June 12, 1928.

1,673,103

J. D. COCHIN

VALVE FOR LIFTING DEVICES

Filed March 23, 1927

2 Sheets-Sheet 1

Fig. 1.

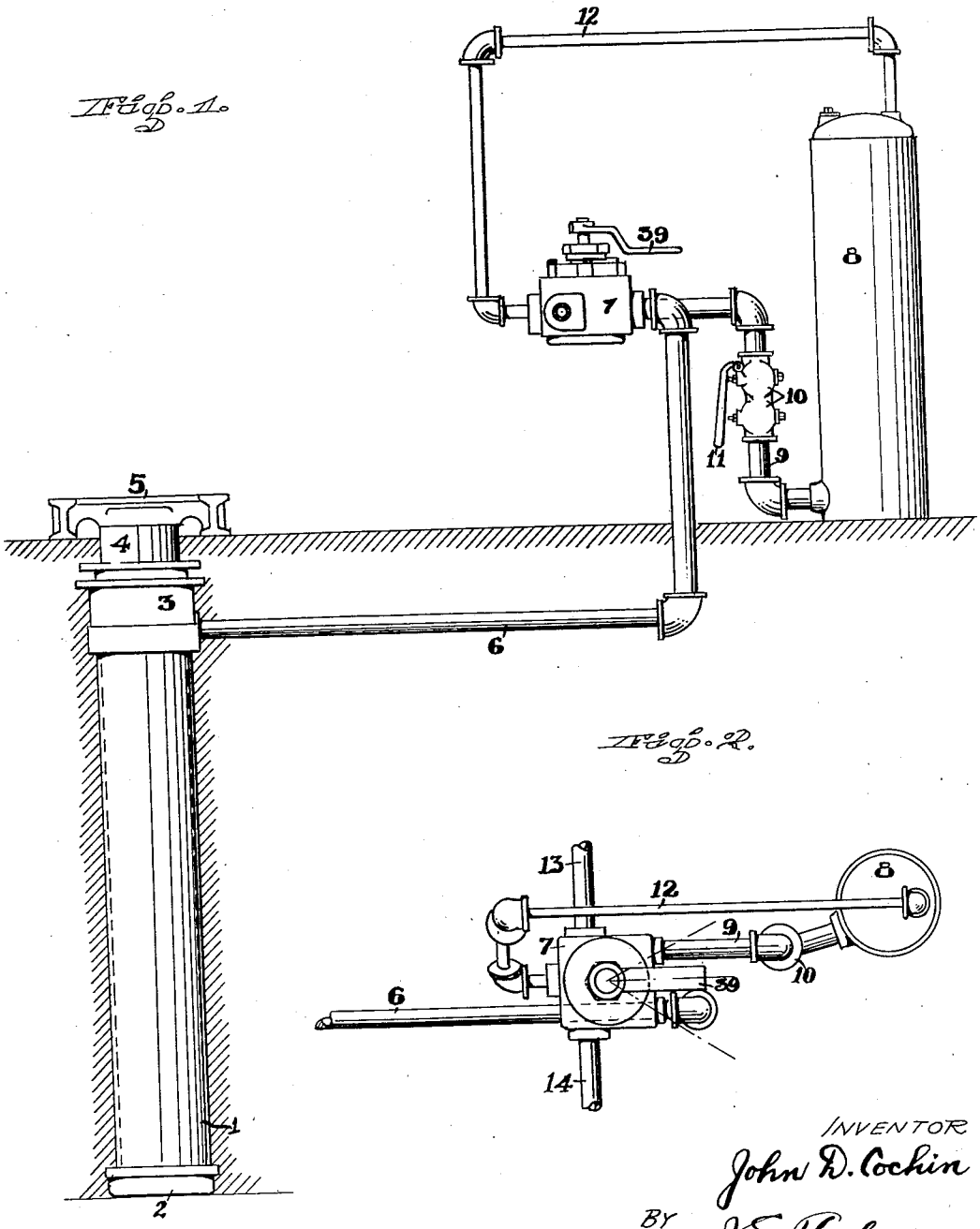



Fig. 2.




