Jan. 25, 1927. 1,615,462

D. G. LORRAINE

VALVE

Filed May 26, 1924

Fig. 2.

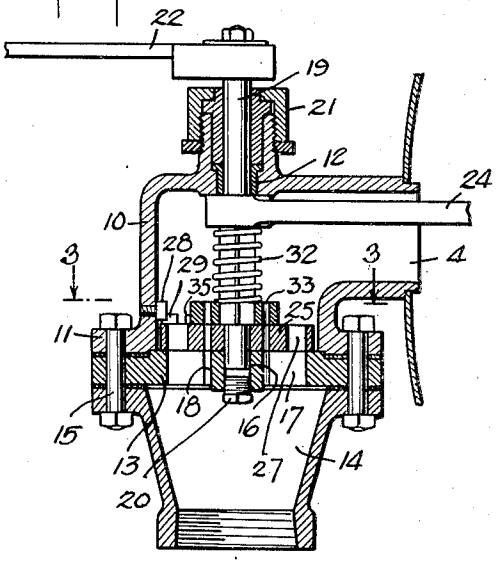


Fig. 1.

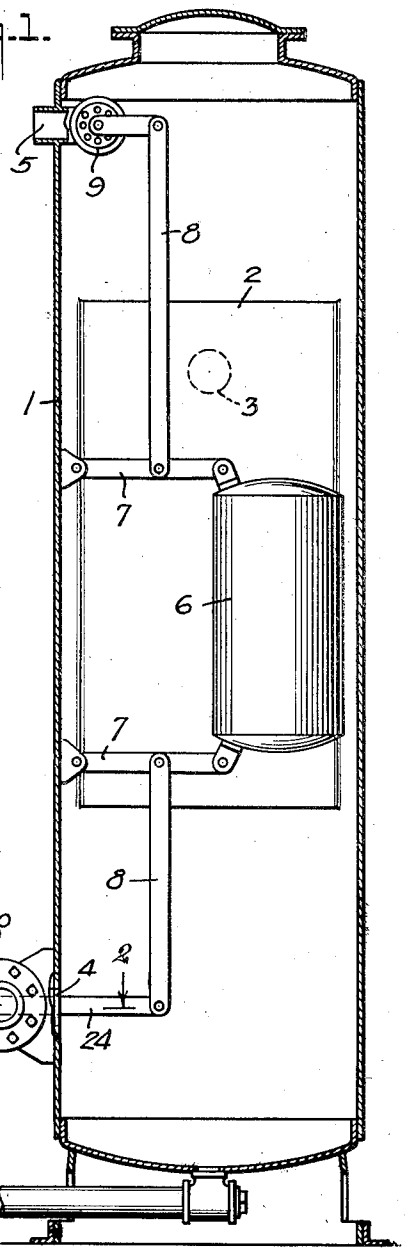


Fig. 3.

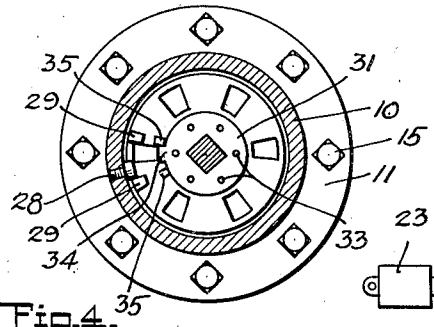


Fig. 4.

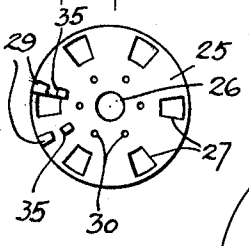
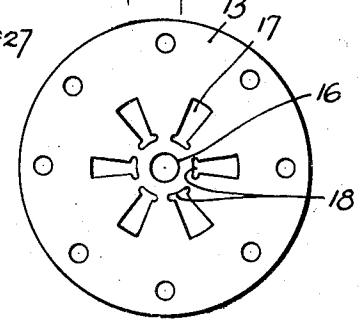


Fig. 5.



