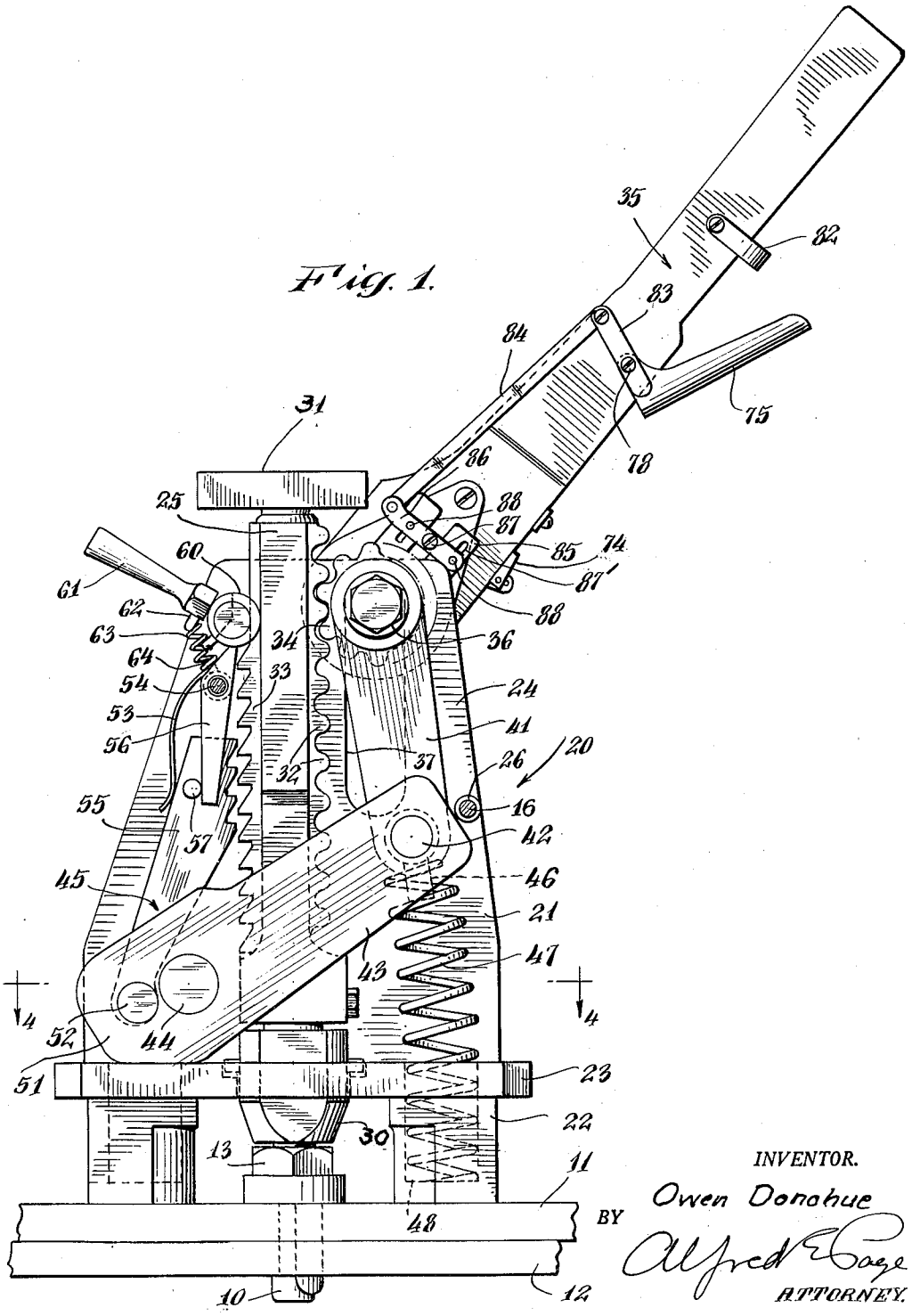
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Filed March 5, 1949 3 Sheets-Sheet 1

Fig. 1.



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Filed March 5, 1949 3 Sheets-Sheet 2

Fig. 5.

