J. M. MEYERS.

JACK.

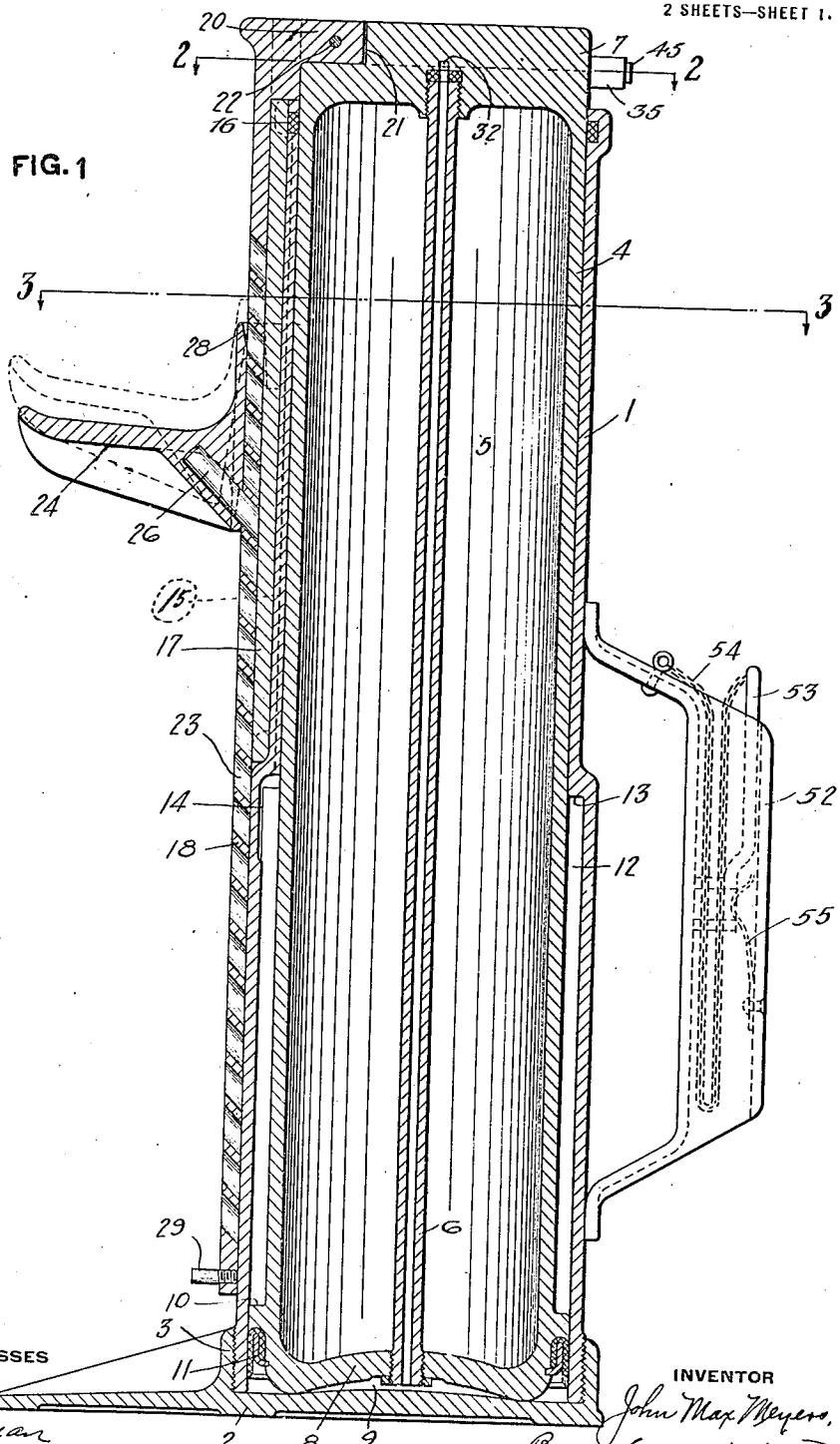
APPLICATION FILED FEB. 1, 1917.

