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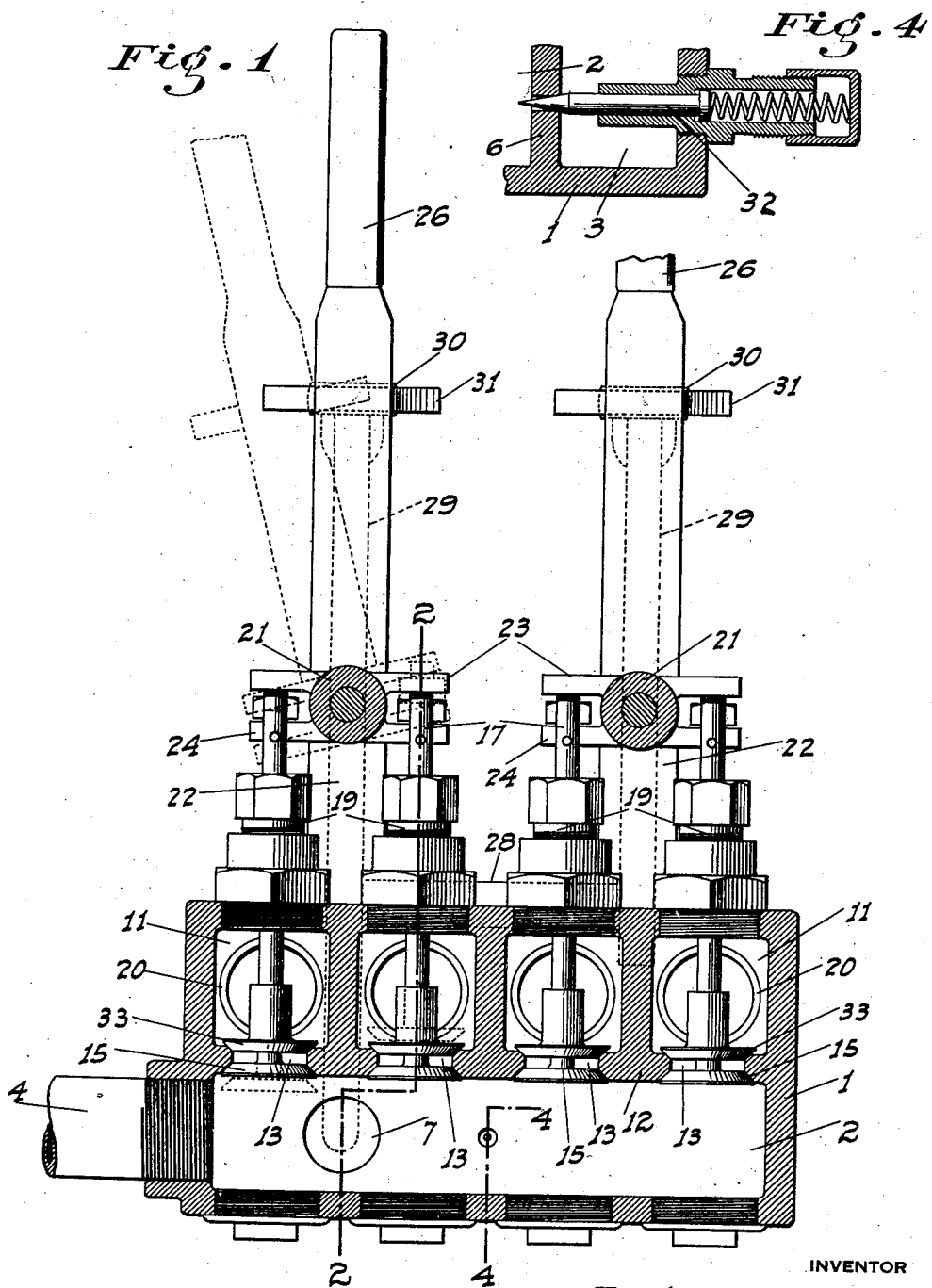
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1,760,308

