

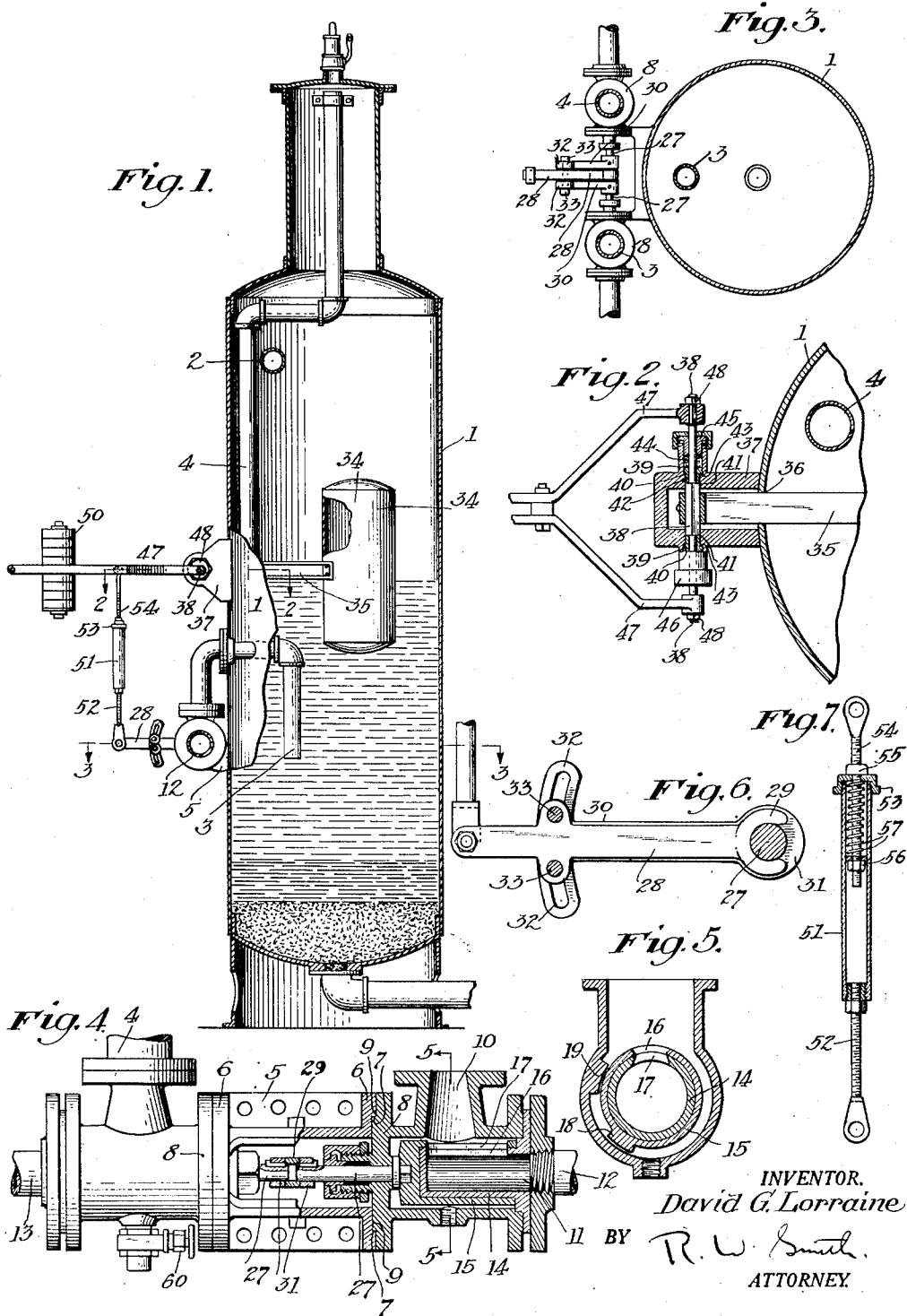
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VALVE

Original Filed Nov. 6, 1922



UNITED STATES PATENT OFFICE.

DAVID G. LORRAINE, OF LOS ANGELES, CALIFORNIA.

VALVE.

Original application filed November 6, 1922, Serial No. 599,420. Divided and this application filed February 23, 1923. Serial No. 620,720.

To all whom it may concern:

Be it known that I, DAVID G. LORRAINE, a citizen of the United States, residing at Los Angeles, county of Los Angeles, State of California, have invented new and useful Improvements in Valves, of which the following is a specification.

This invention relates to a valve mechanism adapted to control the flow of a plurality of fluids, and particularly adapted for use in connection with an oil and gas separator of the type illustrated and described in my co-pending application Serial No. 599,420, filed November 6, 1922, and of which the present application is a division.

It is the object of the invention to provide a construction having a plurality of valves each adapted to control the flow of a fluid, as for example the oil and gas from a separator, said valves being arranged whereby relative opening and closing thereof may be adjusted.

