(No Model.) 3 Sheets—Sheet 1.

J. BARRETT.

JACK.

No. 527,102. Patented Oct. 9, 1894.

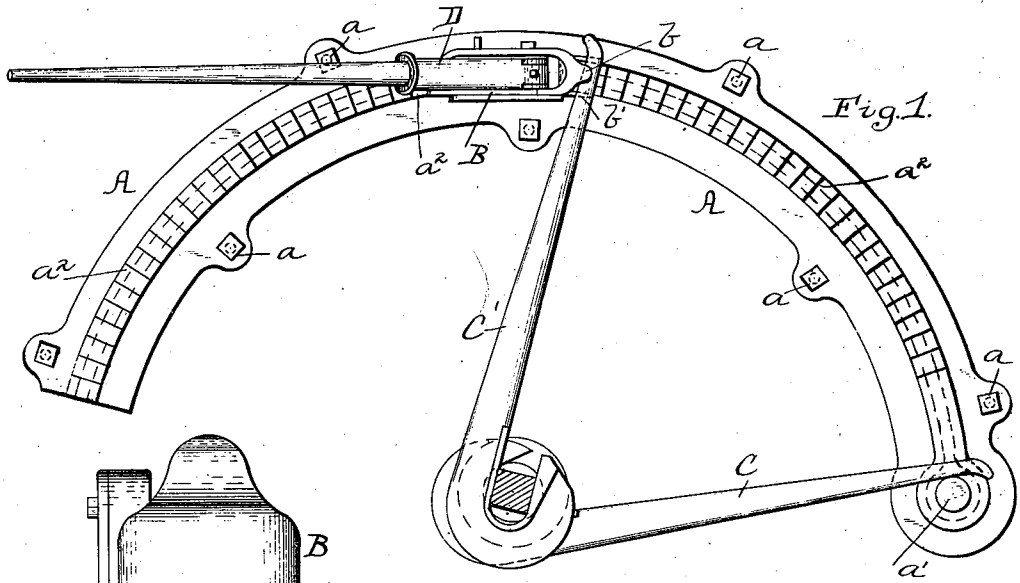

Fig. 1.

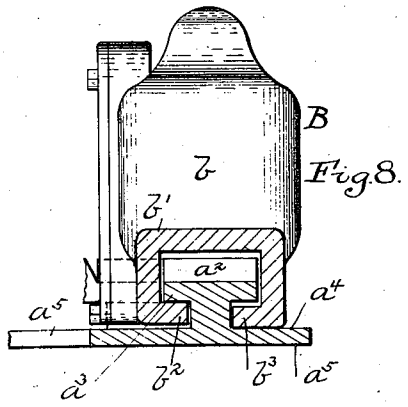

Fig. 8.

Fig. 2.

Witnesses:
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L. N. Kuck.

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(No Model.) 3 Sheets—Sheet 2.

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No. 527,102. Patented Oct. 9, 1894.

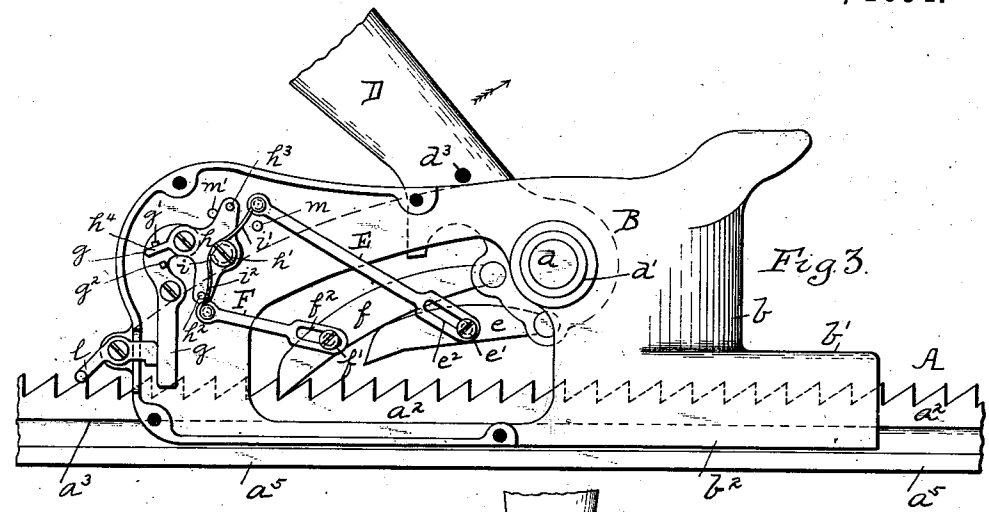

Fig. 3.