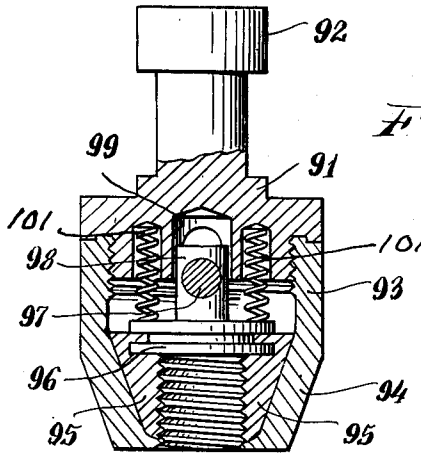
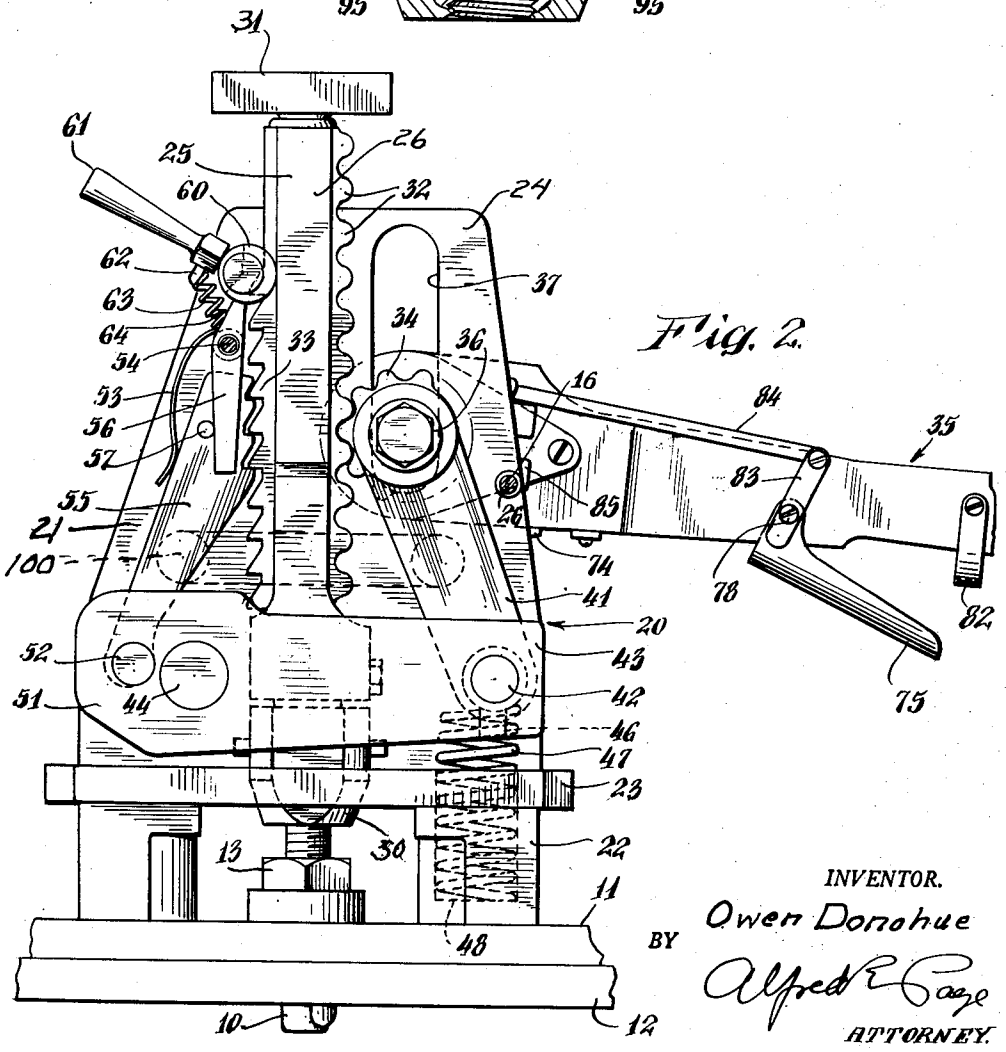


Fig. 2.



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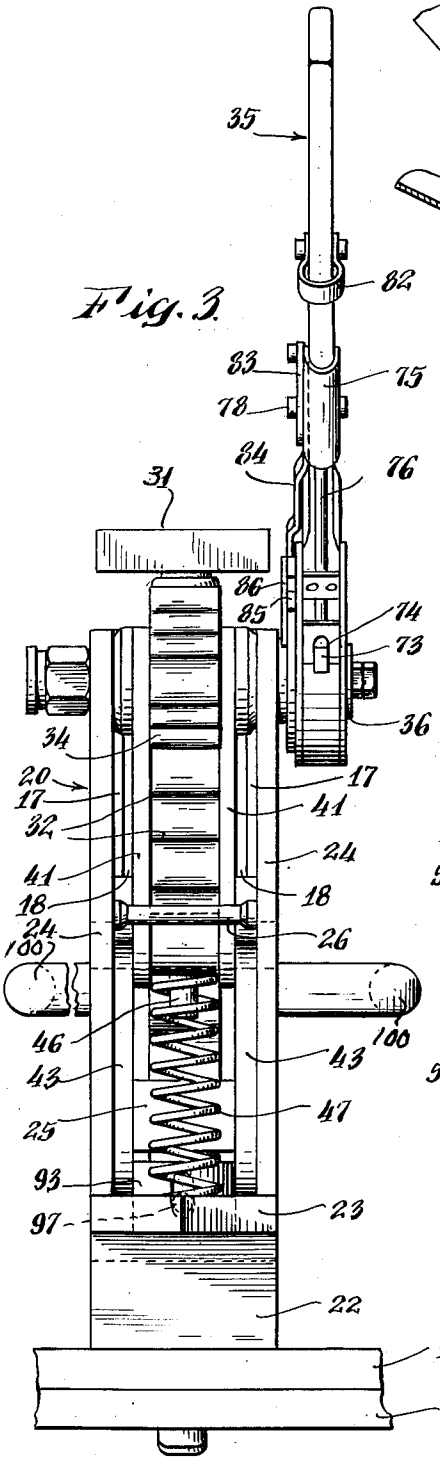


Fig. 3.

