(No Model.) 3 Sheets—Sheet 1.

W. S. McKINNEY.

LIFTING JACK.

No. 549,458. Patented Nov. 5, 1895.

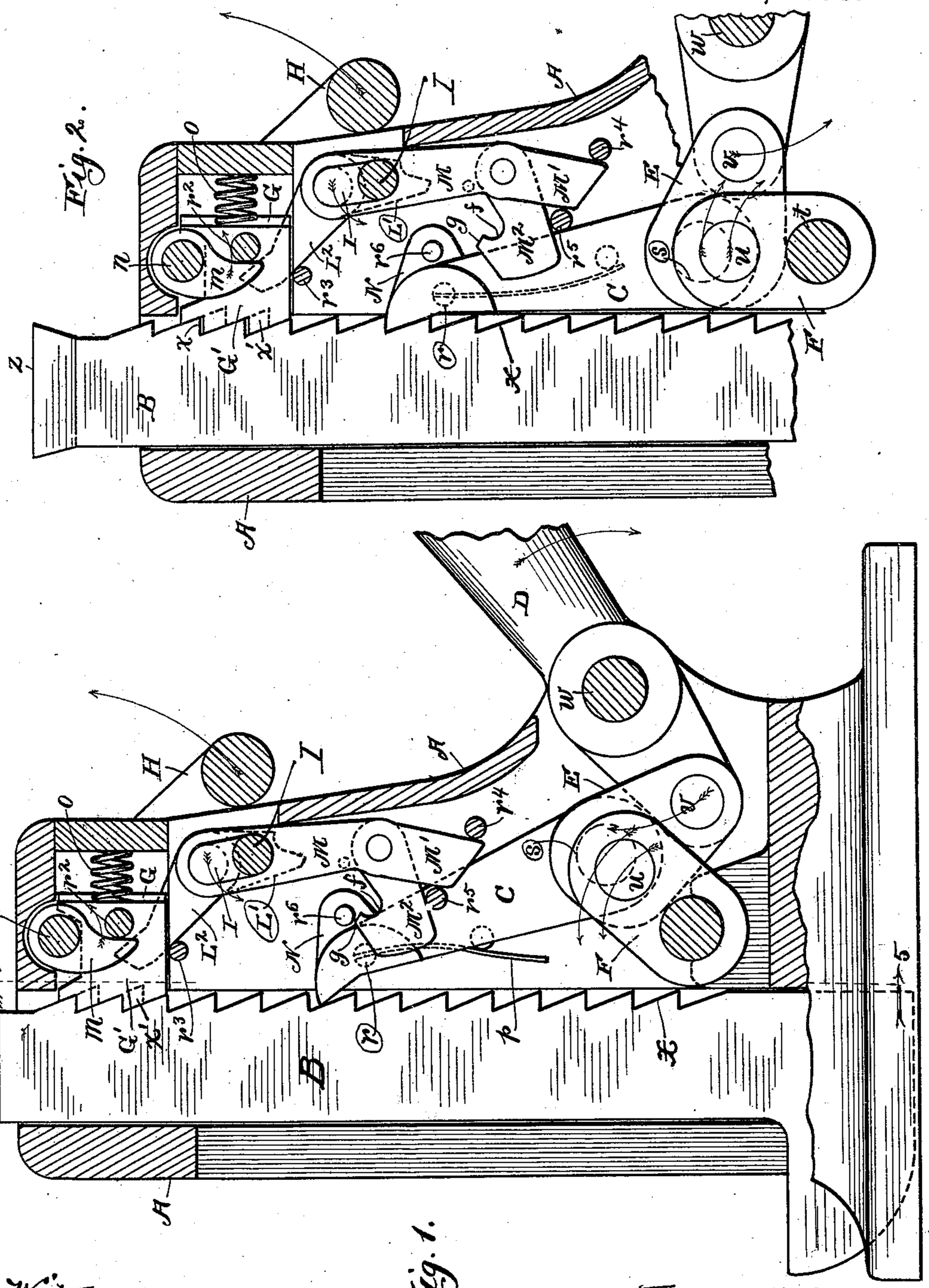

Fig. 1.