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UNITED STATES PATENT OFFICE.

DAVID G. LORRAINE, OF LOS ANGELES, CALIFORNIA.

VALVE.

Application filed May 26, 1924. Serial No. 715,893.

This invention is a valve particularly adapted for operation by a float mechanism, and providing for opening movement with a minimum effort.

It is the object of the invention to provide a valve structure wherein initial opening movement will shift a member having a relatively small area exposed to the pressure against the valve and thereby permit said movement with little effort, said initial movement opening a relatively small orifice through the valve in order that the pressure at the respective sides thereof may be balanced and thus permit continued opening movement of the valve with minimum effort.

It is a further object of the invention to provide a valve structure as described, in which both initial and final opening movement is accomplished by sliding motion at right angles to the direction of pressure against said valve, so that there will be less resistance to said opening movement than in a construction wherein the movable member of the valve opens directly against the pressure on the same.

It is a still further object of the invention to provide an extremely simplified and compact arrangement adapted to be readily assembled or taken apart for replacement of parts, repairs, and the like.

It is a still further object of the invention to provide a valve particularly adapted for use in connection with an oil and gas separator, said valve controlling the oil discharge from said separator and having an operating connection with a float suspended therein so that the oil discharge is regulated in proportion to the level of the liquid with relation to the separator, the arrangement of the valve which provides for movement thereof with minimum effort, permitting of sensitive response to movement of the float.

Fig. 1 is a vertical section through a usual gas and oil separator, showing the improved valve used in connection with the oil discharge therefrom.

Fig. 2 is a detail section of the valve mechanism on the line 2—2 of Fig. 1.

Fig. 3 is a transverse section on the line 3—3 of Fig. 2.

Fig. 4 is a front view of the intermediate movable closure disc.

Fig. 5 is a similar view of the fixed closure disc.

The oil and gas separator upon which the improved valve is used, comprises a tank 1 having vertical partition 2 forming an inlet passageway in rear of said partition and open at its respective ends to the lower and upper portions of the tank which form a settling chamber and a gas chamber.

Flow inlet 3 communicates with the tank in rear of partition 2, and oil and gas discharges 4 and 5 are open to said tank at the settling chamber and the gas chamber, respectively. A float 6 is suspended in the tank in front of partition 2 by rocker arms 7, and links 8 connected to said rocker arms control valves 9 and 10 for the gas and oil discharges, respectively.

The valve 10 for the oil discharge comprises a casing mounted on the outside of the wall of tank 1, and communicating at one end with the oil discharge. The casing has a discharge opening at one side provided with a lateral peripheral flange 11, and an opening 12 forms a bearing for the valve rod at the opposite side of said casing.

Closure means shown as a disc 13 is mounted against the lateral flange 11 of the discharge opening and a reduction nozzle 14 adapted to have a suitable discharge pipe connected thereto, is provided with a flanged end received against disc 13, the parts being held in place by bolts 15 extending through said flanges and disc.

Disc 13 as clearly shown in Fig. 5, is provided with a central bearing 16, and radial slots 17 circumferentially spaced and forming relatively large ports, said slots terminating at their inner ends in restricted circumferential extensions 18.

The operating rod 19 for the valve is journaled at one end in bearing 16, the end of said bearing opening being closed by a plug 20, and said operating rod extends

across the valve casing and through bearing opening 12, with a suitable stuffing box 21 on the projecting end of said rod.

An arm 22 carrying a counter-weight 23 is mounted on the outer end of rod 19, and an operating arm 24 is fixed upon a squared medial portion of said rod inside the valve casing, and extends into tank 1 through the oil discharge opening 4. The operating arm is pivoted to one of the links 8, so that movement of float 6 responsive to variations in the oil level in the separator, will oscillate valve rod 19.

A slidable member adapted for movement at right angles to the direction of the flow against the closure means of the valve, cooperates with closure disc 13 and is shown as a disc 25 having a central bearing 26 for journaling the same on rod 19 against the inner surface of disc 13.

