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COMPRESSED AIR JACK.

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1,268,816.

Patented June 11, 1918.

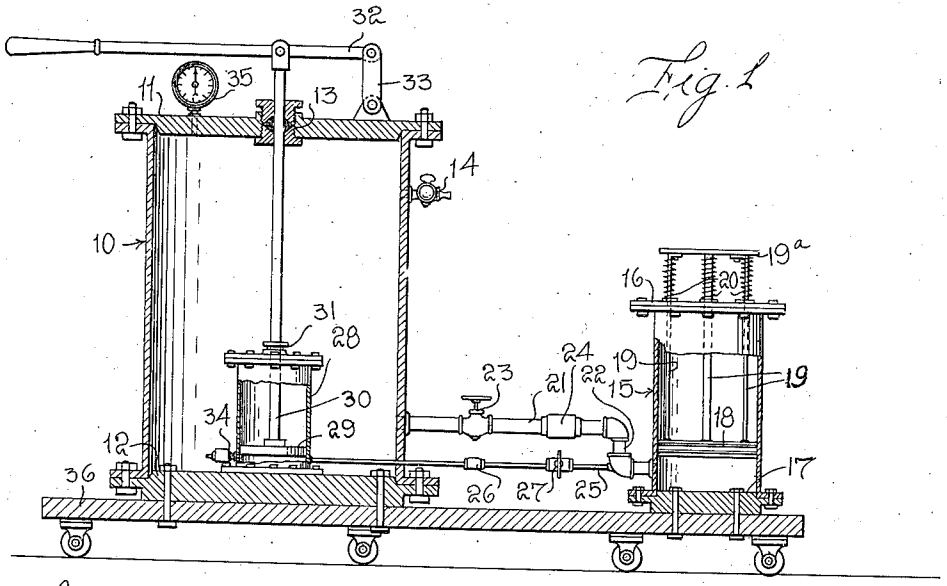


Fig. 1

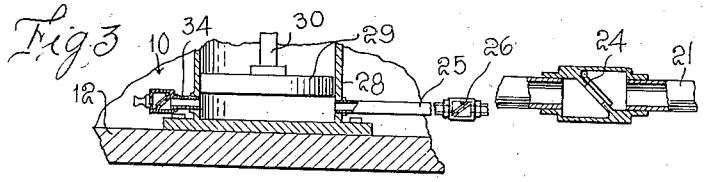


Fig. 3

Fig. 4

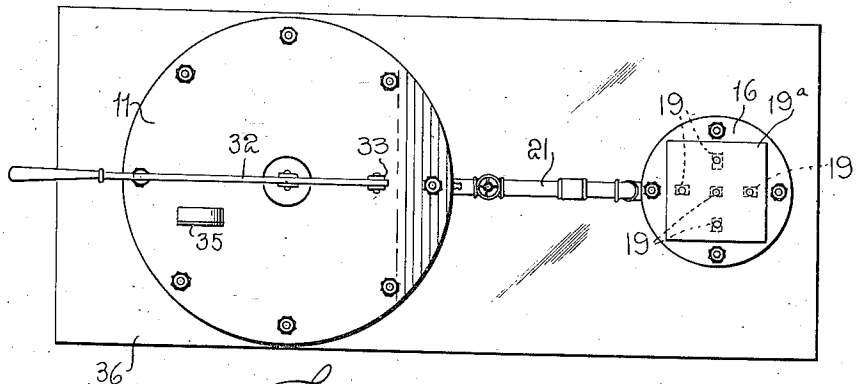


Fig. 2

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COMPRESSED-AIR JACK.

1,268,816. Specification of Letters Patent. Patented June 11, 1918.

Application filed January 19, 1918. Serial No. 212,662.

To all whom it may concern:

Be it known that we, WARREN J. BUCHNER and RAYMOND F. NORTH, citizens of the United States, residing at Glendive, in the county of Dawson and State of Montana, have invented certain new and useful Improvements in Compressed-Air Jacks, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to lifting jacks, and particularly to a lifting jack wherein compressed air is used as the means for lifting the jack.

The general object of the invention is the provision of a lifting jack having a storage chamber and a piston chamber, the storage chamber being provided with means whereby it may be charged with air at a predetermined pressure, and valve connections be provided whereby the air within the storage chamber may be allowed to flow into the lifting jack chamber to thereby lift the jack proper, and whereby when the lifting operation is completed, air may be caused to flow from the lifting jack chamber back to the storage chamber.