1,286,051.

Patented Nov. 26, 1918.

2 SHEETS—SHEET 1.

FIG. 1



WITNESSES

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2 SHEETS—SHEET 2.

FIG. 3

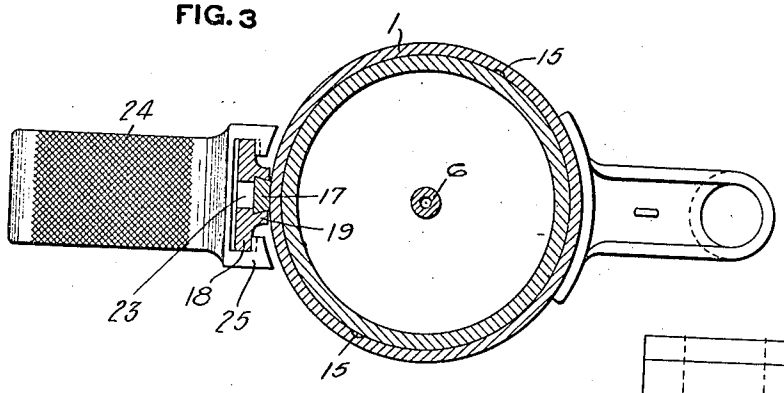


FIG. 2

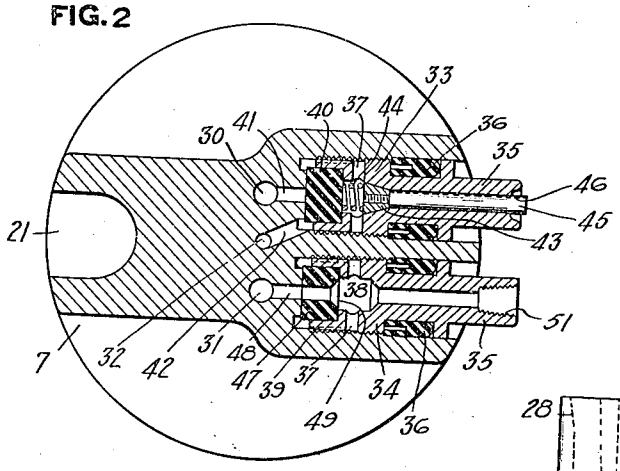


FIG. 4

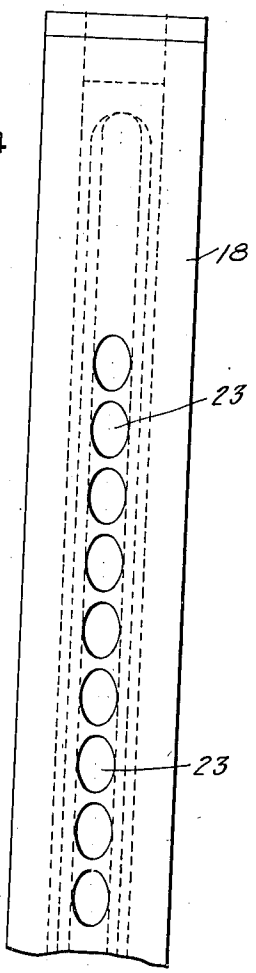


FIG. 5

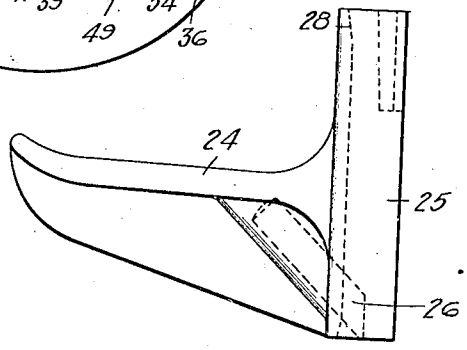
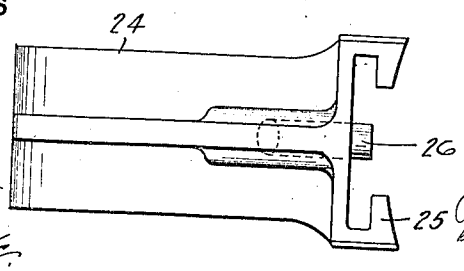


FIG. 6



WITNESSES

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1,286,051. Specification of Letters Patent. Patented Nov. 26, 1918.