Disc 25 as clearly shown in Fig. 4, is provided with relatively large circumferentially spaced radial ports 27, adapted to aline with the outer ends of ports 17 or be turned completely out of alinement with said ports, by oscillation of disc 25.

The movement of disc 25 to position for full alinement of ports 17—27 so as to open the valve, or complete closing of the valve by alinement of ports 27 with the portions of disc 13 between the circumferentially spaced ports 17 formed therein, is limited by a stud 28 mounted on the inside of the valve casing and projecting between circumferentially spaced lugs 29 on the surface of disc 25 at the periphery thereof, one or the other of said lugs being adapted to abut against stud 28 when disc 25 is turned to full open or closed position.

Restricted orifices 30 are formed in disc 25 in circumferentially spaced relation, so as to aline with the restricted extensions 18 in disc 17, irrespective of the position to which disc 25 is turned with relation to disc 13, the circumferential enlargement of said extensions maintaining said alinement of the restricted openings at one end or the other of said extensions, even when disc 25 is turned to its respective limits of movement for full opening or closing of the ports through the valve.

A second member adapted for sliding movement at right angles to the direction of pressure against the closure means of the valve, cooperates with discs 13 and 25, and is shown as a disc 31 fixed on the squared medial portion of valve rod 19 against disc 25, a coil spring 32 mounted on said valve rod and impinging against disc 31 yieldably maintaining discs 13, 25, and 31 in axial abutment while permitting relative rotation of the same.

Disc 31 as shown in Fig. 3, is of a diameter terminating short of ports 17 and 27 so as not to obstruct the same and provide a relatively small area exposed to the pressure in the valve casing, and said disc has restricted orifices 33 adapted for alinement or non-alinement with restricted orifices 30, upon turning of disc 31 relative to disc 25.

A lug 34 projects radially from disc 31 between circumferentially spaced lugs 35 on disc 25, the arrangement of the parts permitting initial turning of disc 31 for alinement or non-alinement of orifices 30—33 without abutment of lug 34 against either of the lugs 35. Continued turning of disc 31 after alinement of orifices 30—33 will turn disc 25 by contact of lug 34 with one or the other of lugs 35, in order to move the disc to its respective limits of movement for opening or closing ports 17—27.

In operation the float 6 moving responsive to variations in the oil level in the separator, will rock operating arm 24 and thereby turn valve rod 19 in opposite directions.

Turning movement of rod 19 in one direction will turn disc 31 for initial non-alinement of orifices 30—33 and subsequent shifting of disc 25 to its limit of movement for closing the passages through ports 17—27, the valve in this position being completely closed.

Initial turning of rod 19 in the opposite direction will rotate disc 31 without movement of disc 25, for alinement of restricted orifices 30—33, and orifices 30 being always open to the restricted extensions 18, a relatively small passage through the valve is thus opened for balancing the pressure at the respective sides thereof.

The disc 31 exposing but a relatively small area to the pressure in the valve casing, and moving in a direction at right angles thereto, permits of said initial turning movement with a minimum effort, and after the pressure against disc 31 has been thus relieved, turning movement thereof may be readily continued for subsequent partial or full alinement of ports 17—27, to variably open the valve.

It will be apparent that various changes may be made in the construction, combination, and arrangement of parts as thus described, without departing from the spirit of the invention.

I claim:

A valve comprising a casing, a closure for the casing having a discharge opening with a small portion of said opening transversely elongated, a movable member having a port adapted for alinement or non-alinement with said discharge opening, the movable member also having an orifice adapted for alinement with the elongated portion of the discharge opening irrespective of alinement or non-alinement of the port and discharge opening, a second movable member having an orifice adapted for alinement or non-alinement with the orifice of the first mov-

able member, means for initially moving the second movable member to aline the orifices without movement of the first movable member, and a lost motion connection between the movable members whereby continued movement of the second movable member will also move the first movable member to aline its port and the discharge opening and maintain the orifices in alinement.

In testimony whereof I have affixed my signature to this specification.

DAVID G. LORRAINE.