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Fig. 4.

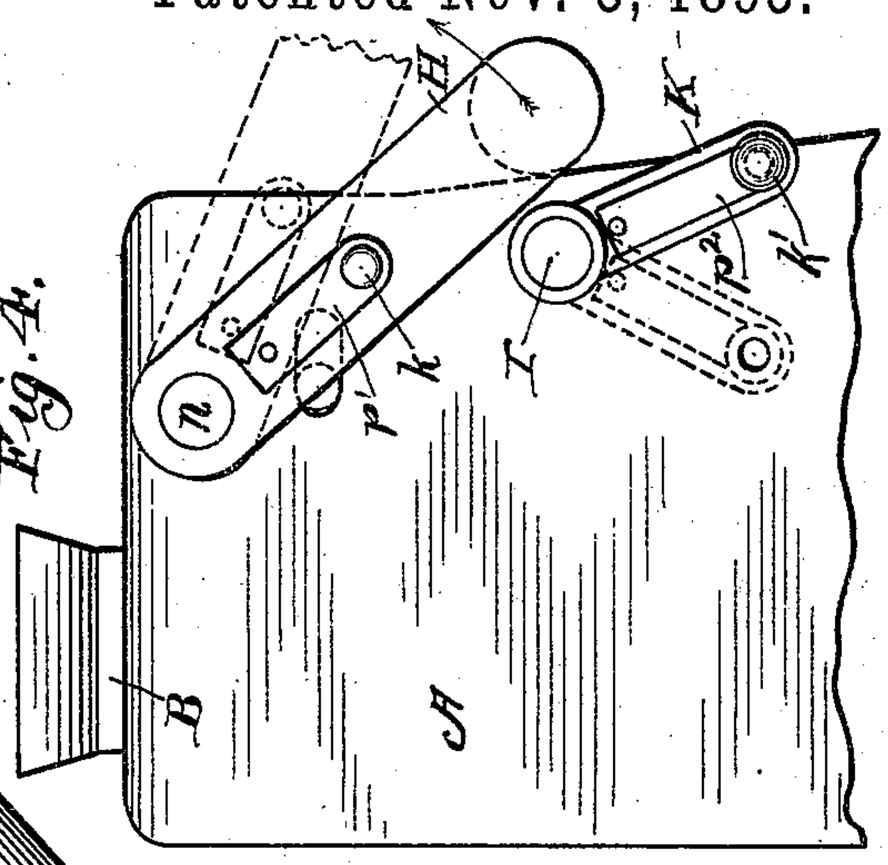

Fig. 3.

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W. S. McKINNEY.

LIFTING JACK.

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Fig. 6.

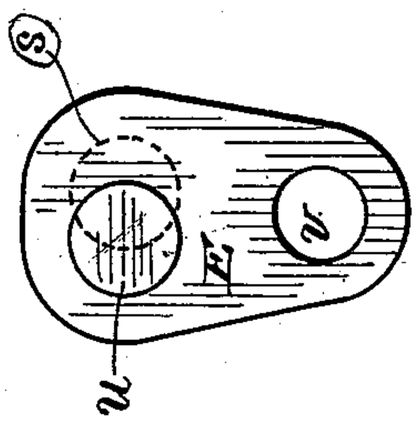


Fig. 7.

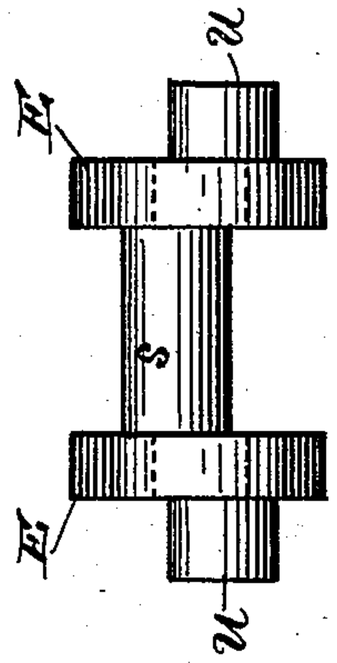


Fig. 5.