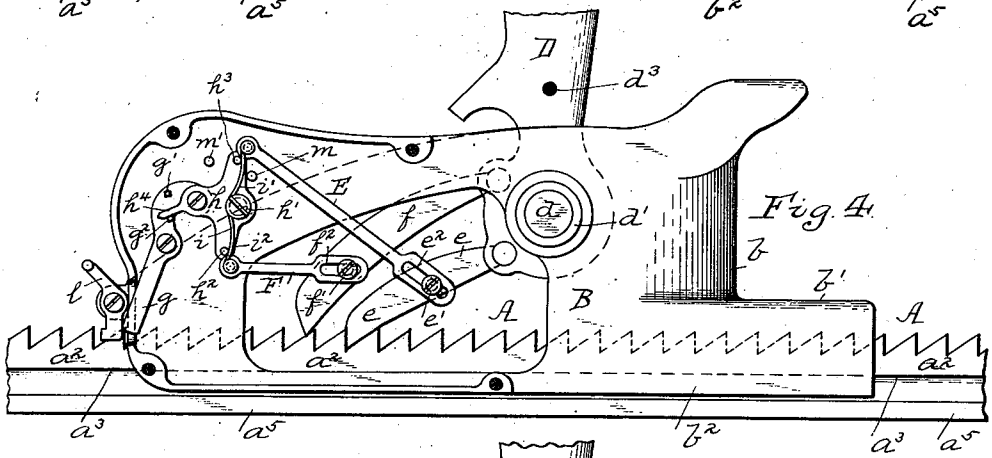

Fig. 4.

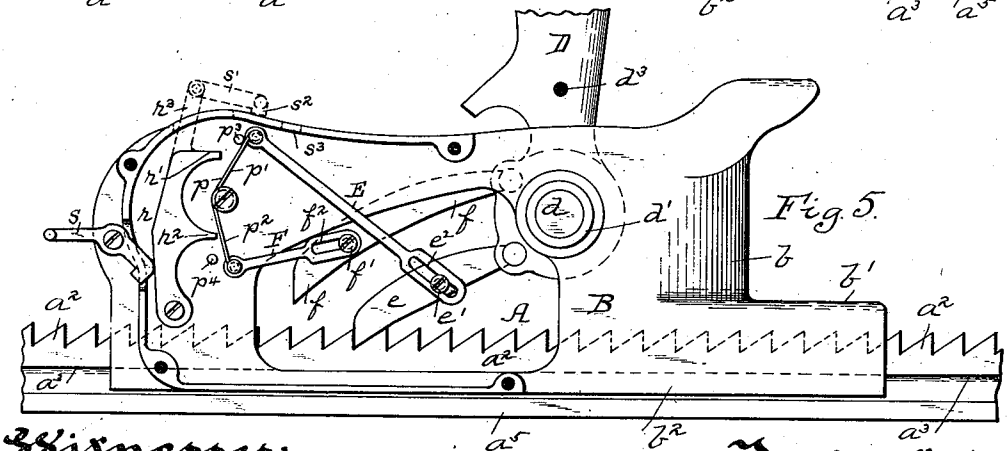

Fig. 5.

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(No Model.) 3 Sheets—Sheet 3.

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No. 527,102. Patented Oct. 9, 1894.