FLUID CONTROL VALVE

Filed Feb. 27, 1928

2 Sheets-Sheet 1



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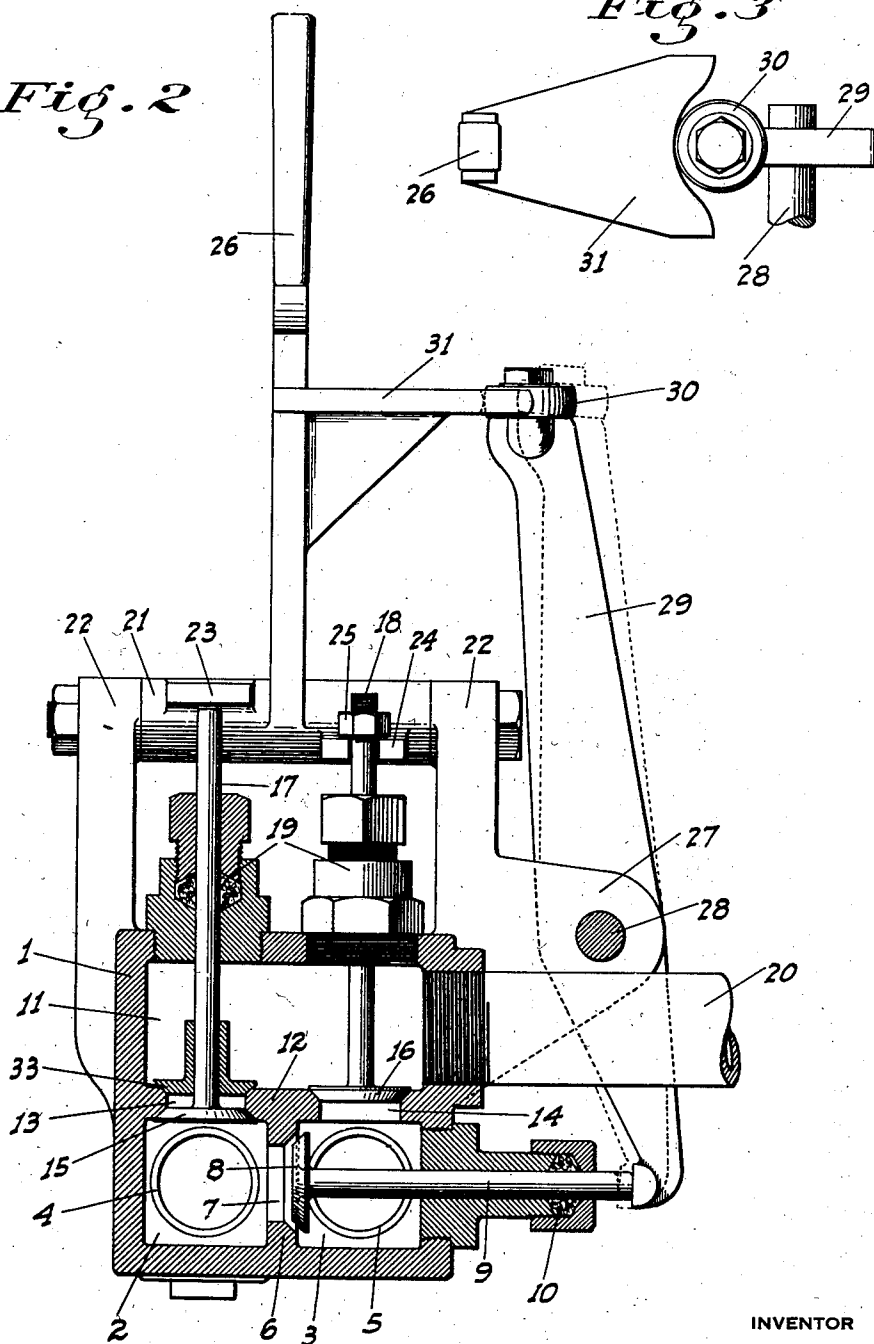
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*Fig. 2*

*Fig. 3*



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## UNITED STATES PATENT OFFICE

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## FLUID-CONTROL VALVE

Application filed February 27, 1928. Serial No. 257,503.

This invention relates to valves for controlling the flow of a liquid or air under pressure, and especially to a multiple-way valve for use in the manual control of the flow of a fluid to and from the opposite ends of cylinders and like members.

I have particularly in mind to employ this valve in connection with the control of the pressure actuated bucket closing cylinder structure shown in my co-pending application for patent Serial Number 223,548, filed October 3, 1927. To operate this structure the fluid must be under a very high pressure to effectively operate the bucket sections, and such pressure is necessarily fed to both ends of the cylinder at different times.

The principal object of this invention is to provide a valve for this purpose so constructed that with the aid of a single operating handle, the pressure may be selectively let into either end of the cylinder while being released from the other end; and for enabling such pressure to be held in the cylinder indefinitely so as to enable the parts controlled by the fluid to be maintained in certain fixed positions.

A further object is to construct the valve so that the opening of any valve member, even with the very high pressure employed, may be very easily accomplished with but comparatively little physical exertion being necessary.