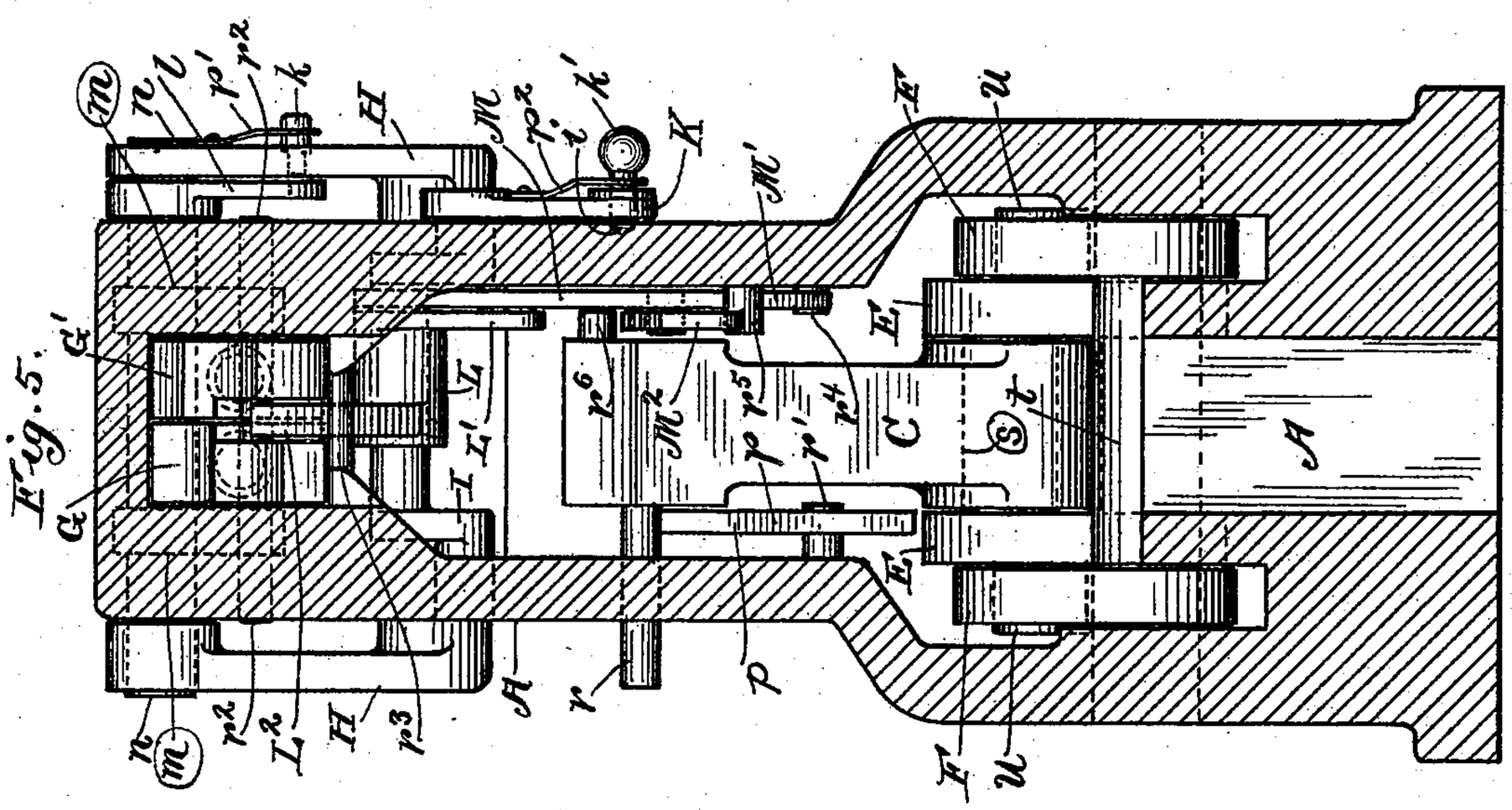
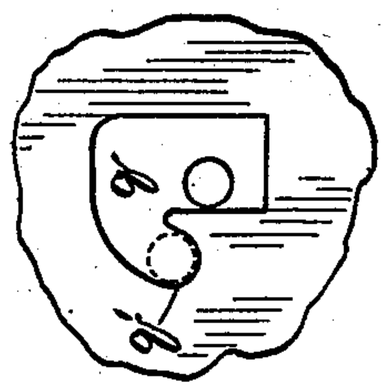


Fig. 8.