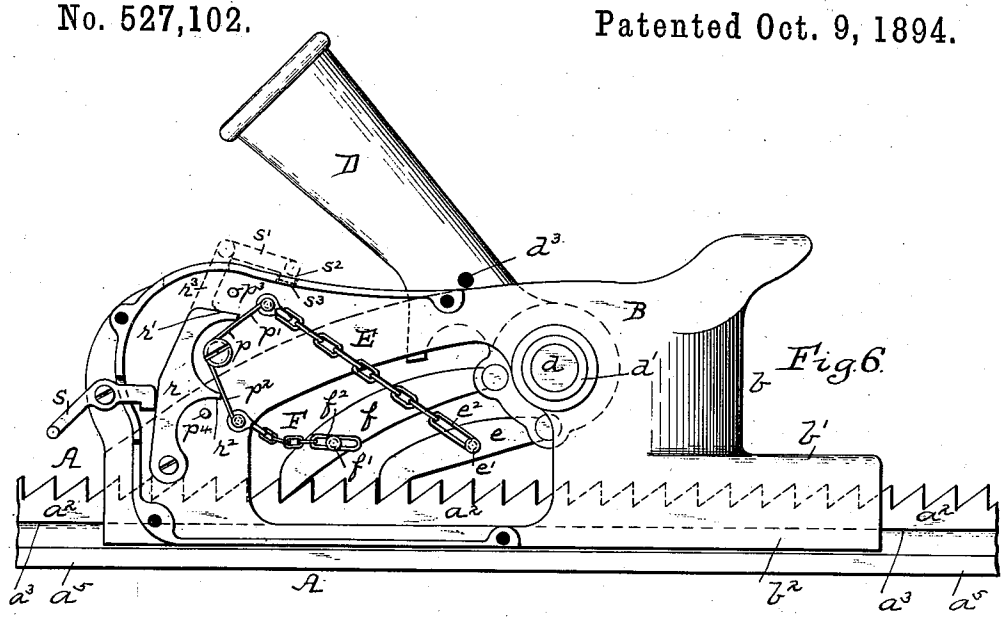

Fig. 6.

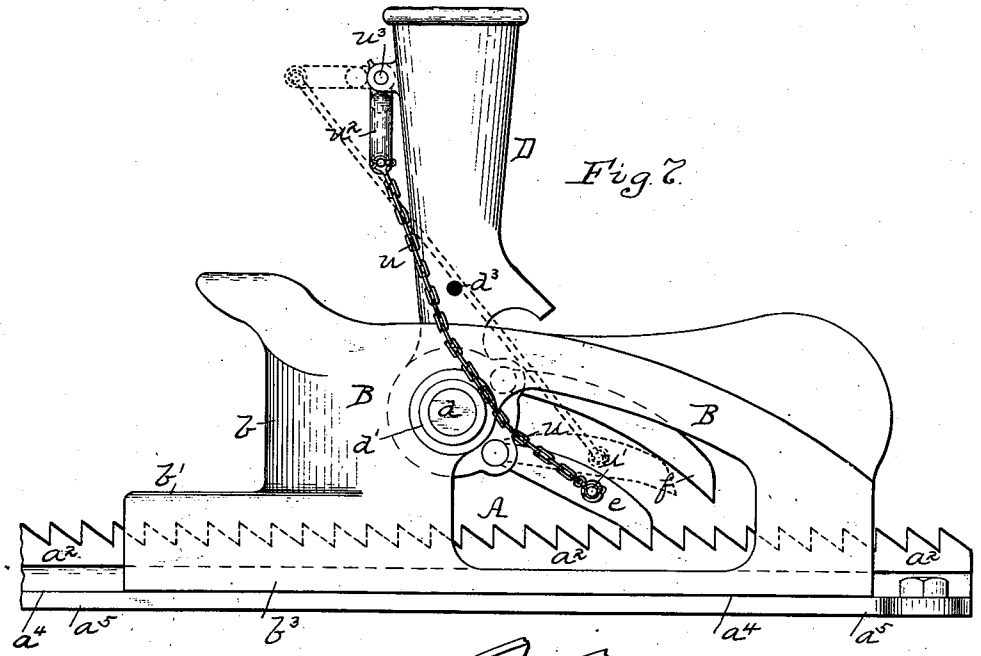

Fig. 7.

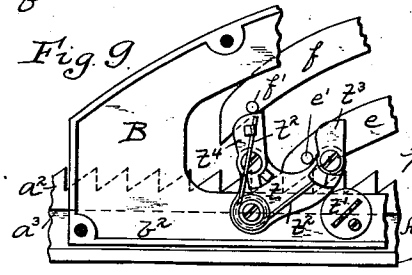

Fig. 9.

Witnesses:
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UNITED STATES PATENT OFFICE.

JOSIAH BARRETT, OF ALLEGHENY, PENNSYLVANIA, ASSIGNOR TO THE DUFF MANUFACTURING COMPANY, OF SAME PLACE.

JACK.

SPECIFICATION forming part of Letters Patent No. 527,102, dated October 9, 1894.

Application filed January 9, 1894. Serial No. 496,228. (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 Jacks; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to jacking mechanism, its object being to improve jacking mechanism in certain particulars, and some parts of the invention being more especially though not exclusively applicable to what may be termed oil well jacks, namely, the tools employed for operating upon the wrenches grasping the oil well tools to turn the same in screwing or unscrewing the joints thereof. The invention is to be understood, however, as applying broadly to any power mechanism in which a step by step movement back and forth is obtained whether the same operates horizontally, vertically, on a curve, or in other direction.