It is a further object of the invention to provide for float controlled operation of the valves, said operating means being yieldable to provide a cushioned action as the valves are seated in closed position.

The invention further provides a valvular construction whereby any sand accumulating in said valves may be readily removed; and a mounting for said valves adapted to positively aline the same to insure proper actuation of the valves by the operating connection.

It is a still further object of the invention to provide an operating connection between the valves and the float which controls the same, having improved leak-proof packing for preventing leakage of fluid, and provided with readily accessible means for tightening said packing.

The invention will be readily understood from the following description of the accompanying drawings, in which:

Fig. 1 is a vertical section through an oil and gas separator having the improved valve mechanism mounted thereon.

Figs. 2 and 3 are detail sections on the lines 2-2 and 3-3 of Fig. 1.

Fig. 4 is a detail elevation of the valve mechanism, partly in vertical section.

Fig. 5 is a transverse section on the line 5-5 of Fig. 4.

Fig. 6 is a detail elevation of the valve actuating means.

Fig. 7 is a vertical section through the cushioning means for the valve operating connection.

In the present instance, the improved valve mechanism is illustrated as employed in connection with an oil and gas separator including a closed casing 1, having a flow inlet 2 near the top thereof, and through which the mixed oil and gas from a well is adapted to enter the casing, the heavier oil constituents of the flow settling in the lower portion of the casing, and the lighter gaseous constituents of the flow rising into the top of said casing.

An oil outlet pipe 3 is provided in the lower portion of casing 1, and a gas outlet pipe 4 is open to the upper portion of said casing, the pipes 3 and 4 extending outwardly through the casing wall in horizontal alinement.

A cradle 5 is fixed upon the outside of the casing wall below pipes 3-4, said cradle having outwardly projecting transversely spaced supporting discs 6. These discs have annular shoulders 7 upon their outer surfaces in axial alinement transversely of casing 1.

Valves are mounted upon discs 6 and are connected to pipes 3-4, respectively. Each of these valves includes a cylindrical casing 8 fixed at one end to one of the discs 6, said casings each having an annular shoulder 9 engaging shoulder 7 for positively alining the valve casings.

An inlet port 10 in the top of each valve casing is connected to one of the pipes 3-4, and a discharge port 11 in the outer end of each valve casing is connected to one of the pipes 12-13, which are oil and gas discharge pipes, respectively.

A sleeve 14 is fixed in each of the valve casings, said sleeve having an open outer end communicating with discharge port 11. A rotatable sleeve 15 in the valve casing is received over sleeve 14 and is provided with a port 16 circumferentially alined with a port 17 in the upper portion of sleeve 14.

It will thus be seen that rotation of sleeve 15 will either aline ports 16-17 so as to permit flow through the valve and out of port 11, or will move port 17 out of alinement with port 16 so as to close the valve.

A radial lug 18 projecting from sleeve 15, is adapted to impinge against a cooperating lug 19 extending inwardly from the inner

surface of valve casing 8, when sleeve 15 is turned to closed position, and the abutment of the lugs cooperating with the rotating force exerted upon the sleeve 15, will bind said sleeve to its seat upon sleeve 14 with a twisting force exerted diagonally across the valve, so as to tightly close the latter.

Operating shafts 27 are axially fixed to sleeves 15 of the two valves, and said shafts extend toward one another in axial alignment through bearings in the respective cradle discs 6.

An actuating arm 28 is provided with a forked end 29 journaled upon the ends of shafts 27, said shaft ends being spaced slightly apart. Arms 30 are positioned at each side of arms 28 and form bearings 31 at their inner ends which are keyed upon the respective shafts 27.

Circumferentially slotted members 32 are provided at the outer ends of arms 30 whereby said arms may be circumferentially adjusted relative to one another, and fixed in adjusted position relative to arm 28 by bolts 33 received through the slotted members 32 and through bolt openings in arm 28 alining with said slots.

A float in casing 1 is adapted to rock the arm 28 and the arms 30 fixed thereto, so as to control opening and closing of the valves; and it will be noted that the relative adjustment of arms 30 provides for adjusting the relative opening and closing of the valves.

The float is shown at 34, mounted in casing 1, said float having a supporting arm 35 extending through an elongated slot 36 in the wall of the casing, and into a bearing housing upon the exterior of said wall.

The bearing housing, shown at 37, is an integral casting open at one side, and elongated vertically at said side so as to fit over and close the slot 36, the edges of said casting being welded to the walls of casing 1.

A shaft 38 extends transversely of casing 1 through the outer portion of housing 37, with the end of arm 35 fixed thereon so that the rise and fall of the float will turn the shaft 38.

The walls of housing 37 form bearings for shaft 38, with packing means cooperating with said bearings to prevent leakage. As an instance of this arrangement, outwardly extending bearing sleeves 39 project from the walls of housing 37, said sleeves having interior shoulders 40 at their inner ends, with the shaft 38 extending through said sleeves.