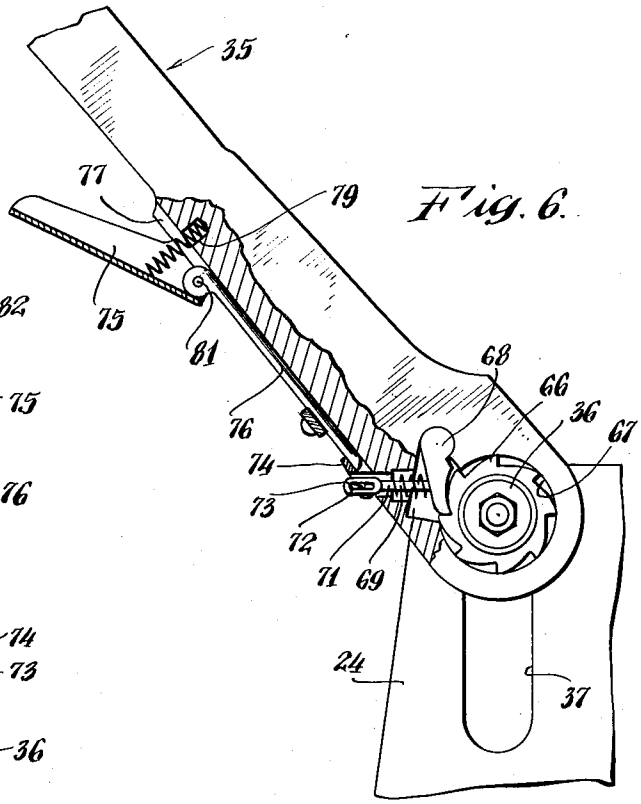


Fig. 6.

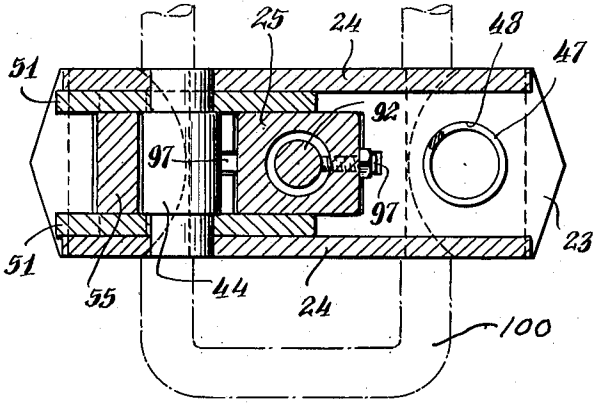


Fig. 4.

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UNITED STATES PATENT OFFICE

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Application March 5, 1949, Serial No. 79,769

15 Claims. (Cl. 254—95)

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This invention relates to jacks and, more particularly, to a jack including a novel high leverage exerting mechanical movement whereby the jack is particularly adapted for pulling up and straightening heavy plates in shipbuilding or repair work, for wrecking operations, for railroad equipment lifting, for boiler making, for pulling posts, for gear pulling, and for many other operations requiring the exertion of great force within fairly limited confines.

In many operations, particularly shipbuilding and repair and boiler making, plate straightening and pulling of a pair of plates into surface contact are recurrent operations. These operations are effected by the use of straightening or pull-up bolts, which are engaged through the plate or plates and then pulled up by a suitable jack or like mechanism to straighten or flatten the plates. The bolts carry nuts which are then tightened to hold the plates "set" until they are riveted or welded in place.

Also, in such operations as wrecking, repair of structural members, and the like, it is necessary to exert great force to separate a pair of riveted or welded members, or to straighten a bent or otherwise damaged structural member. These operations, too, require the exercise of great force on a relatively limited area.

To easily, cheaply and effectively accomplish such operations as the foregoing, the jack of the present invention includes a base arranged to bear against a support and a reciprocable slide which may have an interchangeable chuck at one end, for pulling operations, and a head at the other end for pushing or lifting operations. In the case of pull-up or straightening operations, the chuck is engaged with the pull-up bolt extending through the member to be pulled up or straightened, a nut is screwed onto the bolt, and the end of the latter is then engaged in the quick release chuck on the slide. The jack includes novel mechanism for first rapidly elevating the slide to take up the slack between the jack and its load and then exerting great force on the slide to pull the bolt up tight. The nut is then tightened on the bolt and a quick release mechanism on the jack is operated to release the bolt, allowing the jack to be carried to the next "pull-up" location.

More specifically, the slide has rack teeth along one edge and ratchet teeth along an opposite edge. A vertically movable pinion meshes with the rack teeth and an operating handle is provided to roll the pinion along the slide to effect relative movement of the slide and

2

pinion. A spring biases the pinion upwardly so that, during the first movement, the pinion remains in its upward position and the slide is drawn up or moved outwardly to take up slack. As the resistance increases, the pinion rolls down the slide and, through a lever arrangement of high mechanical advantage, moves a pawl engaged with the ratchet teeth to force the slide outwardly. Automatically operating cam means prevent retrogression of the slide while permitting the outward movement thereof. The cam release means also releases the pawl so that the slide can be quickly released when a "pull-up" is completed.