The main object of the invention is to provide mechanism to operate in connection with the pawls of the jacking mechanism so as to provide for a backward movement by connections made directly to the pawls and operating thereon by a drawing as distinguished from a pushing strain, the jacking mechanism heretofore devised by me for this purpose operating by a pushing or forcing action, and therefore requiring a much stronger and heavier construction.

To these ends my invention consists, generally stated, in the combination with a toothed bar of a frame, said bar and frame being movable one with relation to the other, an operating lever mounted in the frame and carrying a pawl engaging with the toothed bar, and a yielding link connection to the pawl adapted to lift the same from the toothed bar, and so operating to provide for the backward movement of the jacking mechanism.

It also consists in connecting the links to the pawls by what may be termed a slotted connection which permits of the movement of the pawls without the movement of the links in the forward movement of the jacking mechanism.

It also consists in combining with the pawl having a rigid finger thereon, of a spring carrying plate adjustable in two positions and held rigid in the backward jacking operation, and a spring carried by the plate and acting through the rigid pawl finger to raise and hold the pawl from the rack.

It also consists in certain other improvements in the method of supporting and applying the power to the yielding links and adjusting them so as to permit of the forward movement or provide for the backward movement of the jacking mechanism; supporting the frame upon the toothed bar when employed for oil well jacks, and sustaining the strain of the tools; and lifting the pawls from engagement with the toothed bar to permit the rapid backward movement of the frame, all of which will be more particularly hereinafter 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 top or plan view of an oil well jack embodying the invention. Fig. 2 is a side view with the face plate removed, illustrating one means of supporting the yielding links, showing the same in one reversing position. Fig. 3 is a like view showing the same in another reversing position. Fig. 4 is a view of the same apparatus showing the same in a position for forward movement. Fig. 5 is a like view showing another form of apparatus for controlling the yielding links, showing the same in the reversing position. Fig. 6 is a view of the apparatus shown in Fig. 5 illustrating the same in position for moving forward. Fig. 7 is a view illustrating mechanism for withdrawing the pawls for quick backward movement of the frame. Fig. 8 is a cross section on the line 8—8 Fig. 2 to illustrate the method of sustaining the carriage of the oil well jack against the strain of the wrench; and Fig. 9 illustrates another form embodying part of my improvements.

Like letters of reference indicate like parts in each of the views.

The invention is illustrated in connection with an oil well jack, the toothed bar A being formed on a curve, and the frame B being mounted to travel on this toothed bar, or rack, as it is more generally termed, the rack being

secured to the floor by means of bolts passing through flanges, as at a, and having a pin a' at one end against which one of the oil well wrenches, such as the wrench C, is placed, while the other wrench C′ fits against the bearing face b and rests on the support b' of the frame or carriage B, so that the jack operates to push against this wrench and cause the screwing up or unscrewing of the joint in the oil well tools, one wrench holding one section and the other the other, and in screwing up the power of the jack being operated to screw the parts firmly together. The particular reversing mechanism hereinafter described when applied to this form of jack is employed to permit the yielding or backward movement of the carriage against the strain of the wrenches after the joint of the oil well tool has been screwed tight, it being necessary to have a slow or yielding movement of the carriage to free the tremendous strain brought upon the wrenches.

The general construction of the rack A and frame B is old, though certain improvements in the same are embodied in the present application, as hereinafter described. For example, as a minor improvement the construction especially illustrated in Fig. 8 is employed. To hold the carriage B upon the rack A the rack is T-shaped in cross section, the teeth being cut in the T-shaped head a^2 thereof in which the teeth are formed, and the carriage or frame B has the inwardly extending flanges b^2 b^3 which fit around such head and hold the carriage upon the frame. It is found, however, that, as these parts necessarily fit loosely, when the carriage is being moved forward against the strain of the moving wrench C′, the pressure of that wrench is so great as to cant the carriage to one side, the result of which is that the pawls mounted in the carriage do not engage with the teeth of the rack for the full width thereof, but only press against one edge, and the full strength of the rack and pawls is therefore not obtained for sustaining the strain brought upon these parts. It is necessary, however, that the carriage shall move freely on the rack, as the parts are made of malleable iron in which there is considerable variation on account of the treatment after casting, and the parts are necessarily subjected to heavy wear, and if they fitted closely any slight blow might drive the flanges of the carriage out of shape so that they would not fit around the rack, while as the tools are usually employed in out-of-the-way places it is difficult to have them repaired, and difficult to employ an old rack with a new frame. For this purpose I construct the flanges of the carriage different from those heretofore employed, and more particularly illustrated in the sectional view Fig. 8. The inner flange b^2 is raised above the outer flange b^3 so that the inner flange b^2 bears against the lower surface a^3 of the head a^2 of the rack, while the lower surface of the flange b^3 bears upon the top surface a^4 of the base or support a^5 of the rack, from which base or support the flanges a extend by which the rack is secured to the derrick floor. When the strain is brought upon the jack its inner flange b^2 will therefore press against the base of the head a^2, while the outer flange b^3 will be forced against the base a^5 of the rack, and so sustain the jack against the twisting strain to which it is subjected by the pressure of the wrench C′, which, as shown in the drawings, does not apply the pressure directly upon the head but at an angle thereto. It is found that by so constructing the flanges the carriage can be held in a proper and vertical position with relation to the toothed rack, so that the pawls engage therewith for the entire width of the rack teeth. When, however, the pressure is removed from the jack, the inner edge thereof can fall away from the head a^2, and as the other parts of the carriage do not fit the rack head closely, the carriage moves loosely upon the rack.