Witnesses:
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UNITED STATES PATENT OFFICE.

WALTER S. McKINNEY, OF CHICAGO, ILLINOIS, ASSIGNOR TO MOSES M. MOORE, OF SAME PLACE.

LIFTING-JACK.

SPECIFICATION forming part of Letters Patent No. 549,458, dated November 5, 1895.

Application filed February 27, 1895. Serial No. 539,913. (No model.)

To all whom it may concern:

Be it known that I, WALTER S. MCKINNEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Lifting-Jacks, of which the following is a specification.

My invention relates to lifting-jacks of the type known in the trade as "ratchet-jacks;" and my object is to provide a lifting-jack of this character suitable for every class of work, and with which a comparatively small expenditure of power will produce a great lifting force. In a complete lifting-jack, adapted to all purposes to which it may be applied, three essential requisites are presented, viz: First, mechanism for lifting the bar with its load; secondly, mechanism for dropping the bar suddenly at will with or without its load, and, thirdly, mechanism for lowering the bar gradually when required. Of these three features the first two are always essential, but the presence of the third may be made to depend upon the character of work for which the lifting-jack is designed. Thus, for example, if the lifting-jack is to be used exclusively as a track-jack the third feature may be omitted; but if intended to be used as a car-jack the three features should be present.

The nature of my improvements will be understood from the following description, reference being had to the accompanying drawings, of which—

Figures 1 and 2 are central vertical sections of my device, showing the lifting mechanism in different positions and showing the mechanism for gradually lowering the lifting-bar in its inactive position; Fig. 3, a view similar to Fig. 1, but showing the mechanism for gradual lowering of the bar in its active position; Fig. 4, a side elevation of the upper portion of the standard, showing the handle for effecting quick release of the lifting-bar and showing the switch for throwing the mechanism for gradual lowering of the bar into and out of active position; Fig. 5, a vertical section of the device taken on the line 5 5 of Fig. 1 and viewed in the direction of the arrow, and Figs. 6, 7, and 8 detail views.

A is the standard within and upon which all the operative parts are mounted; and B the lifting-bar provided with a head *z*, foot *y*, and ratchet-teeth *x*, and sliding vertically in the standard, as usual.

As above intimated, the primary object of my invention is to secure a lifting-jack of great lifting power, and to this end I operate the pawl C indirectly from the hand-lever D through the medium of a compound lever system, partaking in a measure of the nature of toggle-levers. A description of this part of my device is as follows: The hand-lever D is fulcrumed to the standard at *w*. At its inner end it is provided with lateral lugs *v*, one at each side, and upon each of these lugs is pivoted a link E. The links E in turn are provided with lugs *u*, projecting laterally outward from them, and upon these lugs are pivoted links F, pivotally mounted toward their lower ends upon a shaft *t* in the standard. The two links E are jointed together by a cross-pin *s*, which is not in line with the lugs *u*, their relation being shown by full and dotted lines in Fig. 6 and by an end view in Fig. 7.

