H. L. FRITTS.

HYDRAULIC VALVE.

APPLICATION FILED APR. 2, 1921.

1,428,688.

Patented Sept. 12, 1922.

2 SHEETS—SHEET 1.

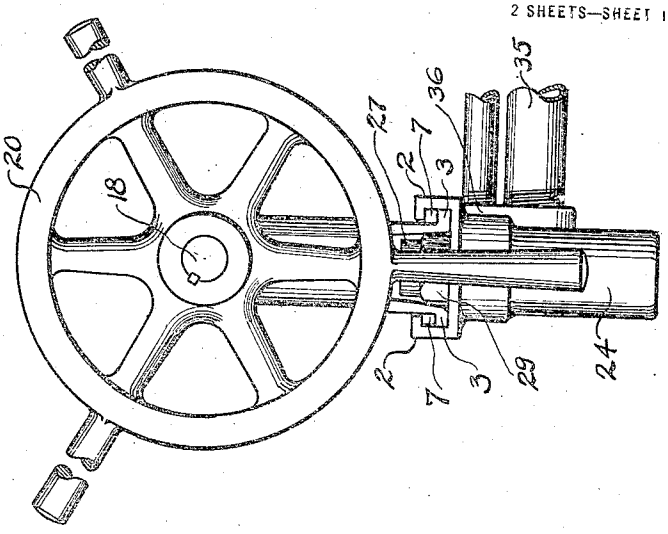



Fig. 2.

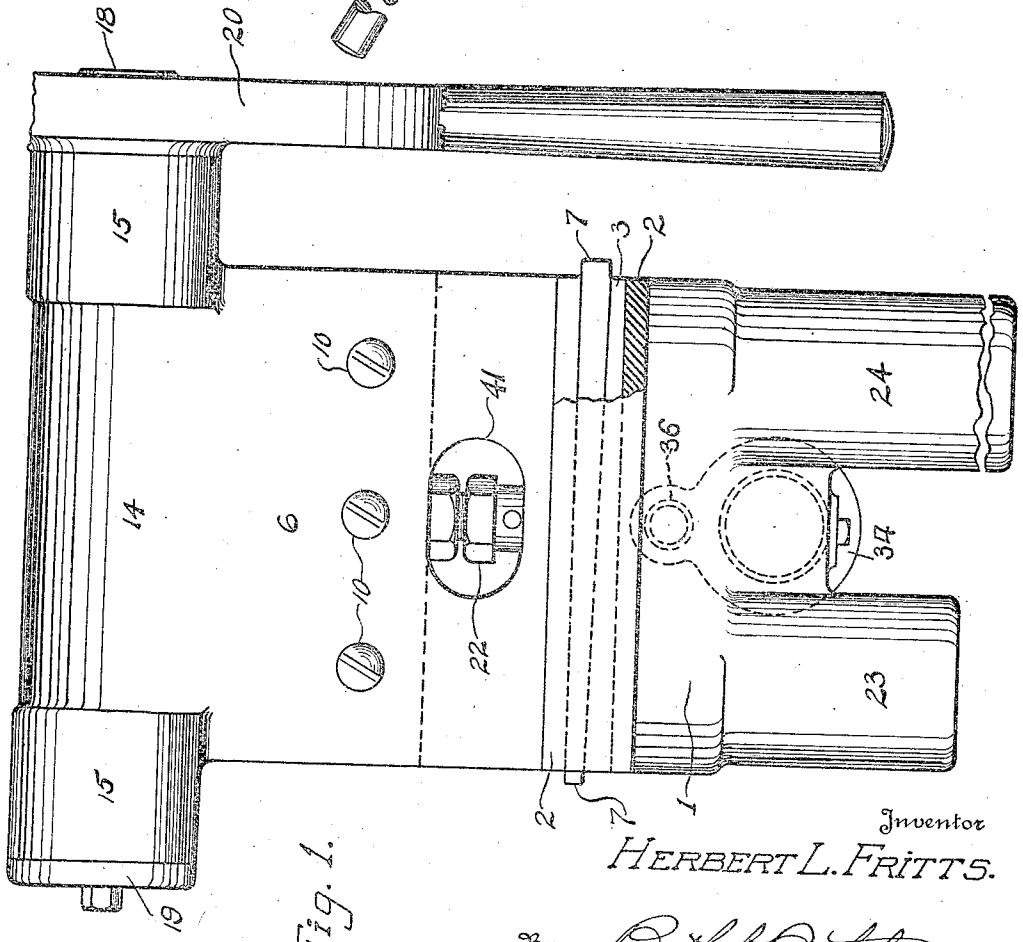



Fig. 1.