The operative mechanism for operating the jack is preferably constructed as follows: The jack has the operating lever D which is mounted in the carriage B by means of a shaft or fulcrum pin d passing through the lever D and fitting in bearings d' of the carriage. Extending out from this operating lever are the two pawls e f which engage with the rack A, these pawls being pivoted to the lever D on opposite sides of its pin d, so that as the lever swings in one direction it will force one pawl forward and draw the other pawl back, so, in the forward movement of the jack, such as shown in Fig. 4, operating to force the inner pawl e forward while the outer pawl f slides over the teeth; and when the lever D is moved in the opposite direction forcing the pawl f forward and drawing back the pawl e to take another hold. The general construction of the above parts is the same as in former jacks and need not be described, the only part of these parts needing description being the hand or operating lever D, which in the ordinary oil well jack has a hollow seat d^2 to receive the hand bar for applying a heavy power to the jack. It is found that when these jacks are exposed to the weather water is liable to collect in this hollow of the handle and to freeze therein, so leading in some cases to the cracking of the handle, or at least filling the hollow seat d^2 and rendering the jack useless until melted out. To prevent this I form in the base of the hollow seat d^2 one or more drip holes d^3 through which the water may drip, so insuring that the hollow seat will always remain clear. Upon the pawl e is the rigid finger or bolt e' confining the link E thereon, and upon the pawl f is the rigid finger or bolt f' confining the link F thereon. These links E F are what might be termed yielding, so that under certain circumstances, such as in the backward movement of the jack, they will yield or be drawn back with the pawls and so compress the spring or other power con-