Application filed February 1, 1917. Serial No. 145,907.

To all whom it may concern:

Be it known that I, JOHN MAX MEYERS, a citizen of the United States, and a resident of West Chester, in the county of Chester and State of Pennsylvania, have invented a new and useful Improvement in Jacks, of which the following is a specification.

This invention relates to fluid pressure jacking mechanism, particularly to improvements in jacking mechanism of the type described in my co-pending application, Serial No. 763,132 filed April 23, 1913, in which the piston or plunger is hollow and serves as a container for liquefied gas or other suitable pressure fluid and which fluid can be conducted from the interior of the piston to a chamber between the base thereof and the inner surface of the shell, to actuate the piston.

One object of the invention is to provide a fluid pressure jacking mechanism with a lifting foot connected to the piston or plunger and adjustable vertically thereon by a simple manual operation, so that the jack can be readily adjusted to engage objects at different heights, without wasting any pressure fluid because of the necessity of raising the piston to the point at which a fixed lifting foot would engage the object to be raised. Another object is to provide means which positively limits the movement of the piston in the shell or casing and thereby obviate the danger of the piston being blown out in case the load is removed before the pressure is released, or by the admission of too great a head of pressure to the chamber beneath the piston. A further object is to provide means whereby pressure is permitted to leak from the chamber beneath the piston when the piston has reached the limit of its movement, but which permits leakage in no other position of the piston, and to provide a dust proof engagement between the piston and shell or casing without the necessity of such a close fit between the same as to prevent gases from escaping under certain conditions between the piston and shell of the jack. Still further objects of the invention are to provide a base so secured to the shell or casing that it may be readily removed and the lower packing ring of the piston renewed, or the piston withdrawn from the shell, and to provide a handle on the jack so constructed as to contain the key for actuating the valves and which handle is furnished with means for securing the key to the handle and in position therein.

The invention comprises the construction and arrangement of parts hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a central vertical section through a lifting jack embodying the invention; Fig. 2 is a horizontal section through the head of the piston on the line 2—2, Fig. 1, illustrating the position and construction of the pressure regulating and safety valves; Fig. 3 is a horizontal section on the line 3—3, Fig. 1; Fig. 4 is an elevation of the rack bar; Fig 5 is a side elevation of the lifting foot; and Fig. 6 is a bottom plan view thereof.

The invention is illustrated as a lifting jack and comprises a suitable casing or shell 1 open at both ends and provided with a foot 2 having a screw threaded connection 3 with the lower end of said casing. Slidable in the casing is the piston or plunger 4 provided with a chamber 5 for containing compressed gas, which is preferably liquefied carbonic acid gas or compressed air. This piston or plunger is moved vertically by admitting pressure fluid from its chamber 5 to a chamber underneath said piston or plunger through a pipe 6 which at its upper end extends into the head 7 of the piston or plunger and communicates with the controlling valves hereinafter described, and at its lower end extends through the bottom 8 of said piston or plunger. The under surface of this bottom 8 is preferably dished or concaved to provide a chamber 9 in which the pressure fluid may expand and start the upward movement of the piston. The piston or plunger at its lower end is enlarged to provide an annular shoulder 10 and is provided immediately beneath said annular shoulder with the packing ring 11. The casing for some distance upwardly from its lower end has its bore enlarged, so as to provide an annular space 12 between the piston or plunger and the casing walls. This enlarged portion at its upper end terminates in an annular shoulder 13 against which the shoulder 10 of the piston abuts when the latter is fully elevated. These abutting shoulders therefore provide positive means for preventing the piston from being blown

out of the casing such as might occur in case the load is removed without releasing the pressure from underneath the piston or in case the actuating fluid is admitted underneath the piston at too high a pressure head.