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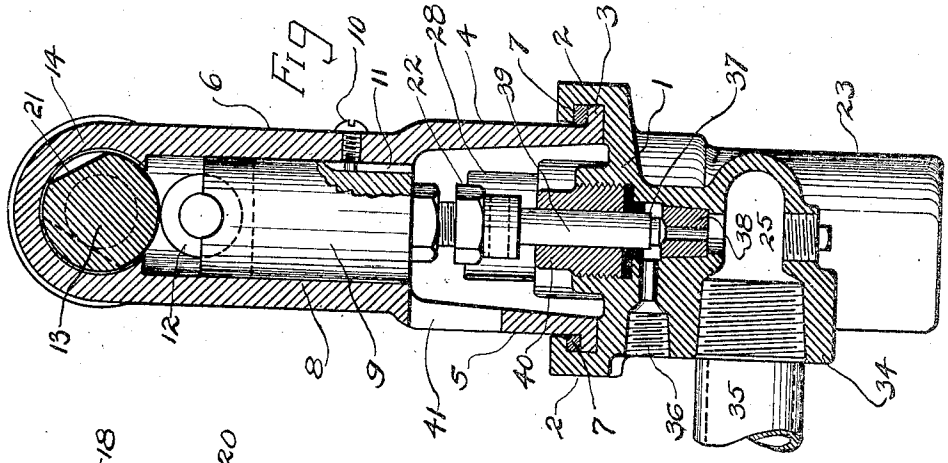
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Fig 4



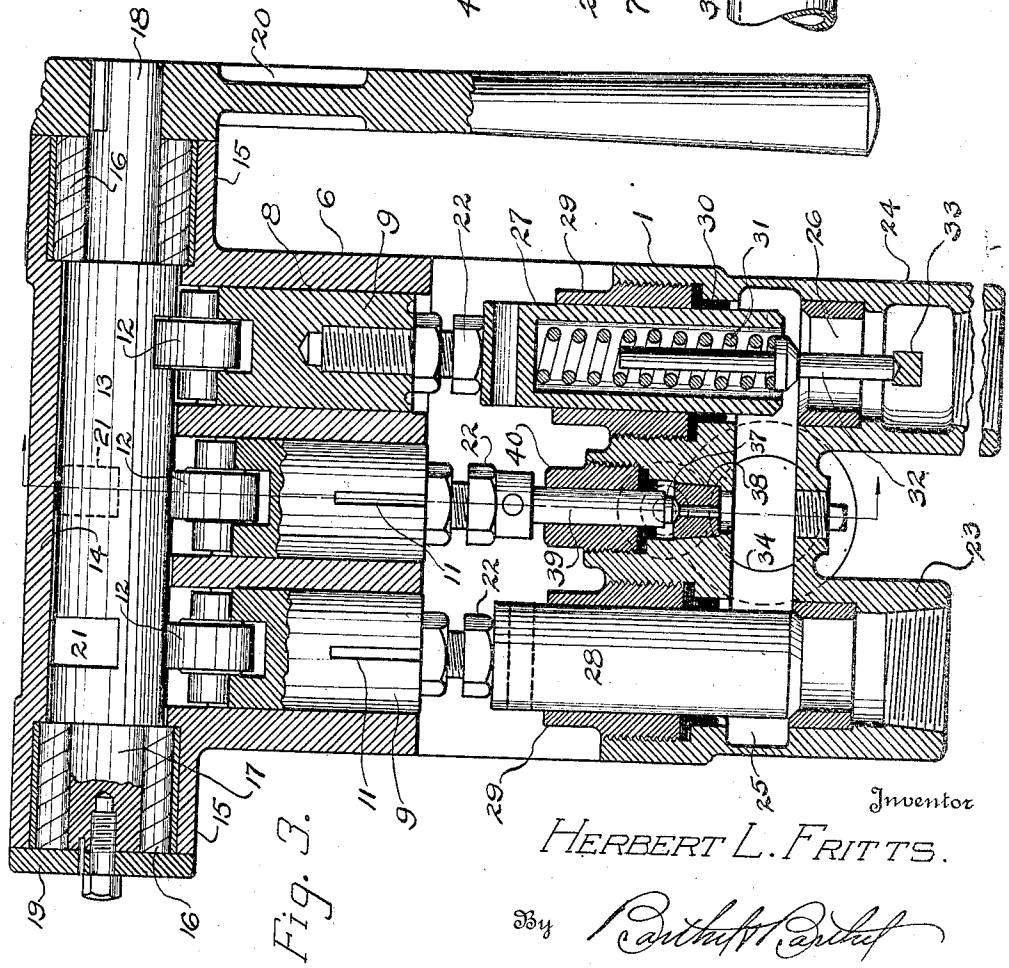


Fig. 3.

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# UNITED STATES PATENT OFFICE.