trolling the links, so that as soon as the pawl is disengaged from the teeth or free to be drawn therefrom, the power stored in the link will act to raise the pawl from the rack, such action providing for the reversal or backward movement of the jacking mechanism, and the link will then hold the pawl out of engagement with the toothed bar until the pawl is moved forward and carried over the rack to engage with a tooth in front of the one with which it had been engaged. It will thus be seen that a drawing strain is employed for the lifting of the pawls in the reversal of the jack, and therefore that the parts need not be constructed as heavy and strong as where the pawls are lifted or withdrawn by a pushing strain, as shown in prior patents granted to me. The links may either be formed in one piece, as shown in Fig. 2, or of a chain or series of links, as shown in Fig. 6. The method of moving or controlling these yielding links can of course be varied, though the form of apparatus for this purpose shown in Figs. 2, 3 and 4 is preferred by me, and I will now describe the same. Mounted in the jack frame is the lever *g* which carries at its forward end the swinging block *h*, that block being pivoted to the lever *g* and the block supporting the spring *i* which is connected to the links E F, and by which the yielding or resilient action of said links is obtained. The spring *i* is coiled around a center pin *h'* and extends out on each side thereof, having therefor the arms *i' i²* connected to the links E F respectively, and the block *h* has thereon the pins h^2 h^3 which act as stops for the backward movement of the links. The block *h* is mounted upon the lever *g* and has the arm h^4 which extends out between the lugs *g* g^2 on the lever *g*, the block *h* swinging on the lever for the space between said lugs. On the carriage B are two lugs *m m'* which act to confine the block *h*, the block swinging between said lugs as hereinafter described. To hold the lever in the position shown in Figs. 2 and 3 a foot trip or other stop is employed, such as shown at *l*, which is mounted in the carriage and presses against the outer end of the lever *g*, the action of them being that the lever is drawn so that it stands in substantially a vertical position when the jack is used horizontally, in which case the arm h^4 of the block *h* bears against the lug *g'* on the lever *g* and against the lug *m'* on the carriage, and is thus held rigid, the result being that the block *h* is drawn into such position that the tension is thrown upon the spring *i*, which then acts to give the backward movement to the jacking mechanism. That movement is accomplished in practically the following way. The links E F when formed in one piece have what may be termed a sliding connection with the pawls *e f*, the link E having the slot e^2 through which the bolt *e'* passes, the link F having the slot f^2 through which the pin *f'* passes. These sliding connections are preferably made with the pawls, though the same result could be accomplished by their connection to the spring. When the jack is to be moved in a backward direction, and the lever *g* and supporting block *h* are held in the position shown in Figs. 2 and 3, and the operating or hand lever is reciprocated on its coupling pin, and as it moves forward in the direction indicated in Fig. 2 the pawl *e* will engage with the rack, while the pawl *f* will be held above the same, the carriage being thus moved backward as the hand lever is swung forward, and the hand lever in this way moving the pawl *f* forward with it until the spring arm i^2 comes against the stop h^2 of the block *h*, when as the pawl moves forward further its finger *f'* slides in the slot f^2, and the pawl is free to be lowered and to engage with the rack and support the strain. While this operation has been going on the backward movement of the pawl *e* has drawn with it the yielding link E and so compressed the arm *i'* of the spring, and this continues until the pawl *f* takes the load and leaves the pawl *e* free to be lifted from the rack, when the yielding link E raises the pawl from the rack, bringing the parts to the position shown in Fig. 3. The parts are now in position for the backward movement of the carriage when the pawl *f* is sustaining the strain, and the hand lever D is swung in the direction shown by the arrow, and the link E will hold the pawl *e* above the rack until that pawl is moved forward to such a distance that the spring *i* strikes against the stop h^3, when the pawl will be permitted to drop into engagement with the rack and sustain the pressure. Meanwhile the pawl *f* has been drawn backward, carrying with it the link F, compressing the spring arm i^2, and as soon as the pawl *e* takes the load the yielding link F will raise the pawl *f* from the rack. It will thus be seen that the pawls are lifted by a drawing strain, which is much more efficient for the purpose, because, first, a more durable and a lighter machine may be obtained, the strain for drawing being much less than the strain for pushing as there is a straight pull on the link and the only part required to yield to or sustain the strain is the spring; and, second, by supporting the yielding links forward of the pawls the drawing strain can lift the pawls to a considerable height above the rack bar with but a short movement of the links, it being understood that as soon as the pawls are freed from the rack a strain partially in the direction of their length is applied, which, on the principle of the straightening out of an angle, gives a considerable upward movement in a short longitudinal movement, it being found that in this way the pawls can be held at such distance above the rack bar that there is no liability of their catching thereon in their movement above the rack.

In the forward movement of the jack it is only necessary to leave the pawls free to perform their usual functions, and for that pur-

pose, as shown in Fig. 4, the operator simply raises the outer end of the foot trip l, leaving the upper end of the lever g and the block carried thereon free to swing forward, and as a result the block h swings forward until it strikes the lug m and it then swings upon the lever g, carrying the upper end of that lever forward with it until the arm h^4 strikes against the lug g^2 on the lever, the action being to move the block forward to such an extent as to free the links E F from the strain of the springs and to hold the block h in substantially the same position with relation to the links. When the parts assume this position as the hand lever d is swung back and forward the pawls E F perform their ordinary function, the one pawl pushing on the rack while the other pawl is sliding back over the surface thereof to take a fresh hold, and the forward movement between the rack and frame being thus obtained; and during this movement the fingers e' f' of said pawls slide in the slots e^2 f^2 of the links, leaving the pawls free to their regular movement and to perform their regular function of lifting or pushing, or the chains hang loosely, permitting a like movement.