An examination of the several figures will show that when the link E approximates a horizontal position by downward pressure upon the long arm of the socket-lever D, the lugs *u* and cross-pin *s* are in vertical line with each other, or substantially so, as shown in Fig. 2, and by the raising of the long arm of the socket-lever D and consequent deflection of the links E from the horizontal, the cross-pin *s* is rocked away from the vertical, as indicated by the full and dotted lines in Fig. 1. The pawl C is pivoted at its lower end upon the cross-pin *s*, and accordingly with each stroke of the socket-lever D it is raised, not only to the extent produced by the movement of the link F from the inclined position shown in Figs. 1 and 3 in the vertical position shown in Fig. 2, but also to the extent produced by the movement of the cross-pin *s* from the inclined position with relation to the lugs *u* shown in Figs. 1 and 3, to the vertical position with reference to those lugs shown in Fig. 2. It will thus be seen that the several jointed members constituting the lever system form a compound lever operating ultimately upon the pawl C with greatly-

multiplied force. To maintain the pawl normally in contact with the ratchet-teeth x on the lifting-bar, and also to permit it to be withdrawn from contact with the ratchet and secured there when it is desired to drop the bar suddenly, the following mechanism is provided: From near the upper end of the pawl a pin r projects laterally through the standard, the form of the opening through which it projects being shown at q in Fig. 8, the opening having a depressed offset q'. To the pin r a flat spring p is secured which projects downward and bears against a pin r' projecting inward from the wall of the standard. By raising the socket-lever and pulling upon the projecting portion of the pin r, the pin may be brought into the offset q', which holds the pawl out of contact with the ratchet in opposition to the spring p.

It is of course necessary with this, as with all lifting-jacks, to provide means for retaining the bar in its raised position between the downward strokes of the socket-lever, and for this purpose I provide two contiguous metal blocks G and G′, sliding in guides in the upper part of the standard and provided on their ends which are toward the lifting-bar with teeth x' to engage the ratchet-teeth x. I prefer to provide one of these blocks with teeth of the same height as those of the lifting-bar and the other block with teeth of half that height, in order that the bar may be engaged and held even when only slightly raised from any given position that it may be in. Two springs o, bearing against the standard and the blocks, maintain the latter normally in engagement with the lifting-bar. Obviously, as the bar is raised, the teeth of the ratchet thereon pass the teeth of the blocks G and G′, the latter being forced back sufficiently in opposition to the spring o, and returning instantly when the teeth have cleared each other. To drop the bar suddenly, therefore, it is obvious that the blocks G and G′, as well as the lifting-pawl C, must be withdrawn from contact with the ratchet of the lifting-bar, and for this purpose the following mechanism is provided:

From the outer faces of the blocks G and G′ pins r^2 project. Extending laterally through the upper end of the standard and projecting from each side thereof is a pin n, to which are rigidly secured two arms m in position to engage the pins r^2. Mounted upon the projecting ends of the pin n is a yoke-handle H. This yoke-handle might be rigidly connected to the cross-pin n, but I deem it preferable, in order to prevent accidental operation, to mount it loosely on the cross-pin and provide means for connecting it rigidly at will. These means are as follows: Upon one side of the standard an arm l, rigid with the cross-pin n, projects downward at an angle parallel with the adjacent arm of the yoke. On the outer face of that arm of the yoke is a flat spring p', having upon it a stud k, passing through a hole in the arm and capable, when pressed inward in opposition to the spring, of entering a recess in the fixed arm l. When this construction is employed, and it is desired to lift the yoke-shaped handle for the purpose of retracting the blocks G and G′, the pin k is pressed inward, causing it to engage the arm l, and the handle then raised. It is not necessary to continue the pressure upon the pin k, since after the lifting of the yoke is begun the spring p' is insufficient to overcome the friction of the pin k in its recess. Whether the yoke-handle is permanently rigid upon the cross-pin n or adapted to be temporarily locked to it by means such as those last described the operation of lifting it is to cause the arms m to bear against the pins r^2 and retract the blocks. The pawl C, having been previously withdrawn from engagement with the teeth by means of the pin r, as previously described, it is obvious that the retraction of the blocks G and G′ will cause the lifting-bar to drop suddenly. The yoke-handle H has an additional important function that should be mentioned, which is that it serves, also, as the handle for lifting the jack, and when the pawl is released by the means provided for that purpose the load may be dropped and the jack displaced by a single exertion of force upon the yoke-handle. There are occasions in the use of lifting-jacks, particularly on railroads, when facilities for speedy release of the load and removal of the jack are very desirable, and my construction is peculiarly adapted to fulfill this requirement.