In the case of lifting or pushing operations, the base of the jack is placed on one member or a supporting surface and the slide is rapidly extended to engage its outer head with the member to be pushed or lifted. As the jack mechanism is further operated, the high leverage mechanical movement exerts great pressure on the slide to force the latter outwardly with a high degree of force. A novel use of the jack is in pulling a plug or stopper into a hole in a ship's hull for salvage or rescue operations.

With the foregoing in mind, it is an object of the present invention to provide a mechanical jack having rapid slack take-up means capable of exerting great force when resistance to jack movement increases.

Another object of the invention is to provide such a jack having quick release means.

A further object of the invention is to provide such a jack particularly adapted for use in "pulling up" or straightening structural members, or for lifting or forcing operations.

Yet another object is to provide such a jack including novel quick release means for a detachable operating handle.

These, and other objects, advantages and novel features of the invention will be apparent from the following description and the accompanying drawings. In the drawings:

Fig. 1 is a side elevation view of the jack in the retracted position arranged to "pull up" a plate holding bolt, a side plate being removed to better illustrate the jack mechanism.

Fig. 2 is a view similar to Fig. 1 showing the jack in a partially extended position.

Fig. 3 is an end elevation view of the jack looking from the right of Figs. 1 and 2.

Fig. 4 is a horizontal sectional view on the line 4—4 of Fig. 1.

Fig. 5 is a vertical sectional view of a chuck arranged to grip the plate holding bolt.

Fig. 6 is a partial sectional view of the jack operating handle, showing the pawl mechanism.

While the jack is universally applicable to any operation requiring the exertion of concentrated force, it will, for purposes of specific illustration only, be more particularly described as applied to a plate pull-up operation. In such typical operation, the interchangeable chuck on the jack slide is particularly useful with the plate holding bolt of my copending application Serial No. 79,770, filed March 5, 1949, for "Plate Holding Bolt." Such bolt, which is indicated as a whole at 10 in Figs. 1 and 2, may be used, for example, to hold a pair of plates 11, 12 in tight surface engagement, being provided with a nut 13 for tightening against plate 11 after bolt 10 has been "pulled up" by jack 20 to clamp the plates together.

The jack includes a casing generally indicated at 21 supported on legs 22, 22 and reciprocably mounting a slider 25 having an interchangeable chuck 30 on its lower end arranged to grip bolt 10. Casing 21 contains novel, high leverage mechanism operable by a handle 35 to force slider 25 outwardly to effect a clamping of plates 11, 12 by bolt 10.

More specifically, casing 21 includes a base 23 and side walls 24, 24 held in spaced parallelism by studs 16 engaged in spacers 26. Side walls 24, 24 have transversely aligned, facing vertical grooves or tracks formed by transversely spaced ribs or rails 17 (Fig. 3) and slidably receiving elongated ribs 18 on opposite sides of slider 25. During operation of the jack, slider 25 is reciprocated relative to base 23 and walls 24, being guided and held in vertical alignment by the ribs 18 engaged in the grooves or slots 17 in walls 24.

The slider 25 has a lifting or pushing head 31 at its outer end, and the longitudinal edge adjacent handle 35 is formed with rack teeth 32. The opposite longitudinal edge has inwardly facing ratchet teeth 33. Rack teeth 32 mesh with a pinion 34 keyed to a shaft 36 extending laterally through aligned longitudinal slots 37, 37 in walls 24. Handle 35 is mounted on one end of shaft 36 in a manner described more fully hereinafter.

A pair of links 41 extend from shaft 36 and, at their inner ends, carry a pin 42 pivotally connecting links 41 to the longer arms 43 of a pair of levers 45. These levers are pivoted on a pin 44 extending between walls 24. As pinion 34 is rotated clockwise, it will roll inwardly along rack teeth 32, carrying links 41 inwardly to swing levers 45 clockwise. Pin 42 carries a radially projecting pin 46 forming a seat for the outer end of a heavy coil spring 47. The inner end of spring 47 is seated in a recess 48 in a leg 22. Coil spring 47 biases pin 42, and thus pinion 34, outwardly.

The shorter arms 51 of levers 43 carry a pin 52 closely adjacent pivot pin 44, and an outwardly extending pawl 55 is mounted on pin 52 and arranged to engage ratchet teeth 33 on slide 25. Pawl 55 is held in engagement with teeth 33 by a leaf spring 53 secured to a pin 54 extending between walls 24 above pawl 55, and this pin acts as a pivot for a dog 56 whose inner end extends inwardly of a pin 57 carried by pawl 55.