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Fig. 3.

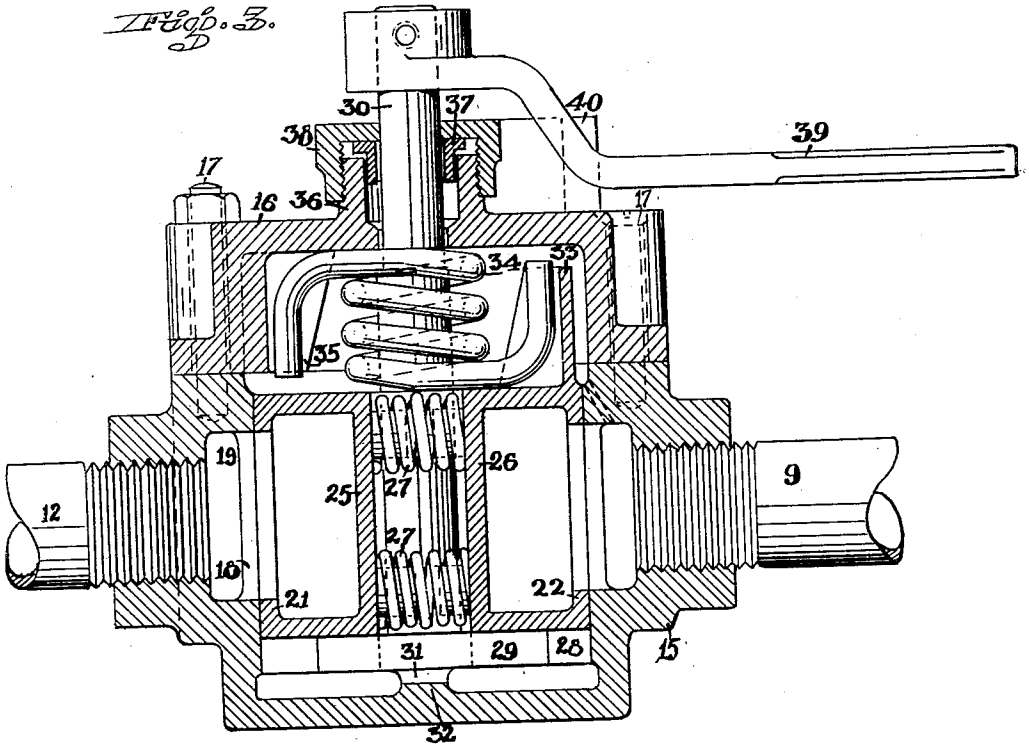
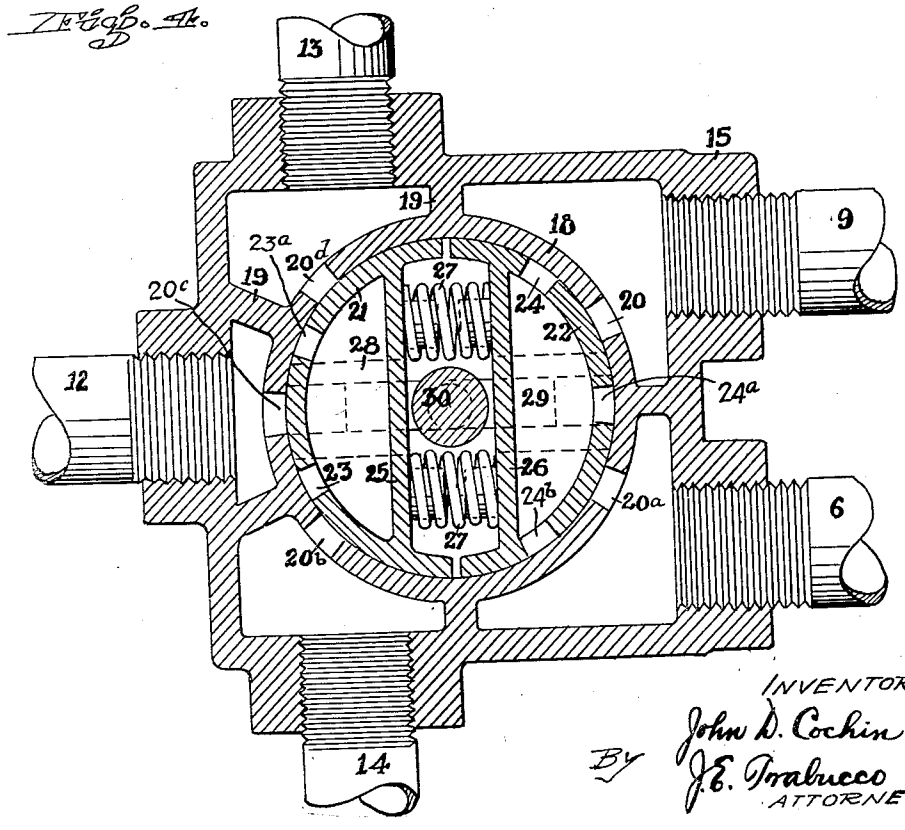