The remaining feature to be described is the mechanism by which the bar may be lowered gradually, notch by notch. To effect this, it is obvious that the blocks G G′ and the pawl C must operate to engage and release the lifting-bar alternately—that is to say, a tooth of the ratchet of the lifting-bar being upon the upper end of the pawl the lifting-bar can be lowered for a certain distance by raising the socket-handle, provided the blocks G G′ are retracted during the time the handle is raised, and if then the blocks are caused to re-engage the ratchet of the lifting-bar, and if by lowering the socket-lever the pawl is caused to pass upward clear of the teeth and engage another one higher than the previous one it is obvious that the lowering operation may be repeated until the lifting-bar reaches its lowest point. The purpose of the mechanism about to be described is to permit this operation to be performed automatically by the mere operation of the hand-lever.

I is a crank-shaft extending through the casing from side to side and projecting therefrom at one side and K is an arm rigid upon the projecting end and which serves as a switch. Upon the outer face of the switch-arm is a flat spring p^2, through which and through the arm a loose stud k' passes, the spring having a contrary action from that of

the spring p' previously described as being upon the yoke-handle H—that is to say, while the tendency of the spring p' was to hold the pin k outward, the tendency of the spring p^2 is to press the pin k' inward. The switch only has two positions for operation, these being shown by the full and dotted lines in Fig. 4, and at these points the wall of the standard is recessed to receive the end of the pin and hold the switch in place, as indicated at i in Fig. 5. Loosely mounted upon the horizontal portion of the crank-shaft I, by means of a sleeve L, is a bell-crank lever L′ L², the arm L′ projecting downward near the side of the standard and the arm L² projecting upward at the center thereof between the blocks G G′, which are recessed to receive it, and resting upon a cross-pin r^3. Depending from the same horizontal portion of the crank-shaft I is a loose arm M, having jointed thereto an extension M′, guided between two pins r^4 and r^5, projecting from the wall of the standard and having also jointed to it a hook-arm M², which rests upon the pin r^5 and the function of which, when the parts are properly set, is to serve as a deflector for the pawl, causing it to clear a tooth of the lifting-bar in its upward movement and engage the bell-crank lever to retract the holding-blocks. Projecting from the upper end of the pawl C is a flange N, provided with a stud r^6, which projects over the hook-arm M². These parts, in conjunction with others that have been described, after the switch has been properly set, automatically operate to lower the bar gradually by the simple working of the socket-lever in the following manner:

Let it be supposed that the parts are in the inactive position shown in Figs. 1 and 2 and that it is desired to lower the bar gradually. The first step necessary is to throw the switch-arm K to the position represented by the full lines in Fig. 4. The effect of this is to rock the crank-shaft I to the position shown in Fig. 3, and this carries the lower arm of the bell-crank lever L′ L² immediately over the stud r^6, upon the flange of the pawl C, and also carries the hook-arm M² toward the lifting-bar and changes its angle from a downward deflection, as shown in Figs. 1 and 2, to an upward deflection, as shown in Fig. 3. If, then, the socket-lever is raised, the stud r^6 engages the inclined end g of the hook-arm M² and passes down into the notch f of the hook, thus carrying the upper end of the pawl C away from the ratchet-teeth of the lifting-bar in opposition to the spring p. During all this period the bar is retained by the blocks G G′. Now by depressing the socket-lever, the pawl C of course rises, but it is still held out of contact with the ratchet of the lifting-bar by means of the hook-arm M², and when the stud r^6 has cleared the hook-arm it strikes against the lower arm L′ of the bell-crank lever and trips it, causing the upper arm L² to bear against the end of the recess provided for it in the blocks G G′ and retract them. The parts are so adjusted that at the instant the blocks are retracted the pawl engages a tooth of the lifting-bar. Then by raising the hand-lever the pawl descends, carrying with it the freed lifting-bar, and at the same time the retaining blocks approach the lifting-bar, owing to the fact that the bell-crank lever gradually returns to its normal position as the pawl descends; but the blocks do not re-engage the ratchet of the lifting-bar until it has been lowered to the extent of one tooth. With the operation of the hand-lever this is repeated indefinitely so long as the parts are left in the active position indicated in Fig. 3. By throwing the switch back to the position indicated by the dotted lines in Fig. 4 the lifting-jack is restored to its normal condition.

