotal point, and I have pivoted the tripping-lever H to the lower end of such spring-actuated lever *m*, its upwardly and inwardly inclined arm H' extending over and bearing on the top of a shoulder formed on the pivotal pin f^3 of the spring-actuated lever *l*, while its lower arm H^2 is adapted to engage with the shoulder g^6 of the tripping-plate. The springs for actuating the levers *m l* are wound around their pivot-pins and adapted to engage both with the levers and the pawls, as illustrated in the dotted lines. In such construction of jack the tripping-plate is held rigidly either in the position which permits the raising operation or in the position which causes the pawls to act to lower the load. As the inner pawl is lowered, its spring-actuated lever *l* comes in contact with the shoulder g^7 of the tripping-plate, and said lever is thereby moved, so that it compresses its spring *p*, and as soon as the outer pawl D takes the load the compression of this spring, while the lower end of the lever is bearing on the shoulder *g'* of the tripping-plate, will act to withdraw the pawl. On the reverse movement of the operating-lever the shoulder f^3 on the inner pawl in rising will contact with and travel along the arm H' of the tripping-lever H, while the lower arm H^2 of said lever bears against the shoulder g^6 of the tripping-plate G which is held rigidly, and the necessary result is that the lower arm of the lever *m* is pushed outwardly, so compressing the spring *q* between said lever and the pawl D, such compressing action continuing until the pawl *d* is lowered free from the toothed bar, when the combined operation of the upward movement of the inner pawl E, the downward movement of the outer pawl D, and the action of the spring to force the lower end of the lever *m* inwardly will, when the lower end of the lever H is held rigid, impart the necessary outward movement to the pawl D and draw it free from the toothed bar.

It is exceedingly desirable, and, indeed, practically necessary, that the pawls mounted in the hand-lever shall be strongly supported by a seat which extends for the entire length of the base of the pawl, so as to sustain the exceedingly heavy strain brought upon this part of the jack. For this purpose a special construction is described in my said Patent No. 312,316. That construction, while giving all the necessary strength, has the objection that it requires considerable machine-work for the formation of the side plates and other parts, and that it requires the removal of at least one such side plate to replace a pawl in case of a breaking of the same.

To provide a strong mounting of each pawl within the hand-lever I have devised the construction illustrated in Figs. 3, 4, and 5, the hand-lever being formed of an integral steel casting, through which is bored the central passage *c'* for the reception of the pivot-pin *c*, while extending above the same in the form indicated are the flanges *s s'*, and in order to form a seat for a pawl I bore through such flanges and the body of the metal between them, as indicated at s^2, so forming a true seat extending through said flanges and between the same. In order to support the boring-tool during this operation I generally form the casting with a slightly greater thickness of metal than that removed by the boring-operation, and after the boring out of such seat I cut or mill away the thin film or web s^3 so left, so forming a perfect seat *w* for the reception of the pivot-pin *t*, which is formed at the base of the pawl.

In order to introduce that pivot-pin into its seat I cut through one flange—such as the flange *s* at the forward end thereof—a slot *v*, sufficient to permit the introduction of the pawl, and said pawl can then be passed through the slot *v* into its seat *w*, formed in

the manner above described, the flange *s* forming a perfect bearing on one side of the pawl as soon as the pawl is raised into its operative position, and when the lever is secured within the jack-frame its body will fit between said flanges *s* and *s'* and will be held in place thereby. By such construction I do away with the necessity of separate side plates, forming the handle of an integral casting, which is much stronger. At the same time I so mount the pawl in the hand-lever that it may be quickly removed from the handle upon the withdrawal of the hand-lever from the jack-frame; but is firmly secured therein when the hand-lever is mounted within the jack-frame, while a perfect turned bearing or seat for each pawl is formed in the hand-lever, and an exceedingly strong and firm connection between the two is obtained.

By the particular improvements in the operative parts of the jack above described, I am enabled to obtain a long lifting-stroke when the operating-lever is lowered, and a shorter and easier lifting-stroke when the operating-lever is raised, so reducing the power necessary to operate the jack, while at the same time I am enabled further to reduce the power by bringing the pawls into more direct line with the toothed lifting-bar, and also to exert sufficient power under such circumstances to raise the outer pawl free from the toothed bar in lowering the jack, so greatly increasing its efficiency and ease of action.

As above referred to, in the term "jack" I include any mechanism in which either main element—that is, the toothed bar or the frame carrying the operative mechanism—has a step-by-step movement which is actively operative in one direction to move or raise a load, and is passively operative in the opposite direction to lower the load or to control its movement, whether the same acts vertically, horizontally, curvilinearly, or in other direction.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a jack, the combination of a bar having teeth on one face thereof, a pivotal hand-lever, two pawls pivoted thereto, and a lever carried by the outer pawl and having an arm provided with an inclined lower face extending over and bearing on the top of the shoulder on the inner pawl and the other end bearing against a shoulder, so that when the inner pawl is raised and the outer pawl is lowered the upward movement of the inner pawl and the downward movement of the lever will, through said lever, withdraw the outer pawl, substantially as and for the purposes set forth.

2. In a jack, the combination of a bar having teeth on one face thereof, a pivotal hand-lever, two pawls pivoted thereto, one pawl having a finger or shoulder thereon and the other pawl having a tripping-lever pivoted directly thereto and having one arm bearing on the shoulder of the inner pawl, and a yielding tripping-plate having a shoulder with which the other end of said tripping-lever engages, substantially as and for the purposes set forth.

3. In a jack, the combination of a bar having teeth on one face thereof, a pivotal hand-lever having a pawl engaging with said toothed bar, a slidable tripping-plate mounted on the jack-frame and having a spring pressing against the same to hold it in its operative position, and a withdrawing device to hold said plate away from engagement with said pawl, substantially as and for the purposes set forth.

4. In jacks, the combination of a toothed bar, a frame having a pivoted hand-lever mounted therein, a pawl mounted in such hand-lever and having a finger rigid therewith, the slidable tripping-plate *g'*, having a shoulder engaging with said finger, and having slots through which bolts pass into the jack-frame, and provided with a pin extending out at the rear thereof, and a spiral spring fitting within a seat in the jack-frame, into which said pin enters, substantially as and for the purposes set forth.

5. A hand-lever for a lifting-jack, having flanges integral with the body thereof and extending up from the same, a seat extending through such flanges and along the body of the handle, and a slot formed in one flange, in combination with a pawl having its bearings integral with and formed at the base thereof, said pawl entering the seat through said slot in the flange, substantially as and for the purposes set forth.

In testimony whereof I, the said JOSIAH BARRETT, have hereunto set my hand.

JOSIAH BARRETT.

Witnesses:
ROBT. D. TOTTEN,
JAMES I. KAY.