Fig. 4.




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# UNITED STATES PATENT OFFICE.

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## VALVE FOR LIFTING DEVICES.

Application filed March 23, 1927. Serial No. 177,804.

This invention relates to improvements in valves for lifting devices.

An object of my invention is to provide an improved valve for lifting devices.

Another object of my invention is to provide an improved valve for lifting devices in which is embodied suitable means for safely maintaining a load at any desired height.

Another object of my invention is to provide an improved valve for lifting devices, having suitable means embodied therein for instantaneously stopping the upward movement of the lifting device.

Another object of my invention is to provide an improved valve for elevating devices, having suitable controls embodied therein for regulating the movement of the various operating parts of the device.

Other objects more or less apparent will present themselves or will be specifically pointed out in the description to follow.

In the accompanying drawings:

Fig. 1 is a side elevation of a lifting apparatus embodying my invention;

Fig. 2 is a top view of a portion of the apparatus shown in Fig. 1;

Fig. 3 is a vertical sectional view of a regulating valve constituting my invention, showing the same in an open position; and

Fig. 4 is a horizontal sectional view of the valve shown in Fig. 3, showing the same in a closed position.

Referring to the drawings, the numeral 1 represents a cylindrical shaped casing having its lower end closed by a bottom plate 2, its upper end provided with a reenforcing ring 3, and its inside surface provided with vertically extending grooves. Movably located inside the casing 1 and the ring 3, with its circumferential surface slightly separated from the inside surface of the casing, is a ram 4 which has a rack 5 secured to its top end. The casing 1 and the ram 4 are placed in operating position below the surface of the ground or floor, with the rack 5 suitably projecting above the ground so as to engage with the underneath part of an automobile or other device to be elevated.

Extending through the ring 3 to the inside of the casing 1, is a pipe 6 which is adapted to carry oil to the inside of the casing for the purpose of elevating the ram. The oil delivered under pressure to the inside of the casing by the pipe 6, is forced downwardly inside the grooves located in the wall of the casing; and it thereafter exerts sufficient pressure on the bottom of the ram 4 to force the said ram and the automobile located on the rack 5 in an upward direction.

The pipe 6 is suitably connected at its opposite end to a control valve 7, which is adapted to deliver oil with sufficient pressure to elevate the ram 4. Connecting the control valve 7 and an oil containing tank 8 is a pipe 9 which is adapted to carry oil from the said tank to the control valve. Located on the pipe 9 is a double control valve 10 which embodies a construction adapted to shut off the flow of oil from the tank to the control valve 7 when the handle 11 is released, as shown in Fig. 1.

Connecting the tank 8 and the control valve 7 is a pipe 12 which is adapted to carry compressed air from the said control valve to the said tank.