Outwardly of pin 54, a cam 60 is rotatably mounted between walls 24 and provided with an operating handle 61 and a projection 62 engaged in a coil spring 63 which also is engaged with a projection 64 on pin 54. Cam 60 frictionally engages slide 25 and is designed that, as the slide moves inwardly, cam 60 is rotated clockwise to wedge more tightly against the slide and resist such inward movement. However, handle 61 may be operated to release cam 60 to permit inward movement of slide 25. When the handle 61 is swung counterclockwise (Figs. 1 and 2), by a sharp blow of the hand, for example, the cam 60 is released and spring 63 is compressed to bias projection 64 and pin 54 clockwise. This swings dog 56 to engage pin 57 and kick pawl 55 out of engagement with teeth 33.

The manner in which handle 35 is attached to pinion shaft 36 is as follows. Referring to Figs. 1, 3 and 6, shaft 36 has a ratchet wheel 66 normally clutched thereto and embraced by a bearing aperture 67 in the inner end of handle 35 (Fig. 6). A pawl 68 on handle 35 is biased by a spring 69 to engage the ratchet wheel teeth, and carries a rod 71 having a slot 72 in its outer end. Slot 72 receives a pin 73 in a member 74 on the end of a bar 76 slidable in a groove 77 along an edge of handle 35. A U-shape lever 75 is pivoted at 78 on handle 35 and biased outwardly by a spring 79, the inner end of lever 75 being connected by a pin 81 to the outer end of bar 76. A lever retaining loop 82 on handle 35 may be used to lock lever 75 against the handle. When lever 75 is pressed against the handle, bar 76 is drawn outwardly to pull pawl 68 out of engagement with ratchet wheel 66.

The clutch connection for ratchet 66 is also operated by lever 75. This includes an extension 83 on lever 75 connected by a link 84 to an oscillatable link 86 pivoted at 87 on handle 35. A pair of curved clutch jaws 85, 85 are pivotally mounted on handle 35 and arranged to be swung toward and away from the axis of shaft 36. These jaws have slots 87' in their outer ends receiving pins 88 on link 86. Jaws 85 are tapered or wedge-shaped in transverse section, with their radially inner edges being thinner than the outer edges. As the jaws 85 are moved toward each other, their wedge surfaces engage frictional clutch members (not shown). Such inward movement is effected as lever 75 is moved inwardly to swing link 86. This disengages ratchet wheel 66 from shaft 36 so that pinion 34 is free to roll up slide 25 under the influence of spring 47.

Chuck 30 is shown more in detail in Fig. 5 as comprising an upper member 91 having a T-head 92 receivable in a suitable slot in the lower end of slide 25. A lower member 93 is threaded onto member 91, and has a frusto-conical section 94. Section 94 embraces chuck jaws 95, 95 which are mounted on a member 96 carrying pins 97 projecting through slots in member 93 and having a head 98 engaged in a guide recess 99 in member 91. Springs 101 bias member 96 downwardly so that jaws 95 are forced toward each other by the walls of section 94 to grip a bolt in the chuck. Chuck 30 is interchangeably mounted in slide 25 so that smaller or larger or different types of chucks may be readily used with the jack.

The described jack operates in the following manner in a pull-up operation. Cam 60 is released by being swung counter-clockwise by a sharp inward blow of inward pressure against handle 61, releasing pawl 55 as previously de-

scribed, and lever 75 is swung inwardly to release handle 35 and ratchet wheel 34 from shaft 36. Slide 25 is then moved inwardly to the position of Fig. 1 and engaged with bolt 10, which has previously been inserted through plates 11, 12 and has nut 13 screwed thereon. As the outer end of the bolt enters chuck 30, jaws 95 are moved inwardly and spread apart to receive bolt 10.

Lever 75 is released, clutching ratchet 66 to shaft 36 and engaging pawl 68 with the ratchet. As handle 35 is reciprocated, pinion 34 moves in an inward direction along slide 25. Actually, at the beginning of the jack operation, slide 25 moves outwardly so that the pinion remains stationary. As slide 25 meets increased resistance to outward movement, due to the head of bolt 10 bearing against the under plate, pinion 34 moves inwardly. This swings levers 45 clockwise, causing pawl 55 to force the slide outwardly and pull bolt 10 to clamp the plates against jack legs 22. Such movement continues until the plates are in unyielding surface engagement, at which time nut 13 is tightened.

The bolt is then released by first swinging lever 75 to declutch ratchet 66 allowing spring 47 to move pinion 34 outwardly. Cam lever 61 is then swung inwardly, as described, to release cam 60 and disengage pawl 55 through the medium of dog 56. Slide 25 may then be pushed in to release clutch 30 from bolt 10.

It will be noted that two actions are involved in moving slide 30, both having pronounced force exerting effects. As pinion 34 is rotated, spring 47 tends to prevent its inward movement, thereby effecting an outward movement of slide 25. Then, as the resistance increases, levers 45 are swung clockwise (Figs. 1 and 2) to force slide 25 outwardly through the medium of pawl 55. The tremendous mechanical advantage due to the ratio of long arms 43 of the levers to short arms 51 thereof enables great force to be exerted on the slide.