The bore of the upper portion of the casing has a fairly close fit with the piston or plunger, so as to provide an effective guide for the latter, and a sufficient area of contact to insure stability of support for the piston and reduce wear to a minimum.

In order to provide a safety device and prevent too great an accumulation of pressure underneath the piston and too hard a hammer blow of the annular shoulder 10 of the piston on the annular shoulder 13 of the casing, the latter is provided in its inner wall face immediately below the annular shoulder 13 with one or more vertical grooves 14, which are of such length that when the piston is entirely lifted the lower ends of these grooves project below the packing ring 11 so that the pressure underneath the piston can slowly escape. Such pressure can flow between the wall of the upper portion of the casing and the piston or plunger, but to insure its more rapid escape one or more vertical grooves 15 are formed in the walls of the bore of the casing, extending from the annular shoulder 13 to the top of the casing. Such grooves permit the rapid escape of any compressed fluid which may escape around the piston ring 11, and at the same time permit such a close fit of the piston or plunger in the upper portion of the bore of the casing as to form a stable support for the piston or plunger. In order to prevent the entrance of grit or dirt into the interior of the shell, an annular packing ring 16 of felt or similar material is placed in an annular groove formed around the bore of the casing at the upper end thereof. This packing ring is sufficiently porous to permit the escape of pressure fluid, but sufficiently dense to prevent the entrance of dirt or grit through the same.

On the outer face of the shell at one side and extending from the enlarged lower portion of the casing to its upper end is a guide bar 17, which is rigidly secured to the shell, such as by spot-welding, and which preferably in cross section is dove-tailed, as shown in Fig. 3. Slidably engaging this guide bar is the rack bar 18, which has an inwardly projecting dove-tailed portion 19 fitting the dove-tailed guide bar and slidable thereon. This rack bar at its upper end is provided with a right angled portion 20 engaging in a socket 21 in the piston head 7, and being secured thereto, such as by pin 22. The rack bar is provided with a vertical series of sockets 23 which slope downwardly and inwardly, as shown in Fig. 1, for the purpose of adjustably supporting the lifting foot 24. The latter is provided with rearwardly and inwardly projecting wings 25 which engage around the edges of the rack bar and behind the same, as shown in Fig. 3, but sufficiently loosely so that said foot can be moved up and down and also slightly tilted on the rack bar. This foot is provided with a downwardly sloping pin 26 arranged to enter the sockets 23. The inner face of the vertical portion of the foot at its upper end is beveled off, as at 28, so that when the foot is lifted at its outer end it rotates as a whole around a horizontal axis so as to withdraw the locking pin 26 from the socket 23, and in this position the foot can be either lowered or lifted, but as soon as released the outer or free end of the foot automatically drops to a position perpendicular to the rack bar, thereby rotating the foot bodily about the horizontal axis above referred to and causing the locking pin 26 to enter into the next lower socket 23. This construction permits of the ready vertical adjustment of the foot so that it can be brought to the desired height to immediately engage underneath the object to be lifted, and prevent the waste of fluid pressure and the lost motion necessary to lift objects of different height with a jack having a fixed foot.

The inner end of the locking pin 26 is beveled, as shown in Fig. 1, so as to get the maximum support in the sockets 23 and also permit the guiding pin to slide past the sockets when lifting or lowering said foot. The lower end of the rack bar is provided with a stop pin 29 to prevent the foot from falling off the rack bar.

The head 7 of the piston is provided with three ports, to wit, ports 30 and 31 communicating with the chamber 5 in the piston, and port 32 communicating with the pipe 6 extending down through the lower end of the piston. The ports 30 and 32 are controlled by the pressure application and release valve 33, and the port 31 is controlled by the safety and charging valve 34. These valves are disposed in the same horizontal plane, in bores in the piston head, and have their bodies threaded to engage threads cut in the walls of said bores, and each is provided with a stem 35 whose outer end is formed to be engaged by a suitable wrench or key. The bodies of these valves outside of the threaded portion are reduced, and surrounding the reduced portions are packing sleeves 36. The bodies of both of these valves are provided with transverse passages 37 communicating with central cavities 38, and their stems are also hollow to form an outlet from said cavities 38. The screw threaded portions of said bodies are provided with longitudinal grooves or the like, 39, to permit the escape of fluid pressure from the inner ends of said valves to the transverse passages 37 and then out through the hollow stems.