A further object of the invention is to provide means whereby when the article being lifted is blocked up, the air may be forcibly withdrawn from the lifting jack chamber and forced into the storage chamber.

Other objects will appear in the course of the following description.

Our invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a longitudinal vertical sectional view of a compressed air lifting jack constructed in accordance with our invention, the connecting pipes being in elevation;

Fig. 2 is a top plan view of the construction illustrated in Fig. 1;

Fig. 3 is an enlarged vertical sectional view, a portion of the head 12 and the cylinder 28, the piston being in elevation; and

Fig. 4 is an enlarged longitudinal sectional view of the check valve in pipe 21.

Referring to these figures, 10 designates the storage chamber which is flanged at its upper and lower ends and closed by the upper and lower heads 11 and 12 respectively. The upper head is formed with a central perforation 13 having a stuffing box or gland through which the pump piston rod passes. This storage chamber 10 is provided with an air inlet nipple 14 and the controlling valve, this nipple being adapted to be connected to any source of compressed air.

Coacting with the storage chamber 10 is a jack chamber 15. This is cylindrical in form and closed at its upper and lower ends by means of the heads 16 and 17 respectively, these heads being riveted or bolted to the body of the chamber. Disposed within the chamber 15 is a piston 18 having a plurality of piston rods 19 extending up through suitable openings in the upper head 16 and preferably through glands or stuffing boxes in this head, these piston rods carrying upon their upper ends a square or other shaped plate 19^a. A cushioning spring 20 is disposed around one or more of the piston rods 19 and bears against the upper head 16 so as to resist such extreme downward movement of the piston 19.

The chamber 15 below the piston is connected by a relatively large pipe 21 to the storage chamber 10. This pipe 21 at its outer end is formed with an elbow 22 and intermediate its length the pipe is provided with a manually controlled cut-off valve 23 and a check valve 24 which opens in the direction of the jack chamber upon pressure from the storage tank or chamber, but closes when the pressure in the jack chamber exceeds that in the storage chamber.

Extending from the space below the piston and preferably from the elbow 22 is a relatively small relief pipe 25 having therein a check valve 26 and a hand operated valve 27. The check valve opens toward the storage chamber and the pipe 25 passes through the storage chamber and into a centrally disposed pump cylinder 28, mounted upon the bottom or head 12. The upper and lower ends of this cylinder 28 are closed and operating within this cylinder 28 is a piston 29 having a piston rod 30 extending out through a stuffing box 31 in the upper head of the cylinder 11 and out through the opening in the head surrounded by the stuffing box 13. Attached to the rod 30 is a lever 32 which is mounted upon a link 33 in turn engaged with the head 11.

By means of this lever the piston 29 may be reciprocated. Extending from the cylinder 28 below the piston 29 is a relief pipe 34 having therein a check valve closing to pressure within the storage tank but opening to pressure from within the cylinder 28.

Mounted upon the tank 10, in any suitable position, and preferably upon the head 11 is a pressure gage 35. Preferably the storage chamber 10 and the jack chamber 15 are mounted upon a platform 36 having wheels whereby the jack may be readily shifted to any desired position.

The operation of this invention is as follows: The storage chamber 10 is filled with air at a certain predetermined pressure. The means for compressing the air within the storage chamber may be of any suitable character and when the storage chamber has been filled with compressed air the valve in the nipple 14 is closed. Both of the valves 23 and 27 are closed and the piston 18 is lowered to its full extent. Now when it is desired to use the jack, the valve 23 is opened and the air in the storage chamber causes the outward movement of the piston 18 and the lifting of the platform 19. When the article being lifted has been lifted a predetermined degree the valve 23 is closed and the air trapped between the piston 18 and the valve 27 will hold the article in a raised position. If it be desired to block up the article after it has been raised and to remove the jack, then after the article is blocked up, the valve 27 is opened. The weight of the piston alone, however, will not cause the outward passage of air through the pipe 25 and, under these circumstances, the pump piston 29 is reciprocated, causing the withdrawal of air through the pipe 25 and its discharge through the check valve 34 into the storage tank until the piston 18 has been lowered to its full extent. Where the article which has been raised is designed to be again lowered with the piston, then, of course, the pump piston 29 is reciprocated to withdraw the air through the pipe 25 and discharge it into the storage chamber 10.