While the jack has been described as applied to a pull-up operation, solely by way of specific example, it should be emphasized that this operation is exemplary only, and the jack may be used in forcing or lifting operations by engaging base 23 on one member or surface and moving slide 25 to brace head 31 against the other member. In lifting operations, the jack is particularly useful in railroad work, where small clearances are available and concentrated force is required. The jack may be easily transported by means of handles 100, 100 on walls 24.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles thereof, it should be understood that the invention may be otherwise embodied without departing from such principles.

What is claimed is:

1. In a jack, in combination, a base; a force exerting member reciprocably mounted on said base for movement inwardly and outwardly relative to said base; movable means engageable with said member to force the latter outwardly relative to said base; an operating element for said member directly engaged with said member and operable thereon to move said member outwardly; force transfer means interconnecting said movable means and said element for operation of said movable means by bodily inward displacement of said element relative to said base and substantially parallel to the direction of movement of said member; and means biasing said element outwardly relative to said base whereby, during actuation of said element to move said member outwardly relative to said base to take up slack between the jack and the load on the jack, said element will remain in the extended position outwardly relative to said base and move said member outwardly relative to said base; said element, when said member encounters resistance, moving inwardly relative to said base and in a direction parallel to the direction of movement of said member to operate said movable means to force said member outwardly relative to said base.

2. In a jack, in combination, a base; a force exerting member reciprocably mounted on said base for movement inwardly and outwardly relative to said base; movable means engageable with said member to force the latter outwardly relative to said base; an operating element for said member directly engaged with said member and operable thereon to move said member outwardly; force transfer means interconnecting said movable means and said element for operation of said movable means by bodily inward displacement of said element relative to said base and substantially parallel to the direction of movement of said member; means biasing said element outwardly relative to said base whereby, during actuation of said element to move said member outwardly relative to said base to take up slack between the jack and the load on the jack, said element will remain in the extended position outwardly relative to said base, and move said member outwardly relative to said base; said element, when said member encounters resistance, moving inwardly relative to said base and in a direction parallel to the direction of movement of said member to operate said movable means to force said member outwardly relative to said base; and releasable means automatically restraining retrogression of said member inwardly toward said base while providing movement of said member outwardly relative to said base.

3. In a jack, in combination, a load bearing frame; a force exerting slide reciprocably mounted in said frame for movement inwardly and outwardly relative to said frame, and having gear teeth extending therealong; a pinion engaged with said teeth and mounted in said frame for bodily movement in a direction parallel the direction of movement of said slide; mechanism for rotating said pinion; biasing means urging said pinion outwardly relative to said frame; and movable means, including lever means mounted on said frame and operatively connected to said pinion, engageable with said slide and operable by bodily movement of said pinion inwardly relative to said frame to force said slide outwardly relative to said frame; said pinion, during initial rotation being maintained outwardly relative to said frame by said biasing means and moving said slide outwardly relative to said frame until the reaction of said slide on said pinion exceeds the force of said biasing means, and further rotation of said pinion thereupon effecting bodily movement of said pinion inwardly relative to said frame to operate said movable means to force said slide outwardly relative to said frame.

4. In a jack, in combination, a load bearing frame; a force exerting slide reciprocably mounted in said frame for movement inwardly and outwardly relative to said frame, and having gear teeth extending therealong; a pinion engaged with said teeth and mounted in said frame for bodily movement in a direction parallel the di-

rection of movement of said slide; mechanism including a handle and a ratchet device for rotating said pinion; biasing means urging said pinion outwardly relative to said frame; and movable means operatively connected to said frame and said pinion engageable with said slide and operable by bodily movement of said pinion inwardly relative to said frame to force said slide outwardly relative to said frame; said pinion, during initial rotation being maintained outwardly relative to said frame by said biasing means and moving said slide outwardly relative to said frame until the reaction of said slide on said pinion exceeds the force of said biasing means, and further rotation of said pinion thereupon effecting bodily movement of said pinion inwardly relative to said frame to operate said movable means to force said slide outwardly relative to said frame.

5. In a jack, in combination, a load bearing frame; a force exerting slide reciprocably mounted in said frame for movement inwardly and outwardly relative to said frame, and having gear teeth extending therealong; a pinion engaged with said teeth and mounted in said frame for bodily movement in a direction parallel the direction of movement of said slide; mechanism including a handle and a ratchet device for rotating said pinion; biasing means urging said pinion outwardly relative to said frame; and movable means, including lever means mounted on said frame and operatively connected to said pinion, engageable with said slide and operable by bodily movement of said pinion inwardly relative to said frame, to force said slide outwardly relative to said frame; said pinion, during initial rotation being maintained outwardly relative to said frame by said biasing means and moving said slide outwardly relative to said frame until the reaction of said slide on said pinion exceeds the force of said biasing means, and further rotation of said pinion thereupon effecting bodily movement of said pinion inwardly relative to said frame to operate said movable means to force said slide outwardly relative to said frame.