The shaft is squared in cross-section at the portion thereof within housing 37, so that arm 35 may be fixed thereto by means of a square bearing at the end of said arm received on said square shaft. The portions of the shaft extending through the bearing sleeves are round in cross-section, forming

shoulders 41 at the ends of the medial squared portion of the shaft.

A ring 42 is received in each bearing sleeve and is provided with a shoulder 43 whereby said ring is removably seated against the shoulder 40, and shoulder 41 upon the shaft 38 bears against the ring. Packing 44 is positioned around shaft 38 within the bearing sleeve and against ring 42, and a follower 45 is received over the shaft within the bearing sleeve and impinges against the packing.

A nut 46 having the round portion of shaft 38 extending outwardly therethrough, is threaded onto the end of sleeve 39 and bears against follower 45, so that tightening of said nut will expand the packing to form a leak-proof construction.

The portions of shaft 38 beyond the bearing sleeves are squared in cross-section, and outwardly projecting arms 47 having square bearings are fixed on said portions of the shaft, and may be retained in position by nuts 48 threaded onto the ends of the shaft.

The outer ends of arms 47 are laterally offset to a position alongside of one another and a counterweight 50 is mounted upon said juxtapositioned arm ends, with an operating connection between an intermediate point along said arm ends and the outer end of rock arm 28.

This operating connection is a cushioned construction adapted to yield when arm 28 has been rocked to a position causing lugs 18—19 of a valve to impinge, and in which position said valve will be closed as previously described.

The cushioned operating connection includes a tube 51 having a rod 52 threaded in one end thereof, with the other end of said rod pivoted to arm 28. The opposite end of the tube has a cap 53 with a rod 54 slidable therethrough. The outer end of this rod is pivoted to arms 47 and a collar 55 on the rod is adapted to impinge against cap 53 when the rod is forced downwardly by the rise of float 34, thereby forcing the tube 51 and rod 52 downwardly for rocking arm 28 to cause opening movement of the valves.

A nut 56 is threaded onto the end of rod 54 which extends into tube 51, and a spring 57 is mounted on said rod end between the nut and the cap 53. It will thus be seen that as float 34 falls, so as to elevate rod 54, the tube 51 and rod 52 will also be raised until arm 28 is so rocked as to cause the lugs 18—19 of a valve to impinge with said valve in closed position. Continued elevation of rod 54 will compress spring 57 so as to permit yielding of said rod with relation to tube 51 and rod 52.

In operating the valve mechanism as thus described, sand or like material may collect in the casings of the valves, and in order to provide for convenient withdrawal of such

material, valve casings 8 may be provided at the bottoms thereof with manually operated valve controlled drains 60.

What is claimed is:

1. A valve mechanism comprising a cradle having alined positioning means, valves having operating shafts and supported by said cradle in engagement with said positioning means for alining said operating shafts, means for rotatably adjusting said shafts relative to one another, and an operating connection fixed to said adjusting means.

2. A valve mechanism comprising a cradle having alined annular shoulders, valves having operating shafts and supported by said cradle, said valves having annular shoulders adapted to engage the first mentioned annular shoulders for alining the operating shafts of said valves, means for rotatably adjusting said shafts relative to one another, and an operating connection fixed to said adjusting means.

3. Valve operating mechanism including an operating arm, a shaft having said arm fixed thereon, shoulders on said shaft beyond said arm, bearings for said shaft forming annular spaces between said shaft and said bearings, removable rings on said shaft and seated in said annular spaces against said shoulders, and packing means in said annular spaces against said rings.

4. Valve operating mechanism including an operating arm, a shaft having said arm fixed thereon medially of said shaft, the ends of said shaft being of reduced diameter forming shoulders on said shaft, bearings for said shaft ends of a size to permit insertion of the enlarged medial portion of the shaft therethrough and forming annular spaces between said shaft ends and said bear-

ings, removable rings on said shaft ends seated in said annular spaces with the shoulders on said shaft against said rings, and packing means in said annular spaces against said rings.

5. A valve mechanism including valves having axially alined operating shafts, rock arms fixed on the respective operating shafts, an operating arm journaled on said operating shafts between said rock arms, said rock arms having arcuate slots adapted to be circumferentially adjusted relative to one another, and fastening means received through said slots and said operating arm, the adjustment of said rock arms varying the relative opening and closing of said valves.

6. Valve mechanism including an actuating shaft having ends of reduced diameter, bearings for said shaft ends of a size to permit insertion of the enlarged medial portion of the shaft therethrough and forming annular spaces between said shaft ends and said bearings, removable rings on said shaft ends seated in said annular spaces, and packing means in said annular spaces against said rings.

7. A valve mechanism including valves, rock arms for actuating said valves, an operating arm for said rock arms, said rock arms having a common axis and arcuate slots adapted to be circumferentially adjusted relative to one another, and a fastening means received through said slots and said operating arm, the adjustment of said rock arms varying the relative opening and closing of said valves.

In testimony whereof I have signed my name to this specification.

DAVID G. LORRAINE.