

Jan. 27, 1942.

C. D. NELSON

2,271,022

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2 Sheets-Sheet 1

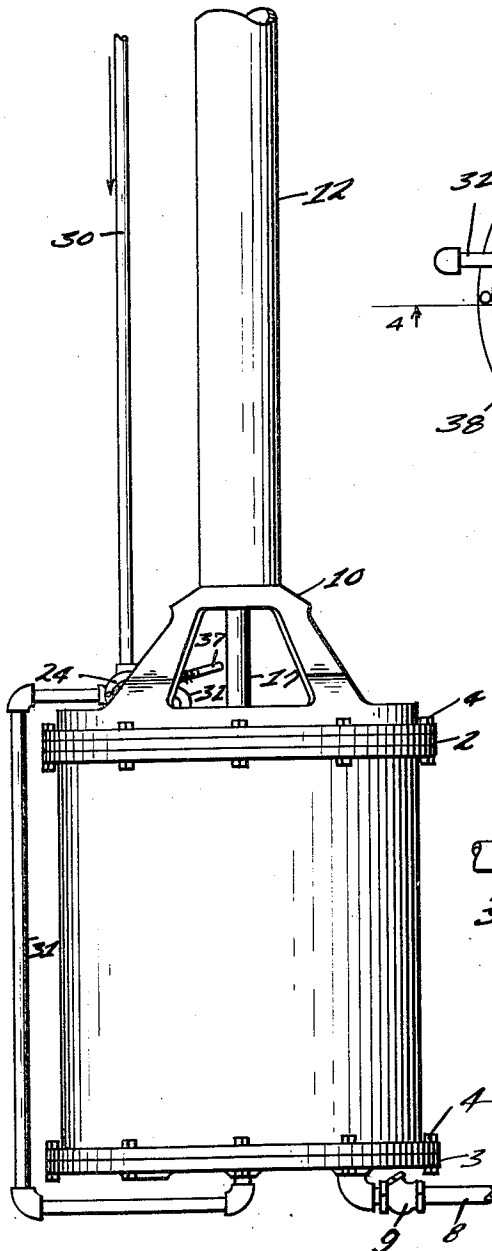


Fig. 1.

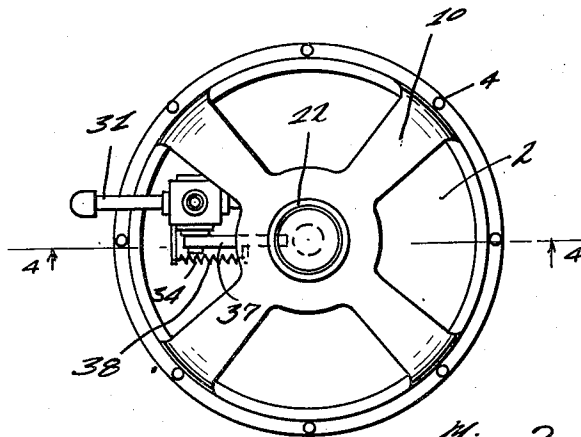


Fig. 2.

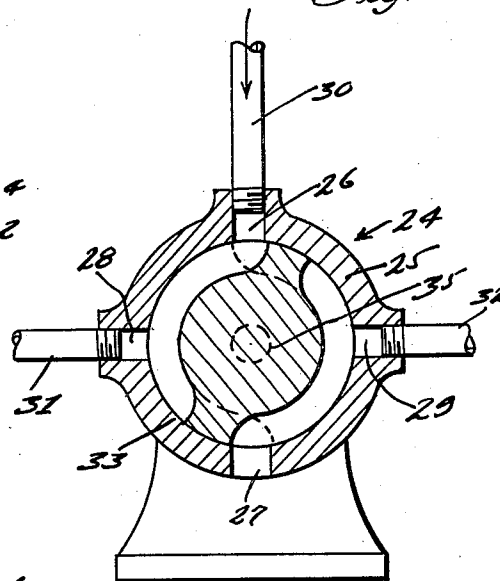


Fig. 3.