In Figs. 5 and 6 the jacking mechanism is shown where the spring is mounted directly upon the carriage B and is left free when the jack is operated in a backward direction, such as where it is yielding against the load, and is compressed when the jack is moving forward so as to lift or force against the load, the parts employed being practically as follows:—The pawls and links are the same. The spring p has the arms p' p^2 connected to the links E F respectively, the backward movement of the springs being confined by the lugs p^3 p^4 on the carriage; and as a result the links operate in the same manner as above described, in the backward movement of the jack, being left free to so operate, and the springs being confined by the lugs p^3 p^4 on the carriage. In line with the springs is the lever having the arms r' r^2 extending out therefrom in line with the spring arms p' p^2, and when the lever r is forced forward it presses on the spring arms p' p^2 and holds the spring p against its regular action (as shown in Fig. 6) so that the pawls will be free to lift or push against the load, their fingers e' f' sliding in the slots e^2 f^2 of the links E F, as above described. This lever r may be controlled in any suitable way, such, for example, as by the trip s, which acts when pressed down to force forward the lever, or, as shown in dotted lines, by an arm r^3 extending up from the lever, to which is pivoted a latch s' having a lug s^2 at the forward end thereof, the lug being adapted to fit in a seat s^3 on the top of the carriage. To free the lever r it would then be necessary either to move the foot trip s or to lift the latch s', either of which can be done by the foot of the operator.

As involving the principle of the spring-carrying plate adjustable in two different positions for the forward or advance movement of the jack and the backward movement thereof, I have illustrated in Fig. 9 another form of the invention in which the springs carried by the plate act to hold the pawls from the rack by a pushing strain, some of the claims hereinafter made being broad enough to cover either the pushing or the pulling action of the springs. The plato or block t is shown as mounted on the jack frame and as moved into the different positions by the eccentric or trip t', which acts positively in one direction, permitting it to drop away from the pawls when not required to cause the backward movement of the jack, but which, if desired, could move the plate positively in both directions. On the said plate is mounted the spring t^2 which is shown as connected with the lugs operating on both pawls, this being the preferable construction.

To obtain a strong bearing surface on the pawls, as well as to simplify the construction and provide for the use of a single spring on the plate t, I pivot on the block the lugs or fingers t^3 t^4 which contact with the rigid fingers e' f', respectively, while the spring t^2 holds the lugs t^3 t^4 with a yielding pressure against the fingers of the pawls, the plate t itself being held rigidly in place but the lugs t^3 t^4 yielding as the respective pawls are drawn backwardly, and when the pawls are free from the load lifting and holding them from the rack so as to obtain the backward movement. By the turning of the eccentric the plate t is brought to its other or inoperative position, leaving the pawls free to move in raising or forcing the load. It will be seen that this construction involves the idea of the spring-carrying plate adjustable in two positions and rigid when in its operative position and the spring connection from it to the pawls.

It is very desirable to have a means for quickly and easily raising the pawls from engagement with the toothed bar, such, for example, as in sliding the carriage on the rack, in oil well racks, and for this purpose I have provided the chain connection shown in Fig. 7, a chain or flexible wire u being connected to the lower pawl e, as at u', and connected at its other end to the lever u^2 pivoted at u^3 to the hand lever D. This lever u^2 is an ordinary stirrup handle which can be grasped to lift or pull the frame or carriage, and it hangs down in the position shown in full lines in Fig. 7, so leaving the chain loose so that it does not in any way interfere with the operation of the jack, but when the operator lifts the stirrup u^2 he draws the chain taut, and the pawl e strikes against the pawl f, and the chain thus acts to lift both the pawls e and f out of the rack, so that the carriage B may be slid along the rack without its pawls engaging with the teeth thereof.

This jacking mechanism has been found to be very efficient and to have the advantages over the old forms of jacking mechanism above indicated of strength and lightness, and especially of lifting the pawls to such distance

above the rack as to insure their being carried along without contact therewith until they are to be lowered into the same, and accomplishing this with but a slight movement of the spring, as the actual longitudinal movement of the pawls with relation to the rack is what gives the necessary movement, the backward or forward movements of the pawls compressing the springs to give the necessary resiliency thereto to lift the pawls from the rack. It is to be understood that the mechanism can be applied to jacks having only one operating pawl and perform substantially the same function therewith.

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

1. The combination of a toothed bar, a frame, an operating lever mounted in the frame, a pawl carried by the lever, and a yielding link connected to the pawl and so supported by the frame as to be compressed on the backward movement of the pawl, and to draw the pawl from the toothed bar when freed therefrom, substantially as set forth.

2. The combination of a toothed bar, a frame, an operating lever mounted in the frame, a pawl carried by the lever and engaging with the toothed bar, a yielding link connected to the pawl and connected at the opposite end to a spring and acting to draw the pawl from the toothed bar, substantially as set forth.

3. The combination of a toothed bar, a frame, an operating lever mounted in the frame, two pawls carried by the lever and engaging with the toothed bar, a spring, and links connecting the two free ends of the spring to the pawls and acting to draw the pawls from the toothed bar, substantially as set forth.