Leading from a source for supplying a desired quantity of compressed air, and suitably connected to the control valve 7, is a pipe 13, which is adapted to deliver sufficient quantities of compressed air for the satisfactory operation of the apparatus.

The control valve 7 is provided with a pipe 14 which is adapted to carry away any compressed air located inside the control valve not required for the operation of the apparatus.

The control valve 7 comprises an enclosing casing 15, having the various pipes 6, 9, 12, 13 and 14 connected thereto, and a top cover plate 16 suitably secured thereon by bolts and screws 17.

Located inside the enclosing casing 15 is a cylindrically shaped member 18 which is suitably maintained and supported inside the said casing by a plurality of supporting members 19 which are each suitably secured to the cylindrical shaped member and the enclosing casing, or are formed integrally therewith.

The supporting members 19 are so arranged inside the casing 15 that one of them extends vertically between the points where each of the pipes 6, 9, 12, 13 and 14 connect with the inside of the said casing, thereby forming separate chambers having each chamber connected to one of the said pipes. The cylindrical shaped member 18 is provided with a plurality of vertically disposed slots $20$, $20^a$, $20^b$, $20^c$ and $20^d$ which are so distributed along the wall thereof that each one of the said slots forms a passage way con-

necting each chamber with the inside of the said cylindrical shaped member.

Movably located inside the cylindrical shaped member 18 with their sides closely fitting against the inner circumferential surface of the said cylindrical shaped member, are two arcuate members 21 and 22, having their tops and bottoms closed. The arcuate member 21 is provided with two slotted openings 23, $23^a$ the former being adapted to register with the slots $20^b$ and $20^c$ of the cylindrical shaped member 18, and the latter with the slots $20^c$ and $20^d$ of the same member. The other arcuate member 22 is provided with three slotted openings 24, $24^a$, and $24^b$, the former being adapted to register with the slot 20, $24^a$ being adapted to register with the slots 20 and $20^a$, and $24^b$ being adapted to register with slot $20^a$.

The arcuate member 21 is provided with a vertically extending plate 25 which is rigidly secured to the top, bottom and sides of the said member so as to enclose the space located therein. The arcuate member 22 is provided with a vertically extending plate 26 which is rigidly secured to the top, bottom and sides of the said member to enclose the space located therein.

Extending inwardly from the two plates 25 and 26 are a plurality of bosses around which are located four spiral springs 27 which exert an outward force against the said plates so as to keep the arcuate members 21 and 22 separated and in close contact with the walls of the cylindrical shaped member 18.

Secured to the bottom of each of the arcuate members 21 and 22 are two parallel and horizontal extending projections 28, and movably located between the said projections is a bar 29 to which is secured an operating rod 30, the latter extending upwardly between the plates 25 and 26, and through the top cover plate 16.

The bottom of the bar 29 immediately beneath the operating rod 30, is provided with a projection 31 which rests on and is supported by a boss 32 located on the bottom side of the enclosing casing 15.

Extending upwardly from the top of the arcuate member 22 is a projection 33 against which bears the upwardly disposed end of a spiral spring 34, the opposite end of the said spring bearing against a downwardly extending projection 35 located on the top cover plate 16. The spiral spring 34 encircles the operating rod 30 and serves to return the arcuate members 21 and 22 to such a position that none of the openings 23, $23^a$ and 24, $24^a$ and $24^b$ located therein register with any of the slots 20, $20^a$, $20^b$, $20^c$ and $20^d$ of the cylindrical shaped member 18.

The top cover plate 16 is provided with a cylindrical projection 36 which is located around the operating rod 30, and located between the said projection and the said operating rod is a bushing 37 which is held in place by a cap 38 screwed on the projection 36.

Secured to the end of the operating rod 30 is a handle 39 which serves to move the said rod, the bar 29 and the arcuate members 21 and 22.