Still another object is to arrange the parts of the structure so that the manifolding of the various passages is very simple, while enabling a considerable number of individual valves (sufficient to control several cylinders if desired) being employed as a single unit.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views.

Fig. 1 is a sectional end elevation of my

improved valve structure, shown with two individual sets of valves, but having certain parts common to both sets.

Fig. 2 is a side section taken on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary top plan view of the operating handle and the pressure-relief valve actuating means.

Fig. 4 is a fragmentary cross section on the line 4—4 of Fig. 1 showing a safety valve.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 denotes the main body of the valve, which is preferably a rectangular casting of suitable size. The lower portion of the body is divided into two separated chambers 2 and 3, to one end of which pressure intake and return pipes 4 and 5 respectively are connected, said pipes leading from a pressure pump or the like which forms no part of this invention.

The division wall 6 between these chambers has a port 7 therethrough, a normally open valve 8 of the poppet type opening away from the intake or pressure chamber 2, being positioned to close said port. The stem 9 of this valve projects to the outside of the chamber 3 through a suitable stuffing gland 10.

The body above the chambers 2 and 3 is divided into a plurality of separate compartments 11 all of which extend crosswise of the chambers 2 and 3. Four of such chambers 11 are shown, but any multiple of two, to control a suitable number of cylinders or other units, may be employed in the one structure. The bottom wall 12 of each chamber 11 has ports 13 and 14 therethrough which communicate with the chambers 2 and 3 respectively. Downwardly opening poppet valves 15 are positioned to normally close the ports 13, while upwardly open poppet valves 16 are positioned to normally close the ports 14. The stems 17 and 18 respectively of these valves project upwardly to a point above the top of the body through suitable guide and packing gland members 19. Each chamber 11 has a pipe 20 leading therefrom, the pipes of adjacent chambers leading to the opposite ends of a cylinder or the like (not shown).

The adjacent pairs of stems 17 and 18 are

on the opposite sides of a horizontally turnable hub member 21 which is mounted in brackets 22 projecting upwardly from the ends of the body 1, so that one stem 17 and one stem 18 lies on each side of the hub. Pads 23 project laterally from the hub over the stems 17, while slotted pads or ears 24 straddle the stems 18 below their upper ends and are adapted to engage collars on the upper ends of said stems, which collars are preferably in the form of adjustable nuts 25. An operating handle 26 projects upwardly from the hub and is rigid therewith.

Journalled in lugs 27 projecting from one end of the body is a shaft 28 on which is fixed a vertical lever 29 which is longitudinally aligned with the handle 26; the axis of the shaft 28 being at right angles to the axis of rotation of the member 21. The lower end of this lever engages the outer end of the stem 9, while the upper end is adapted to be swung away from the body so as to move its lower end inwardly and cause the valve 8 to be closed, in conjunction with the rocking movement of the handle 26 to one side or the other. This is done in various ways but in the present instance I have shown such means as being in the form of a roller 30 mounted on the upper end of the lever 29, and engaged by concaved cam element 31 projecting from and fixed on the handle and arranged to shift the lever as above stated with a movement of the handle in either direction.

To relieve the pressure in the chamber 2 if necessary when the valve 8 is closed, I mount a spring pressed safety valve 32 in the division wall 6 which valve opens toward the return chamber 3 as clearly shown in Fig. 4.

Each set of four valves 15 and 16 has a single operating handle 26 and its connected parts, but even if two sets of such valves are used as shown in Fig. 1, it is only necessary to employ one pressure relieving valve 8. This is done by merely coupling the levers 29 of the two sets together by the common shaft 28; one lever only extending to said shaft while the other one actuates the valve 8. By this arrangement a rocking movement of either handle causes the relief valve to be actuated as will be evident.

In operation the pressure normally maintained in the chamber 2 with the operation of the pump causes the valves 15 to be closed, while the valve 8 is pressed open until its stem abuts against the lever 29. The valves 16 close of their own weight. When the handle 26 is rocked to one side or the other (which depends on whichever one of the pipes 20 it is desired to feed the pressure), one valve 15 of one chamber is depressed and opened while the valve 16 of the corresponding opposite chamber is raised and opened. At the same time the valve 8 which has heretofore been open to reduce the pressure in the chamber 2 and allow the valve 15 to be easily depressed,

is closed by the movement of the lever 29 which accompanies the operation of the handle. The pressure in the chamber 2 can therefore only pass into the chamber 11 through the open valve 15 and thence to the corresponding pipe 20. The return pressure from the adjacent pipe 20 passes into the corresponding chamber 11 and then to the return chamber 3 through the open port 14. If it is desired to hold the pressure in the chambers and pipes, it is only necessary to move the handle back to its neutral position, when both valves 15 and 16 will again close, the pressure in the chamber 2 will prevent the valve 15 from opening with the pressure in the chamber above, while the valve 16 is held seated by such pressure.