4. The combination of a toothed bar, a frame, an operating lever mounted in the frame, a pawl carried by the lever and engaging with the toothed bar, and a yielding link having a slot at the end fitting over a finger on the pawl and so mounted as to draw it from the toothed bar, substantially as set forth.

5. The combination of a toothed bar, a frame, an operating lever mounted in the frame, a pawl carried by the lever and engaging with a toothed bar and having a rigid finger thereon, a spring carrying block movable to and from the pawl and held rigid in its operative position, and a spring carried by the block and acting through the rigid pawl finger to draw the pawl from the rack, substantially as set forth.

6. The combination of a toothed bar, a frame, an operating lever mounted in the frame, a pawl carried by the lever and engaging with the toothed bar, an adjustable block and a yielding connection between the adjustable block and the pawl, acting to withdraw the pawl from the toothed bar, substantially as set forth.

7. The combination of a toothed bar, a frame, an operating lever, a pawl carried by the lever and engaging with the toothed bar, a spring, a link connected to the spring and the pawl and acting to withdraw the pawl from the toothed bar, and a lever controlling the position of the spring so as to provide for the automatic forward and backward movement of the mechanism, substantially as set forth.

8. The combination of a toothed bar, a frame, an operating lever mounted in the frame, two pawls carried by the lever engaging with a toothed bar, a spring having two free ends, links connected to said free ends and to the pawls, and a lever controlling the position of the free ends of the springs so as to provide for the forward and backward movement of the mechanism, substantially as set forth.

9. The combination of a toothed bar, a frame, an operating lever mounted in the frame, a pawl carried by the lever engaging with the toothed bar, a spring having its backward movement controlled by a stop, and a link connecting said spring and the pawl, substantially as set forth.

10. The combination of a toothed bar, a frame, an operating lever mounted in the frame, a pawl carried by the lever and engaging with the toothed bar, a spring having its backward movement controlled by a stop, a link connecting said spring and the pawl, and a lever controlling the positions of the spring so as to provide for the forward or backward movement of the mechanism, substantially as set forth.

11. The combination of a toothed bar, a frame, an operating lever mounted in the frame, a pawl carried by the lever and having a rigid finger thereon, a movable block carrying a spring and a stop for controlling the movement of the spring, said spring carried by the block acting through the rigid finger to raise and hold the pawl from the rack, substantially as set forth.

12. The combination of a toothed bar, a frame, an operating lever, a pawl carried by the lever, a movable block carrying a spring and having a stop thereon for controlling the movement of the spring, and a link connecting the spring and the pawl, substantially as set forth.

13. The combination of a toothed bar, a frame, an operating lever carrying the pawl, a lever having a block mounted thereon carrying a spring, and a link connecting said spring to the pawl, substantially as set forth.

14. The combination of a toothed bar, a frame, an operating lever, a pawl carried by the lever, a lever having a block mounted thereon and having a stop for controlling the movement of the block, a stop on the frame with which said block contacts, and a link connecting the spring on the block with the pawl, substantially as set forth.

15. The combination of a toothed bar, a frame, a lever mounted therein and carrying

a pawl, a spring and a link connecting the spring to the pawl, a lever controlling the position of the spring, and a trip controlling the position of the lever, substantially as set forth.

16. The combination of a toothed bar, a frame, a lever mounted therein carrying a pawl, a lever carrying a block having a spring mounted thereon, a link connecting said spring with the pawl, and stops on the lever carrying the block and on the jack frame for controlling the position of the block, substantially as set forth.

17. The combination of a toothed bar, a frame, an operating lever mounted therein and carrying a pawl, the lever g having the stops g' g^2, the block h mounted on the lever and having a tongue engaging with said stops, the stops m m' on the frame, a spring on the block, and a link connecting said spring with the pawl, substantially as set forth.

18. The combination of a rack having a base plate, and a T-shaped head provided with teeth, and a frame fitting over the T-shaped head and having flanges extending under the same, one flange being adapted to bear upon the under surface of the head and the other flange being adapted to bear upon the upper face of the base plate, substantially as set forth.

19. The combination of a horizontal stationary toothed bar, a frame sliding thereon, an operating lever mounted in the frame and carrying a pawl engaging with the toothed bar, a handle pivoted on the operating lever, and a flexible connection between the handle and pawl, the handle being so pivoted to the operating lever as to lie against the same and leave the flexible connection slack, but when raised from the operating lever to draw the pawl from the toothed bar through such flexible connection, substantially as set forth.

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

JOSIAH BARRETT.

Witnesses:
J. N. COOKE,
ROBT. D. TOTTEN.