The pressure application and release valve 33 carries a disk 40 coöperating with a seat in which is formed a port 41 leading to the port 30. The inner end of the bore in which this valve works communicates through a short passage 42 with the central port 32. The inner end of the bore through the stem of this valve is provided with a conical seat with which coöperates a conical plug valve 43 normally held to its seat by spring 44, and which valve is secured to a stem 45 which extends out through the hollow of the valve stem and slightly beyond the same. This stem 45 is provided with a groove 46, or is flattened, to allow for the escape of fluid pressure therethrough.

The valve 34 carries a disk 47 coöperating with a seat provided with a port 48 leading to the port 31. This disk 47 is provided with a central opening therethrough, and between said disk and the cavity 38 is a safety member shown as a diaphragm 49 formed of thin metal or other material and chosen of such strength that it will break if the pressure in the chamber 5 of the piston exceeds a predetermined amount.

The chamber 5 in the piston is charged with the pressure fluid through the valve 34, by screwing into the threaded end 51 of the stem of said valve a hose connected to a suitable source of fluid pressure. This connection can also be used for inflating tires or the like with the pressure fluid contained in the piston. When charging the piston the valve is slightly unscrewed so as to lift the disk 47 from its seat, whereupon pressure fluid will enter through the hollow stem of the valve to the central cavity 38 and thence through transverse passage 37 and longitudinal grooves 39 and through ports 48 and 31 to the chamber 5. When the chamber is fully charged the valve is screwed inwardly so as to close the port 48. Should the pressure be too high the diaphragm 49 will break and thus prevent injury to the jack.

When the jack is to be used the valve 33 is screwed outwardly so as to lift the disk 40 from its seat and uncover port 41, whereupon pressure fluid will flow from chamber 5 through ports 30 and 41 and thence through port 42 to the pipe 6 to the chamber 9 underneath the piston, thereby lifting the same. During this condition the conical valve 43 is held to its seat and prevents the escape of pressure fluid. When lifted to the desired extent the valve 33 is screwed inwardly to its seat so as to cut off further flow of pressure fluid from the chamber 5 in the piston to the chamber 9 underneath the same. To lower the jack the fluid pressure from chamber 9 is released by merely pressing inwardly on the stem 45, thus unseating the valve 43, whereupon the fluid pressure will escape from chamber 9 through pipe 6 to port 32, thence through passage 42 and grooves 39 to the transverse passage 37 and out through the groove 46 in stem 45.

The jack therefore is actuated by merely unscrewing valve 33 and as soon as sufficiently lifted said valve is closed, and is released by merely pressing inwardly on stem 45.

The valve mechanism illustrated and described, is not claimed herein, but is claimed in my companion application of even date herewith, Serial No. 145,906.

The jack is provided with a handle 52 suitably secured to the casing by welding or other suitable means. This handle is hollow and serves as a container for the wrench or key 53, which is secured to the handle by means of chain 54, and when not in use is held in position in the handle by means of the spring clip 55. This simple means prevents loss of the key and insures that it is always at hand when the jack is to be used.

When using the jack it is set in position to lift the object and the foot is adjusted vertically to be in position underneath the object to be lifted without material loss of motion. The fluid pressure is then admitted underneath the piston to raise the plunger to the desired height, and the jack will remain almost indefinitely in this raised position. Should the load be suddenly released, or should fluid pressure be admitted underneath the piston longer than is necessary, the upward movement of the piston will be arrested by contact of shoulder 10 thereon with the shoulder 13 in the casing, and when this occurs the pressure in the chamber underneath the piston will slowly escape through the grooves 14.