In order that my invention might be clearly understood, I have found it necessary to describe the parts thus in detail. It is obvious, however, that various details might be modified by the exercise of ordinary mechanical skill, and I therefore do not desire to be limited to the particular construction of subordinate or auxiliary parts, except in so far as they may be specifically set forth in the claims. It should be observed that the main purpose of employing two retaining-blocks G G′ is to render practicable the differential teeth thereon, hereinbefore referred to. This, however, though desirable, is not indispensible to the device, and where the feature is omitted it is obvious that a single retaining-block may be employed. My claims are therefore intended to include this construction. The subordinate features of the mechanism for effecting gradual lowering of the lifting-bar may also be modified in various ways without departing from my invention, the essential features of the combination being the adjustable deflector for the pawl and the tripping-lever engaged by the pawl in its upward movement to retract and return the retaining device at the proper time. As to the compound-lever mechanism intermediate between the pawl and the hand-lever, it should be understood that the duplication of the members, while desirable, is not a necessary construction under all circumstances.

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

1. In a lifting-jack, the combination with a standard, a ratchet lifting-bar, and a retaining device for holding the lifting-bar in raised position, of means for lifting the bar, comprising a pawl, a hand-lever fulcrumed to the standard, a link E pivotally connected to the hand lever and pawl, and a supporting link, pivotally connected with the standard, and also pivotally connected with the link E on a different center from that which connects the latter with the pawl, substantially as described.

2. In a lifting-jack, the combination with a standard, a ratchet lifting-bar, a spring-actuated pawl normally in engagement with the

lifting-bar, lever-mechanism for raising the lifting-bar through the medium of the pawl, and a retaining-device normally in engagement with the lifting-bar, of means for permitting the dropping of the lifting-bar, consisting of an extension upon the pawl projecting through a slot in the standard, whereby the pawl may be withdrawn from engagement with the lifting-bar, and an accessible lever engaging with the retaining-device to retract it, and terminating in an accessible handle available both for tripping the retaining-device and lifting the jack substantially as described.

3. In combination with a lifting-jack, comprising a standard, a ratchet lifting-bar, a spring-actuated pawl normally in engagement with the lifting-bar, lever mechanism for raising the lifting-bar through the medium of the pawl, and a retaining-device normally in engagement with the lifting-bar, for holding the latter in raised position, mechanism for gradually lowering the lifting-bar by the operation of the hand-lever, consisting of an adjustable deflector, operating to cause the pawl in its upward movement to clear a tooth of the lifting-bar and engage another, and adjustable lever-mechanism, engaged by the pawl in the same upward movement, and operating to retract the retaining device during the upward movement of the pawl, thereby freeing the lifting-bar and permitting it to descend to the extent of one notch each time the pawl is lowered, substantially as described.

4. In a lifting-jack comprising a standard, a ratchet lifting-bar, a spring actuated pawl, normally in engagement with the lifting-bar, lever-mechanism for raising the lifting-bar through the medium of the pawl, and a spring actuated retaining-device, normally in engagement with the lifting-bar, mechanism for gradually lowering the lifting-bar, consisting of a crank-shaft I, mounted in the standard, switch-arm K for rocking the same, bell-crank lever L' L^2, loosely mounted on the crank-shaft and having its upper arm L^2 supported adjacent to the retaining-device to engage and retract the same when tripped, pendent arm M, mounted loosely upon the crank-shaft I, and having jointed to it the guided extension M' and jointed hook-arm M^2, in combination with the flange N and pin 7^6 upon the pawl, substantially as described.

WALTER S. McKINNEY.

In presence of—
M. J. FROST,
J. H. LEE.