It will be obvious that with this construction the air always remains under the same degree of compression within the storage chamber 10, except while the jack is in actual use and that the same air is used over and over again, so that once the storage chamber is charged with air under a predetermined degree of compression there is no necessity of recharging the storage chamber, except as may be caused by a leakage of air through the stuffing boxes. While we have illustrated a construction which we believe to be thoroughly effective for the purposes intended, it is to be understood that many changes may be made in the details of construction and arrangement of parts, without departing from the spirit of the invention as set forth in the appended claims.

Having described our invention, what we claim is:—

1. A lifting jack including a compressed air storage chamber, a jack chamber, a piston therein operatively connected to a lifting member, tubular connections from the storage chamber to the jack chamber below the piston, one of said connections having a manually operable valve, and a check valve preventing flow of compressed air from the jack chamber, the other connection having a manually operable valve and a check valve permitting flow from the jack chamber to the storage chamber.

2. A lifting jack including a compressed air storage chamber, a jack chamber, a piston therein operatively connected to a lifting member, tubular connections from the storage chamber to the jack chamber below the piston, one of said connections having a manually operable valve, and a check valve preventing flow of compressed air from the jack chamber, the other connection having a manually operable valve and a check valve permitting flow from the jack chamber to the storage chamber, and means for positively pumping air from the jack chamber to the storage chamber.

3. A lifting jack including a compressed air storage chamber, a jack chamber, a piston therein operatively connected to a jack member, tubular connections from the storage chamber to the jack chamber below the piston, one of said connections having a manually operable valve, and a check valve preventing flow of compressed air from the jack chamber, the other connection having a manually operable valve and a check valve permitting flow from the jack chamber to the storage chamber, and means for positively pumping air from the jack chamber to the storage chamber, said means including a pumping cylinder disposed within the storage chamber and having an outlet nozzle provided with an outwardly opening check valve, a piston operating within the pumping chamber and having a rod extending through the storage chamber, and means for operating the piston.

4. A lifting jack including a compressed air storage chamber having a valved nipple whereby compressed air may be forced into the storage chamber, a jack chamber having a piston therein operatively connected to a lifting member, a relatively large tubular connection from the storage chamber to the jack chamber below the piston thereof, said connection having a manually operable valve and a check valve preventing back flow of air from the jack chamber, a pumping cylinder disposed within the storage chamber, a tubular connection from the jack chamber to the pumping cylinder and having a manually operable valve and a check valve opening toward the pumping cylinder, a piston within the pumping cylinder, a piston rod extending through the pumping cylinder and through the storage chamber, and means exterior to the storage chamber for operating the piston rod.

5. A lifting jack including a compressed air storage chamber having means whereby it may be filled with compressed air and having oppositely disposed heads, a pumping cylinder mounted upon the bottom head and closed at its opposite ends, a piston rod extending through the uppermost head of the pumping cylinder and out through the uppermost head of the storage chamber, a lever mounted upon the storage chamber and operatively connected to said rod, a jack chamber, a piston therein, rods extending through the upper end of the jack chamber and attached to the piston and carrying a lifting member, a relatively large tubular connection leading from the lower end of the storage chamber to the jack chamber below the piston thereof and provided in its length with a check valve preventing back flow from the jack chamber, and with a manually operable valve, a relatively smaller tubular connection operatively connected to the jack chamber below the piston and extending into the pumping cylinder and provided in its length with a manually operable valve and a check valve opening toward the pumping cylinder, and an outlet from the lower end of the pumping cylinder having a check valve opening to pressure within the pumping cylinder.

6. A lifting jack including a wheeled base, a compressed air storage chamber mounted thereon, a jack chamber mounted thereon, a piston in the jack chamber operatively connected to a lifting member, tubular connections from the storage chamber to the lifting chamber below the piston therein, one of said connections having a manually operable valve, and a check valve preventing flow of compressed air from the jack chamber, the other connection having a manually operable valve and a check valve permitting flow from the jack chamber to the storage chamber, and a pump connected to the first named of the said tubular connections and discharging into the storage chamber.

In testimony whereof we hereunto affix our signatures in the presence of two witnesses.

WARREN J. BUCHNER.
RAYMOND F. NORTH.

Witnesses:
O. S. HALVORSON,
B. E. GRIFFIN.