6. In a jack, in combination, a load bearing frame; an elongated force exerting slide reciprocably mounted in said frame for movement inwardly and outwardly relative to said frame, and having gear teeth extending along one elongated surface thereof and inwardly facing ratchet teeth extending along an opposite longitudinal surface thereof; a pinion engaged with said gear teeth and mounted in said frame for bodily movement in a direction parallel the direction of movement of said slide; mechanism for rotating said pinion; biasing means urging said pinion outwardly relative to said frame; and movable means operatively connected to said frame and said pinion, including a pawl engageable with said ratchet teeth, operable by bodily movement of said pinion inwardly relative to said frame to force said slide outwardly relative to said frame; said pinion, during initial rotation being maintained outwardly relative to said frame by said biasing means and moving said slide outwardly relative to said frame until the reaction of said slide on said pinion exceeds the force of said biasing means, and further rotation of said pinion thereupon effecting bodily movement of said pinion inwardly relative to said frame to operate said movable means to force said slide outwardly relative to said frame.

7. In a jack, in combination, a load bearing frame; an elongated force exerting slide reciprocably mounted in said frame for movement inwardly and outwardly relative to said frame, and having gear teeth extending along one elongated surface thereof and inwardly facing ratchet teeth extending along an opposite longitudinal surface thereof; a pinion engaged with said gear teeth and mounted in said frame for bodily movement in a direction parallel the direction of movement of said slide; mechanism for rotating said pinion; biasing means urging said pinion outwardly relative to said frame; movable means operatively connected to said frame and said pinion, including a pawl engageable with said ratchet teeth, operable by bodily movement of said pinion inwardly relative to said frame to force said slide outwardly relative to said frame; said pinion, during initial rotation being maintained outwardly relative to said frame by said biasing means and moving said slide outwardly relative to said frame until the reaction of said slide on said pinion exceeds the force of said biasing means, and further rotation of said pinion thereupon effecting bodily movement of said pinion inwardly relative to said frame to operate said movable means to force said slide outwardly relative to said frame; and releasable means automatically restraining retrogression of said slide inwardly relative to said frame while providing for movement of said slide and outwardly relative to said frame; said releasable means, in moving to the slide release position, operating said pawl to disengage said ratchet teeth to release said slide for retrogression inwardly relative to said frame.

8. In a jack, in combination, a load bearing frame; an elongated force exerting slide reciprocably mounted in said frame for movement inwardly and outwardly relative to said frame, and having gear teeth extending along one elongated surface thereof and inwardly facing ratchet teeth extending along an opposite longitudinal surface thereof; a pinion engaged with said gear teeth and mounted in said frame for bodily movement in a direction parallel the direction of movement of said slide; mechanism for rotating said pinion; biasing means urging said pinion outwardly relative to said frame; movable means operatively connected to said frame and said pinion, including a pawl engageable with said ratchet teeth, operable by bodily movement of said pinion inwardly relative to said frame, to force said slide outwardly relative to said frame; said pinion, during initial rotation being maintained outwardly relative to said frame by said biasing means and moving said slide outwardly relative to said frame until the reaction of said slide on said pinion exceeds the force of said biasing means, and further rotation of said pinion thereupon effecting bodily movement of said pinion inwardly relative to said frame to operate said movable means to force said slide outwardly relative to said frame; rotatable cam means automatically restraining retrogression of said slide inwardly relative to said frame while providing for movement of said slide and outwardly relative to said frame; an element operatively associated with said cam means to rotate the same to release the slide; and means interconnecting said element and said pawl and effective, upon operation of said element to release said cam means, to operate said pawl to disengage said ratchet teeth to release said slide for retrogression inwardly relative to said frame.

9. In a jack, in combination, a load bearing frame; an elongated force exerting slide recip-

rocably mounted in said frame for movement inwardly and outwardly relative to said frame, and having gear teeth extending along one elongated surface thereof and inwardly facing ratchet teeth extending along an opposite longitudinal surface thereof; a pinion engaged with said gear teeth and mounted in said frame for bodily movement in a direction parallel the direction of movement of said slide; mechanism including a handle and a ratchet device for rotating said pinion; biasing means urging said pinion outwardly relative to said frame; movable means operatively connected to said frame and said pinion, including a pawl engageable with said ratchet teeth, operable by bodily movement of said pinion inwardly relative to said frame to force said slide outwardly relative to said frame; said pinion, during initial rotation being maintained outwardly relative to said frame by said biasing means and moving said slide outwardly relative to said frame until the reaction of said slide on said pinion exceeds the force of said biasing means, and further rotation of said pinion thereupon effecting bodily movement of said pinion inwardly relative to said frame to operate said movable means to force said slide outwardly relative to said frame; and means on said handle operable to release said ratchet device.

10. In a jack, in combination, a load bearing frame; an elongated force exerting slide reciprocably mounted in said frame for movement inwardly and outwardly relative to said frame, and having gear teeth extending along one elongated surface thereof and inwardly facing ratchet teeth extending along an opposite longitudinal surface thereof; a pinion engaged with said gear teeth and mounted in said frame for bodily movement in a direction parallel the direction of movement of said slide; mechanism including a handle and a ratchet device for rotating said pinion; biasing means urging said pinion outwardly relative to said frame; movable means operatively connected to said frame and said pinion, including a pawl engageable with said ratchet teeth, operable by bodily movement of said pinion inwardly relative to said frame to force said slide outwardly relative to said frame; said pinion, during initial rotation being maintained outwardly relative to said frame by said biasing means and moving said slide outwardly relative to said frame until the reaction of said slide on said pinion exceeds the force of said biasing means, and further rotation of said pinion thereupon effecting bodily movement of said pinion inwardly relative to said frame to operate said movable means to force said slide outwardly relative to said frame; clutch means connecting said ratchet device to said pinion; and means on said handle operable to release said clutch means to release said pinion for movement outwardly relative to said frame.