HERBERT L. FRITTS, OF DETROIT, MICHIGAN.

## HYDRAULIC VALVE.

Application filed April 2, 1921. Serial No. 457,881.

*To all whom it may concern:*

Be it known that I, HERBERT L. FRITTS, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Hydraulic Valves, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a hydraulic valve wherein high and low pressures are utilized for performing various kinds of work, and the valve may be characterized in the following particulars.

First, the valve is of the plunger type operated by a rotary or oscillatory cam member, and opening of the low pressure and high pressure valves may be accomplished by an unbalanced pressure while opening of the discharge valve is attained by the expansive force of the spring housed within said valve.

Second, the hydraulic valve includes a valve body which is detachable relative to the valve operating means and in consequence of this two-part construction, easy access is had to the valve parts for machining, re-grinding, cleaning and lubricating purposes.

Third, the valve includes low pressure and discharge valves which may be consecutively actuated for idling purposes, and the operating mechanism of the valve is isolated relative to the valve body so that any leakage cannot interfere with the operating mechanism.

Fourth, the hydraulic valve includes a simple, durable and inexpensive construction wherein the parts may be easily and quickly assembled, and the operating mechanism employed for the valve insures that only one valve may be open at a time.

The construction entering into my invention will be hereinafter described and then claimed, and reference will now be had to the drawings, wherein

Figure 1 is a side elevation of the valve, partly broken away and partly in section;

Fig. 2 is an end view of the same, on a smaller scale;

Fig. 3 is a vertical longitudinal sectional view of the valve, and

Fig. 4 is a vertical cross sectional view, taken on the arrow line shown in Fig. 3.

In the drawing, the reference numeral 1 denotes a valve body and the top of said valve body, at its side edges, has longitudinal channel ways 2 to receive lateral flanges 3 carried by the side walls 4 and 5 of a housing 6 located above the valve body 1. The housing 6 and the valve body 1 are placed in engagement with each other by endwise movement of one relative to the other and assuming that the flanges 3 of the housing 6 have been slidably placed in the channel ways 2, longitudinally disposed keys or tapering members 7 are driven in the channel ways 2 to anchor the valve body 1 relative to the walls 4 and 5 of the housing 6. The keys 7 constitute a conventional means of holding the flanges 3 fixed within the channel ways 2 of the valve body 1, and said keys may be readily loosened or driven out of the channel ways 2, it being possible to separate the parts of the valve for repair or cleaning purposes.

In the housings 6 are vertically disposed parallel bores 8 and slidable in said bores are plungers 9 which are held against rotation within the bores 8 by set screws 10 extending into grooves 11 in the plungers, as best shown in Fig. 4. Rotatably supported on the upper ends of the plungers 9 are cam rollers 12 and these rollers are normally engaged by a cam shaft or rotary valve releasing member 13 rotatable in a casing 14 integral with the upper end of the housing 6 and extending longitudinally thereof. The casing 14 has enlarged ends 15 provided with anti-frictional bearings 16, preferably of the roller type and in these bearings are journaled the spindles 17 and 18 of the cam shaft 13, so that the cam shaft is free to revolve within the casing 14. The spindle 17 has a detachable end cap 19 and the spindle 18 is provided with a hand wheel 20 by which the cam shaft may be conveniently rotated in either direction. This cam shaft, at places that may vertically aline with the plungers 9, is provided with facets 21 which permit the plungers 9 to be elevated so as to be depressed by uninterrupted shaft surfaces when the cam shaft is revolved.

Adjustably mounted in the lower ends of the plungers 9 are bolt or tappet members 22, the purpose of which will hereinafter appear.

The lower end of the valve body 1 is provided with a low pressure inlet 23, and a discharge or exhaust connection 24, said connections 23 and 24 communicating with

a longitudinal chamber 25 centrally of the valve body 1 and disposed longitudinally thereof. The inner ends of the connections 23 and 24 are provided with valve seat members 26 and adapted to engage these valve seat members are tubular or socket valve members 27 and 28 slidable in glands 29 mounted in the valve body 1, said glands retaining a suitable packing 30 about the valve members 27 and 28. The valve members are engaged by the tappets 22 and the valve member 28 is adapted to be opened by hydraulic pressure in the connection 23, while the valve member 27 is adapted to be opened by the expansive force of a coiled spring 31 within the valve member 27 and about the upper end of a spring supporting pin 32 mounted on a spider or transverse member 33 within the exhaust connection 24.

Communicating with the chamber 25 of the valve body 1 is an outlet connection 34 which may be connected by a pipe 35 or other conduit to a cylinder or other part of a ram, press or any hydraulic piece of machinery that may be controlled by the hydraulic valve.