Extending upwardly from the top of the top cover plate 16 is a projecting part 40 which serves to prevent the handle 39 from being moved by the spiral spring 34 farther than is required to maintain the device in a closed position.

In operation, compressed air under suitable pressure is delivered to the control valve 7 through the pipe 13. The handle 39 is turned in a clockwise direction until the openings 23 and $23^a$ located in the arcuate member 21 are made to register respectively with the slots $20^c$ and $20^d$ located in the cylindrical shaped member 18, and also the openings 24 and $24^a$ in the arcuate member 22 are made to register respectively with slots 20 and $20^a$ of the said member 18.

A quantity of compressed air is thereby allowed to proceed into the space located inside the arcuate member 21, from whence it passes through pipe 12 to the oil tank 8. The compressed air entering the oil tank 8 causes the oil located therein to be forced through pipe 9 into the chamber in the casing 15 which is located adjacent the said pipe. The oil thereafter proceeds through the slot 20 and the opening 24 into the space located inside the arcuate member 22, from whence it passes through opening $24^a$ and slot $20^a$ into the chamber in the casing 15 located adjacent the pipe 6. From this chamber it proceeds through pipe 6 to the cylindrically shaped casing 1 and downwardly through the grooves located therein to the bottom 2. Thereafter, the said oil exerts an upward force on the bottom of the ram 4, thereby elevating the said ram and the load positioned on the rack 5.

By releasing the handle 39, the spiral spring 34 bearing against the projections 33 and 35 returns the arcuate members 21 and 22 to a neutral position, thereby closing the slotted openings located in the cylindrical shaped member 18. The compressed air formerly passing through the pipe 13 is thereupon prevented from proceeding through the valve 7, and the ram 4 is maintained in a raised position.

To permit the ram to be dropped downwardly to the surface of the ground, the handle 39 is turned in a contra-clockwise direction until the slot $23^a$ registers with opening $20^c$ and slot 23 registers with opening $20^b$, thereby permitting the compressed air in the top part of tank 8 to proceed through pipe 12 and escape from the valve through pipe 14. At the same time the slot $24^b$ is

made to register with the opening $20^a$, and the slot $24^a$ is made to register with the opening 20, thereby allowing the oil in the casing 1 to flow through pipe 6 into the valve and from the valve through pipe 9 back into the tank 8.

Although I have described my invention with considerable detail it is apparent to those skilled in the art that the same may be embodied in other forms having similar constructions and similar modes of operation. I therefore do not desire my invention confined to the exact construction shown and described, but desire it to be included broadly in the appended claims.

Having described my invention what I claim is:

1. A valve comprising, a casing having a number of openings therein for the passage of compressed air and liquid, a cylindrical member located inside the casing having a plurality of openings therein, a plurality of compartments located between the casing and the cylindrical member, a pair of arcuate members movably located inside the cylindrical member having a plurality of slots therein; and means for moving the arcuate members whereby certain of the slots in the arcuate members may be made to register with the openings in the cylindrical member.

2. A valve comprising, a casing having a number of ports therein for the passage of compressed air and liquid, a cylindrical member located inside the casing in spaced relation thereto having a plurality of openings therein, a plurality of arcuate members movably located inside the cylindrical member having a plurality of slots therein, means for moving the arcuate members whereby certain of the slots therein may be made to register with certain of the openings in the cylindrical member, and means located between the arcuate members for keeping the walls thereof in contact with the walls of the cylindrical member.

3. A valve comprising a casing having a number of ports therein for the passage of compressed air and liquid, a cylindrical member located inside the casing in spaced relation thereto having a plurality of openings therein, a plurality of chambers located between the casing and the cylindrical member and adjacent the ports in the casing, a pair of arcuate members movably located inside the cylindrical member with their walls in contact with the walls of the cylindrical member having a plurality of slots therein, and means for moving the arcuate members so that certatin of the slots therein may be made to register with the openings in the cylindrical member, whereby compressed air and liquid may pass through the chambers located between the casing and the cylindrical member.

JOHN D. COCHIN.