11. In a jack, in combination, a load bearing frame; an elongated force exerting slide reciprocably mounted in said frame for movement inwardly and outwardly relative to said frame, and having gear teeth extending along one elongated surface thereof and inwardly facing ratchet teeth extending along an opposite longitudinal surface thereof; a pinion engaged with said gear teeth and mounted in said frame for bodily movement in a direction parallel the direction of movement of said slide; mechanism including a handle and a ratchet device for rotating said pinion; biasing means urging said pinion outwardly relative to said frame; movable means operatively connected to said frame and said pinion, including a pawl engageable with said ratchet teeth, operable by bodily movement of said pinion inwardly relative to said frame to force said slide outwardly relative to said frame; said pinion, during initial rotation being maintained outwardly relative to said frame by said biasing means and moving said slide outwardly relative to said frame until the reaction of said slide on said pinion exceeds the force of said biasing means, and further rotation of said pinion thereupon effecting bodily movement of said pinion inwardly relative to said frame to operate said movable means to force said slide outwardly relative to said frame; means on said handle operable to release said ratchet device; clutch means connecting said ratchet device to said pinion; and means on said handle operable to release said clutch means to release said pinion for movement outwardly relative to said frame.

12. A jack comprising, in combination, a load bearing frame; an elongated force exerting slide reciprocably mounted in said frame for movement inwardly and outwardly relative to said frame, and having gear teeth extending along one elongated surface thereof and inwardly facing ratchet teeth extending along an opposite longitudinal surface thereof; a pinion engaged with said gear teeth and mounted in said frame for bodily movement in a direction parallel the direction of movement of said slide; mechanism for rotating said pinion; spring means urging said pinion outwardly relative to said frame; a lever pivoted adjacent one end to said frame; a pawl connected to the short arm of the lever and extending toward said ratchet teeth; and link means connecting the long arm of the lever to said pinion; said pinion, when first rotated, being maintained outwardly relative to said frame by said spring means and drawing said slide outwardly relative to said frame until the reaction of said slide on said pinion exceeds the force of said spring means, said pinion thereupon rotating inwardly along said gear teeth to swing said lever to move said pawl to force said slide outwardly relative to said frame.

13. In a jack, in combination, a base; a force exerting member reciprocably mounted on said base for movement inwardly and outwardly relative to said base; an operating element for said member engaged therewith and movable, relative to said base and said member, in a direction substantially parallel to the direction of movement of said member; biasing means urging said element outwardly relative to said base; whereby, as said element is operated, it will move said member outwardly relative to said base until the reaction of said member on said element exceeds the force of said biasing means; further operation of said element thereupon effecting inward movement of said element relative to said base; and means operatively associated with said member, said base and said element and operable by said element, during such relative inward movement of said element, to force said member outwardly relative to said base.

14. In a jack, in combination, a load bearing frame; a force exerting slide reciprocably mounted in said frame for movement inwardly and outwardly relative to said frame and having gear teeth extending therealong; a pinion engaged with said teeth and mounted in said frame for bodily movement in a direction parallel to the direction of movement of said slide; mechanism for rotating said pinion; biasing means urging said pinion outwardly relative to said

base; and movable means engageable with said slide and operatively associated with said frame and said pinion, said movable means being operable by bodily inward movement of said pinion, relative to said base, to force said slide outwardly relative to said base; said pinion, during initial rotation being maintained outwardly relative to said base by said biasing means and moving said slide outwardly relative to said base until the reaction of said slide on said pinion exceeds the force of said biasing means, and further rotation of said pinion thereupon effecting bodily movement of said pinion toward said base to operate said movable means to force said slide outwardly relative to said base.

15. In a jack, in combination, a base; a force exerting member reciprocably mounted on said base for movement inwardly and outwardly relative to said base; an operating element for said member engaged therewith and movable, relative to said base and said member, in a direction substantially parallel to the direction of movement of said member; biasing means urging said element outwardly relative to said base; a lever pivoted on said base and having a long arm

connected to said operating element to swing said lever as said element moves relative to said base; and cooperating pawl and ratchet means on the short arm of said lever and on said member to force said member outwardly when said lever is swung by inward movement of said element; whereby, as said element is operated, it will move said member outwardly relative to said base until the reaction of said member on said element exceeds the force of said biasing means; further operation of said element thereupon effecting inward movement of said element relative to said base to swing said lever to operate said pawl and ratchet means to force said slide outwardly relative to said base.

OWEN DONOHUE.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,463,797	Page	Mar. 8, 1949