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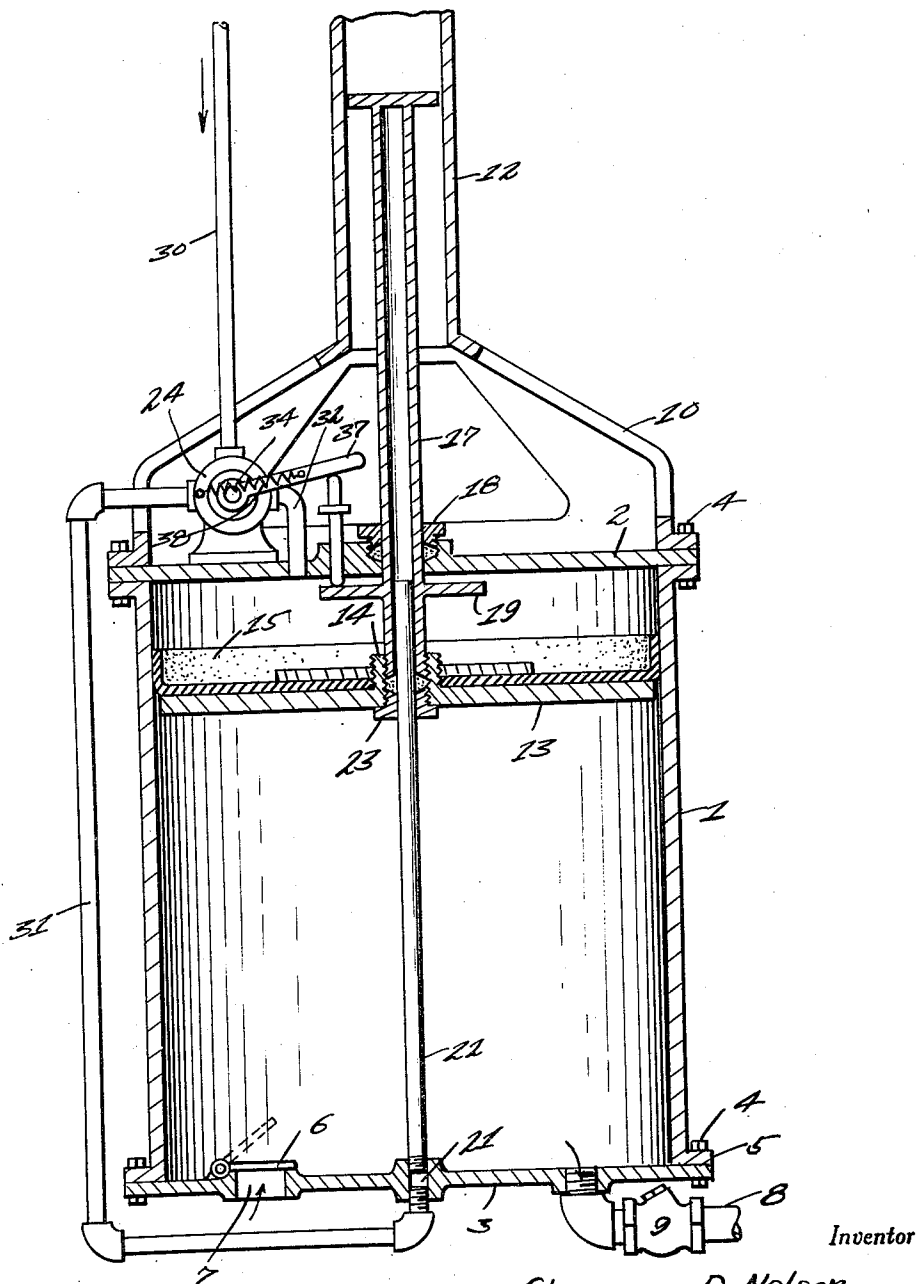


Fig. 4.

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2 Claims. (Cl. 103—52)

My invention relates to improvements in pumps of the vertical reciprocating type.

The invention is designed with the principal object in view of providing an inexpensive, efficient and quick acting pump of the character indicated and automatically operative by compressed air under control of the piston.

To the accomplishment of the above, and subordinate objects presently appearing, a preferred embodiment of my invention has been illustrated in the accompanying drawings, set forth in detail in the succeeding description, and defined in the claims appended hereto.

In said drawings:

Figure 1 is a view in front elevation of the preferred embodiment of my invention,

Figure 2 is a view in top plan,

Figure 3 is a view in vertical section of the control valve, and

Figure 4 is a view in vertical section taken on the line 4—4 of Figure 2 and drawn to an enlarged scale.

Referring to the drawings by numerals, in the preferred embodiment thereof my improved pump comprises a cylinder 1 closed at its ends by top and bottom cylinder heads 2, 3, bolted as at 4, to end flanges 5 on said cylinder. The bottom is provided at one side of the axis thereof with an upwardly opening intake valve 6 preferably of the flap type adapted to open and close an inlet port 7 for a suitable intake line, not shown. Diametrically opposite the intake valve 6 is a discharge line 8 which is tapped into the bottom head 3 with a suitable, outwardly opening discharge valve 9 interposed therein.

Surmounting the top head 2 is a cage structure 10 secured to said head as by the before-mentioned bolts 4 and including a tubular guide 12 upstanding therefrom axially of the same and of the cylinder 1 and spaced above said head.

A disk type piston 13 is provided in the cylinder 1, said piston having an axial hub 14 upstanding therefrom and internally and externally threaded. A suitable, centrally apertured, piston ring 15, of the leather cup type, is secured on top of the piston 13 by a disk 16 threaded onto the hub 14.