In order to positively prevent any possible leakage down past the valve 15 when the pressure is thus being held in the corresponding chambers 11, I mount slidable poppet valves 33 on stems 17 of the valves 15. These slidable valves normally seal the upper ends of ports 13 but readily open upwardly by the pressure from the chamber 2 as soon as the valves 15 are depressed and opened.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described my invention what I claim as new and useful and desire to secure by Letters Patent is:

1. A valve structure including a body, a pair of separated pressure intake and return chambers therein, another chamber in the body having spaced ports communicating with said first named chambers separately, a conduit leading from said other chamber, normally closed valves for said ports, a movable operating structure for said valves for opening them alternately, there being a port between said pressure intake and return chambers, a valve for said port opening away from the intake chamber, and means for closing said last named valve operated in conjunction with the operation of said valve operating structure.

2. A valve structure including a body, a pair of separated pressure intake and return chambers therein, a pair of delivery chambers in the body separated from said first named chambers, conduits leading from said delivery chambers, a pair of separated ports between the intake chamber and the delivery chambers, a pair of separated ports between the return chamber and the delivery chambers, normally closed poppet valves for all said ports, the valves of the intake ports open-

ing toward the intake chamber and the valves of the return ports opening toward the delivery chambers, stems for all the valves extending in the same direction, operating means for engaging the stems and for selectively moving only the stems of one intake-port valve and the stem of a return-port valve of the other delivery chamber, simultaneously in a valve opening direction, a normally open pressure relieving valve between the intake and return chambers, and means for closing said valve operable in conjunction with the opening of either pair of the first named valves.

3. A valve structure including a body, a pair of separated pressure intake and return chambers therein, a pair of delivery chambers in the body separated from said first named chambers, conduits leading from said delivery chambers, a pair of separated ports between the intake chamber and the delivery chambers, a pair of separated ports between the return chamber and the delivery chambers, normally closed poppet valves for all the ports, stems for all said valves extending in the same direction, the opening movement of the intake-port valves taking place in the direction opposite to that of the return-port valves, a rockable member disposed in a plane at right angles and between the stems, the stems of the intake and also the return valves being on opposite sides of the said member, pads projecting from the member and overhanging the ends of the stems of one corresponding pair of valves, collars on the stems of the other pair of valves, other pads projecting from the said member and passing under said collars, and means for rocking said member.

4. A valve structure including a body, a pair of separated pressure intake and return chambers therein, a pair of delivery chambers in the body separated from said first named chambers, conduits leading from said delivery chambers, valve means between the intake chamber and both delivery chambers separately, and between the return chamber and both delivery chambers separately, and a single operating means for controlling the operation of the valves to permit of a flow of pressure from the intake chamber to one delivery chamber, and from the other delivery chamber to the return chamber, alternately and selectively, said means including a handle rockable in a single plane in both directions relative to a predetermined neutral position, a normally open pressure-relief valve between the intake and return chambers, a stem projecting from said valve, a pivoted lever arranged for swivel movement in a plane at right angles to the plane of movement of said handle, said lever at one end engaging said stem, and means between the handle and the opposite end of the lever for moving

the latter in a valve closing direction when said handle is rocked in either direction.

5. A structure as in claim 4, in which said last named means comprises a roller on the said end of the lever, and a cam member mounted on and projecting from the handle to engage the roller.

6. A valve structure including a body, a pair of separated pressure intake and return chambers therein, another chamber in the body having spaced ports communicating with said first named chambers separately, a conduit leading from said other chamber, normally closed valves for said ports, a movable operating structure for said valves for opening them alternately, a normally open pressure relieving valve between the pressure intake and return chambers, and means causing the last named valve to be closed whenever one of said first named valves is opened.

7. A valve structure including a body, a pair of separated pressure intake and return chambers therein, another chamber in the body having spaced ports communicating with said first named chambers separately, a conduit leading from said other chamber, normally closed valves for said ports, a movable operating structure for said valves for opening them alternately, said operating means including a rockable handle; a normally open pressure relief valve between the intake and return chambers, a stem projecting from said valve, a pivoted lever arranged for swivel movement in a plane at right angles to the plane of rocking movement of said handle, said lever at one end engaging the stem, and means between the handle and the opposite end of the lever for moving the latter in a valve closing direction when said handle is rocked.

In testimony whereof I affix my signature.

ROBERT G. LE TOURNEAU.