Above the connection 34 is a high pressure inlet connection 36 communicating with a chamber 37 which communicates with the chamber 25. In the chamber 37 is a valve seat member 38 adapted to be engaged by a valve member 39 slidable in a gland 40 mounted in the valve body 1, between the glands 29, and the valve member 39 is adapted to be operated by one of the tappets 22. The inner end of the valve member 39 is reduced so that a hydraulic pressure under said valve member may elevate it and constantly maintain its actuating plunger in engagement with the cam shaft 13, and this valve member, as well as the members 27 and 28, have the upper ends thereof apertured or constructed so that suitable tools may be employed for rotating said valve members to grind the valve seat members or insure more perfect seating of the valve members.

The wall 5 of the housing 6 has an opening 41 so that easy access may be had to the intermediate valve member 39, and access may be had to the end valve members 27 and 28 at the ends of the housing 6.

The arrangement of the cam facets 21 of the cam shaft 13, provides three longitudinal uninterrupted surfaces on the cam shaft which will retain all of said valves closed, and the cam facets 21, permit of only one valve member being open at a time. As shown in Fig. 3, the valve member 27 is elevated by the expansive force of the spring 31 so that the chamber 25 may exhaust through the connection 24.

When the cam shaft 13, which constitutes a rotary valve operating member, is rotated in a counter clockwise direction the low pressure valve member 28 is opened and the other valve members retained closed. Low hydraulic pressure therefore enters the pipe 35, either for idling purposes or certain degrees of work, and assuming that the cam shaft 13 continues to revolve, the low pressure valve member 28 will be closed and the high pressure valve member 39 opened. It is now apparent that the valve members may be successively actuated, also that by oscillating the cam shaft 13 the valve members 27 and 28 may be alternately actuated, as may be necessary in connection with different kinds of work.

With the housing 6 detached, the valve mechanism can be easily removed so that the valve seat members can be ground or renewed, and it obvious that the packing can be maintained in proper working order.

I attach considerable importance to the simplicity of construction entering into this three-way valve, and while in the drawings, there is illustrated a preferred embodiment of my invention, it is to be understood that the structural elements are susceptible to such changes in size, shape and manner of assemblage, as fall within the scope of the appended claims.

What I claim is:—

1. A valve of the type described comprising a body having a chamber adapted to communicate with high and low hydraulic pressures and a discharge connection, high and low pressure valve members operatable in said valve body and adapted to be opened by hydraulic pressure, an exhaust valve member operatable in said valve body, means adapted to open said exhaust valve member, and rotary means adapted to successively close said valves and permit of only one of said valves being opened at a time.

2. A valve as in claim 1, characterized by said low pressure valve member and said discharge valve member extending into the chamber of said valve body with said high pressure valve member located between said low pressure and discharge valve members.

3. A valve as in claim 1, characterized by said means including plungers and a cam shaft adapted to operate said plungers to cause said plungers to close said valves.

4. A valve of the type described, comprising a valve body, valve members therein, a housing detachably connected to said valve body and separable from said valve body by endwise movement, plungers in said housing adapted to operate said valve members, and means in said housing adapted to successively actuate said plungers.

5. A valve of the type described, comprising a valve body, valve members therein, a housing detachably connected to said valve body, plungers in said housing adapted to operate said valve members, a cam shaft in

said housing adapted to successively actuate said plungers, and a hand wheel at an end of said cam shaft.

6. A hydraulic valve comprising a body having communicating chambers therein with one of said chambers provided with a high pressure connection and the other chamber with a low pressure connection and a discharge connection, valves extending through the last mentioned chamber to close said low pressure and discharge connections, a valve controlling the high pressure connection, and plungers adapted to operate all of said valves.

7. A hydraulic valve as in claim 6, characterized by said plungers being arranged in a housing detachable relative to said valve body.

8. A hydraulic valve comprising three valve members, only one of which may be opened at a time, and means which may be oscillated to cause two of said valve members to be alternately opened and closed, and rotated to successively cause all three of said valve members to be opened and closed one at a time.

9. A hydraulic valve comprising a plurality of valve members adapted to open when released, and means including plungers and a rotary member against which said plungers constantly bear, said rotary member adapted to retain all of said valves closed and permit of only one valve being released at a time.

10. A hydraulic valve comprising a body containing a valve mechanism, and a housing adjoining said body and containing valve operating means for the valve mechanism of said body, said body and housing being separatable by endwise movement.

11. The combination of a plurality of valve members, adapted to open when released, and a rotary valve releasing member maintaining all of said valve members closed and when rotated adapted to intermittently release said valve members.

In testimony whereof I affix my signature in presence of two witnesses.

HERBERT L. FRITTS.

Witnesses:
KARL H. BUTLER,
ANNA M. DORR.