The foot 2 can be readily removed from the casing so as to permit access to the packing ring 11 for repair or lubrication, and the piston as a whole can also be readily removed from the casing for cleaning or repairing by merely removing the foot 3 and disengaging the rack bar 18 from the piston head 7, by removing pin 22 and the valves.

The jack is safe even with unskilled handling, as there is no possibility of blowing the piston out of the casing, and also no possibility of injuring the jack by too long an application of the pressure fluid or the release of the load without first releasing pressure from underneath the piston, as the relief passages 14 will take care of this.

The construction as a whole is simple and the parts are durable, and all parts are readily accessible for cleaning or repair.

The jacking mechanism described can be used in a horizontal as well as a vertical position and is adapted to a variety of purposes.

What I claim is:—

1. Fluid pressure jacking mechanism comprising a casing, a fluid actuated lifting

member movable therein, a guide on the outside of the casing, and a lifting bar actuated by said lifting member and extending downwardly and slidably engaging said guide.

2. Fluid pressure jacking mechanism comprising a casing, a fluid actuated lifting member movable therein, a guide on the outside of the casing, and a lifting bar having an interlocking sliding engagement with said guide and being connected to said lifting member.

3. Fluid pressure jacking mechanism comprising a casing, a piston in said casing and projecting beyond the same, a guide on the outside of the casing, a bar slidably engaging said guide and attached to the projecting end of the piston, and a lifting foot adjustably secured to said bar.

4. Fluid pressure jacking mechanism comprising a casing, a fluid actuated lifting member movable therein, a rack bar secured to said lifting member and projecting downwardly outside of the casing, and a lifting foot having an interlocking sliding connection with said rack bar and having a projection arranged to engage said rack bar, said lifting foot being cut away at its upper extremity to permit rotation on a horizontal axis relative to the bar to disengage its projection from said bar.

5. Jacking mechanism comprising a casing, a fluid actuated piston therein and projecting outside the same, a bar secured to the projecting end of the piston and lying adjacent the outside of the casing and provided with inclined sockets, a lifting foot having an interlocking slidable connection with said bar and being cut away at its upper extremity to permit rotation on a horizontal axis relative to the bar, and an inclined projection on said lifting foot arranged when said foot is perpendicular to the bar to enter a socket therein and to be withdrawn from said socket upon rotation of said foot.

6. Fluid pressure jacking mechanism comprising a casing, a piston arranged to be actuated by pressure in said casing, means for limiting the outward movement of said piston in said casing, and means permitting leakage of pressure past said piston when it has reached the limit of its outward movement.

7. Fluid pressure jacking mechanism comprising a casing, a piston arranged to be actuated by pressure in said casing, coöperating shoulders in said casing and on said piston for limiting the outward movement of said piston, and a groove in the casing wall for permitting leakage of pressure past said piston when it has reached the limit of its outward movement.

8. Fluid pressure jacking mechanism comprising a casing enlarged in diameter for a portion of its height from its bottom upwardly and thereby providing an internal shoulder, a piston arranged to be actuated by pressure in said casing and provided with a shoulder arranged to abut the shoulder in said casing to limit the outward movement of said piston, and a groove in the wall of said casing adjacent to the shoulder therein and arranged to permit leakage of pressure past said piston when it has reached the limit of its outward movement.

9. Fluid pressure jacking mechanism comprising a casing open at one end, a piston arranged to be actuated by pressure in said casing, said piston providing a reservoir for pressure fluid, and a foot removably closing the lower end of said casing and when removed permitting the withdrawal of the piston from said casing.

10. Fluid pressure jacking mechanism comprising a casing open at its upper end and enlarged in diameter for a portion of its height from its bottom upwardly, thereby providing an internal shoulder, a piston in said casing arranged to be actuated by fluid pressure and provided with a shoulder arranged to abut the shoulder in said casing, said piston providing a reservoir for pressure fluid, and a foot removably closing the lower end of said casing and when removed permitting the withdrawal of said piston therefrom.