Arising from the hub 14, with its lower end threaded therein, is a tubular piston rod 17 slidably extended through a suitable stuffing box 18 in the top head 2, said piston extending upwardly into the guide 12 and having formed on its upper end a T-head fitting in said guide to reciprocate therein. Within the cylinder 1, the piston rod 17 is equipped with a radial circular

flange 19 spaced slightly above the piston 13 and serving a purpose presently seen.

The bottom head 3 is provided with an axial air port 21 from which arises axially of the cylinder an air pipe 22 having its lower end threaded into said port, said pipe extending upwardly through the piston head 14, by way of a suitable stuffing box 23 in the bottom of said hub, and into the piston rod 17 in which it is slidably fitted so that under reciprocation of said piston 13 the piston rod 17 slides up and down on said pipe 22.

Suitably secured on top of the top head 2, within the cage 10, and at one side of the center of the head is a control valve 24 comprising a circular casing 25 provided with a pair of peripheral, vertically aligned, inlet and exhaust ports 26, 27 in the top and bottom thereof, respectively, and a pair of similar, diametrically opposite, discharge ports 28, 29, in opposite sides thereof. A compressed air line 30, leading from a suitable source of supply, not shown, is threaded into the inlet port 26. A discharge line 31 leads from the discharge port 28 to the bottom of the air port 21. A second discharge line 32 extends from the discharge port 29 into the top of cylinder 1. Rotatably mounted in the valve casing 25 is a valve member 33 having a pair of axial trunnions 34, 35, extending oppositely out of the casing for a purpose presently seen. The valve member 33 is adapted for operation in opposite directions into two positions in one of which, shown in full lines in Figure 3, said valve member establishes communication between the inlet port 26 and discharge port 29 and also between discharge port 28 and exhaust port 27. In the first described position of the valve member 33, air from the line 30 is admitted by way of line 31 to air pipe 20 and piston rod 17 to force said rod and piston 13 upwardly, and air above the piston 13 is discharged by way of line 32 and exhaust port 27. In the second position of valve member 33, air is admitted to the top of the cylinder 1 by way of line 32 to force the piston down, and air in the piston rod 17 and pipe 22 is discharged by way of line 31 and exhaust port 27 in a manner which will be clear.

The valve member 33 is operated toward its second described position under the upstroke of the piston 13 and through the medium of the before-mentioned flange 19 which, as the piston nears the limit of its upstroke engages a tappet rod 36 vertically slidable in the head 2 and moves said rod upwardly into engagement with a crank arm 37 fast on valve trunnion 34 whereby said

member 33 is rotated in the proper direction and toward the second described position. On the other hand, valve member 33 is operated toward its first described position under the down stroke of the piston 13 by the described T-head on piston rod 17, which head, as the piston nears the limit of its down stroke, moves down on said crank arm 37 and thereby rotates the valve member 33 in the proper direction. Obviously, under the suction created by the upstroke of the piston 13 the intake valve 6 is opened to admit the fluid to the pump, and under the compression created by the down stroke of said piston 13, the discharge valve 9 is opened and the valve 6 closed so that the fluid is discharged from the cylinder 1 by way of line 8.

A spring 38 is suitably connected to the casing 25 and to said lever 37 to complete movement of said valve member after initial operation of the same in either direction.

The foregoing will, it is believed, suffice to impart a clear understanding of my invention, since its operation has been set forth in connection with the description of the parts thereof.

Manifestly the invention, as described, is susceptible of modification without departing from the inventive concept, and right is herein reserved to such modifications as fall within the scope of the subjoined claims.

Having described the invention, what I claim is:

1. In a pump of the class described, a pump cylinder including a pair of cylinder heads, an intake and a discharge valve in one cylinder head, a reciprocating piston in the cylinder, and means to reciprocate said piston under the action of compressed air comprising a compressed air inlet pipe extending axially from said one cylinder

head inwardly and slidably extended through the piston, a hollow piston rod extending from said piston out of the other piston head and slidably receiving said pipe, said rod having an outer closed end, an air control valve on said cylinder for connection to a compressed air source, a pair of air lines leading from said valve to said air pipe and extending through said other cylinder head, respectively, said valve being operative to open said lines alternately, and means to operate said valve under movement of said piston rod in opposite directions.

2. In a pump of the class described, a pump cylinder including a pair of cylinder heads, an intake and a discharge valve in one cylinder head, a reciprocating piston in the cylinder, and means to reciprocate said piston under the action of compressed air comprising a compressed air inlet pipe extending axially from said one cylinder head inwardly and slidably extended through the piston, a hollow piston rod extending from said piston out of the other piston head and slidably receiving said pipe, said rod having an outer closed end, an air control valve on said cylinder for connection to a compressed air source, a pair of air lines leading from said valve to said air pipe and extending through said other cylinder head, respectively, said valve being operative to open said lines alternately, means to operate said valve under movement of said piston rod in opposite directions, said means comprising an operating arm on said valve, an arm operating plunger, a flange on said piston rod for engaging said plunger under movement of the piston in one direction, and a second flange on said piston rod for engaging said arm under movement of said rod in the other direction.

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