11. Fluid pressure jacking mechanism comprising a casing, a piston movable therein and projecting beyond one end thereof and providing a reservoir for pressure fluid, a lifting bar detachably connected to said projecting end of the piston, and a foot removably closing the opposite end of said casing and when removed permitting the withdrawal of the piston therefrom.

12. Fluid pressure jacking mechanism comprising a casing enlarged in diameter for a portion of its height from its lower end upwardly, thereby providing an internal shoulder, a piston arranged to be actuated by pressure in said casing and provided with a shoulder arranged to abut the shoulder in said casing and projecting above the casing, said piston providing a reservoir for pressure fluid, a lifting bar removably attached to the projecting end of said piston, and a foot removably closing the lower end of said casing and when removed permitting the withdrawal of the piston therefrom.

13. Fluid pressure jacking mechanism comprising a casing, a piston movable therein and providing a reservoir for pressure fluid, said piston projecting beyond said casing, and a lifting member connected to the projecting end of said piston and adjustable vertically relative thereto.

14. Fluid pressure jacking mechanism comprising a casing closed at one end, a piston movable therein and projecting beyond the open end of said casing, said piston being provided with a reservoir for pressure

fluid, a bar secured to said projecting end of said piston and lying outside of said casing and parallel thereto, and a lifting foot adjustable longitudinally on said bar.

15. Fluid pressure jacking mechanism comprising a casing closed at one end, a piston movable in said casing and projecting beyond the open end thereof, said piston being provided with a reservoir for pressure fluid, and coöperating shoulders in said casing and on said piston for limiting the outward movement of the latter.

16. Fluid pressure jacking mechanism comprising a casing closed at one end, a piston movable therein and projecting beyond the open end thereof, said piston being provided with a reservoir for pressure fluid, and a groove in the wall of the casing arranged to allow the escape of pressure fluid around said piston when it has reached the limit of its outward movement.

17. Fluid pressure jacking mechanism comprising a casing closed at one end, a piston movable in said casing and projecting beyond the open end thereof, said piston being provided with a reservoir for pressure fluid, coöperating shoulders in said casing and on said piston to limit the outward movement of the piston, and a groove in the wall of said casing arranged to permit the escape of fluid pressure around said piston when it has reached the limit of its outward movement.

18. Fluid pressure jacking mechanism comprising a casing closed at one end, a piston movable therein and provided with a reservoir for pressure fluid, valve mechanism arranged to admit pressure fluid from said chamber in the piston to a chamber underneath the piston, a key for actuating said valve mechanism, and a hollow handle on said casing arranged to receive said key.

19. Fluid pressure jacking mechanism comprising a casing, a piston movable therein and provided with a reservoir for pressure fluid, valve mechanism arranged to admit pressure fluid from said chamber in the piston to a chamber underneath the piston, a key for actuating said valve mechanism, a hollow handle on said casing arranged to receive said key, and means for securing said key in said hollow handle.

20. Fluid pressure jacking mechanism comprising a casing, a piston movable therein and provided with a reservoir for pressure fluid, valve mechanism arranged to admit pressure fluid from said chamber in the piston to a chamber underneath the piston, a key for actuating said valve mechanism, a hollow handle on said casing arranged to receive said key, and a spring member arranged to engage said key when in said hollow handle.

21. Fluid pressure jacking mechanism comprising a casing, and a piston therein forming a container for the pressure fluid, said piston having a tubular stem extending from the outer head thereof through said piston and into open relation with the interior of the casing and having communication with a valve chamber in the outer piston head, a communication between said valve chamber and the interior of said piston, a valve bore connecting said valve chamber with the exterior of said piston, a hollow valve stem within said bore carrying a valve disk working within the valve chamber to close communication to the interior of the piston, a release valve for closing the opening of the hollow valve stem at the interior end thereof, and means within the stem for unseating said release valve.

In testimony whereof, I have hereunto set my hand.

JOHN MAX MEYERS.

Witnesses:
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SUE B. FRITZ.