Sept. 1, 1925. 1,552,331

J. E. MILLARD

HYDRAULIC VALVE

Filed April 24, 1922 3 Sheets-Sheet 1

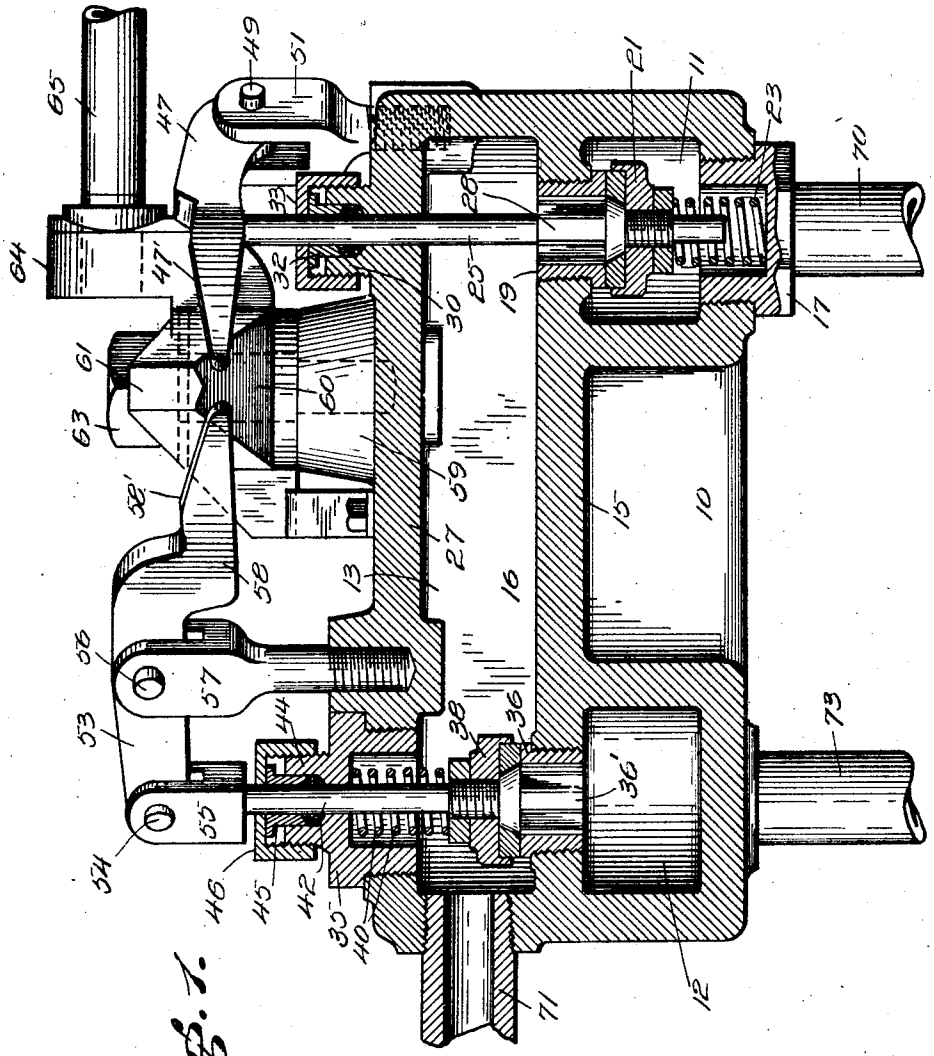


Fig. 1.

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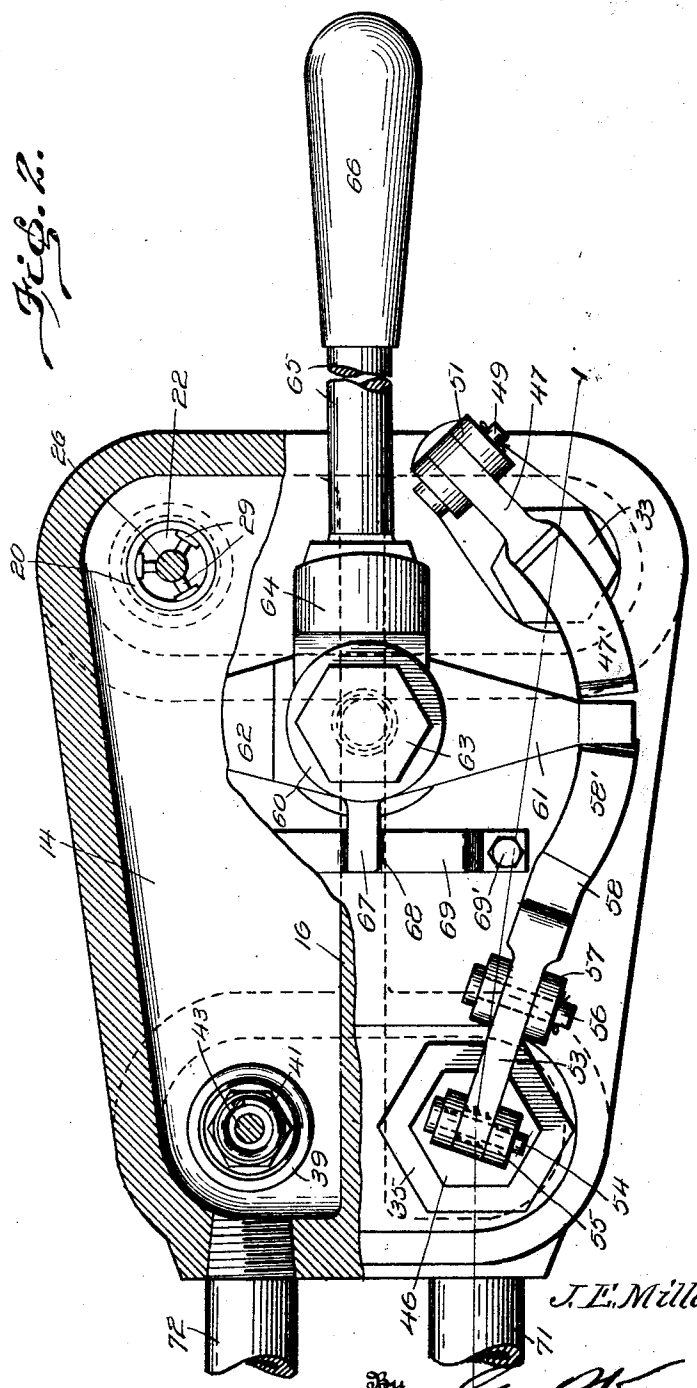
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Fig. 2.



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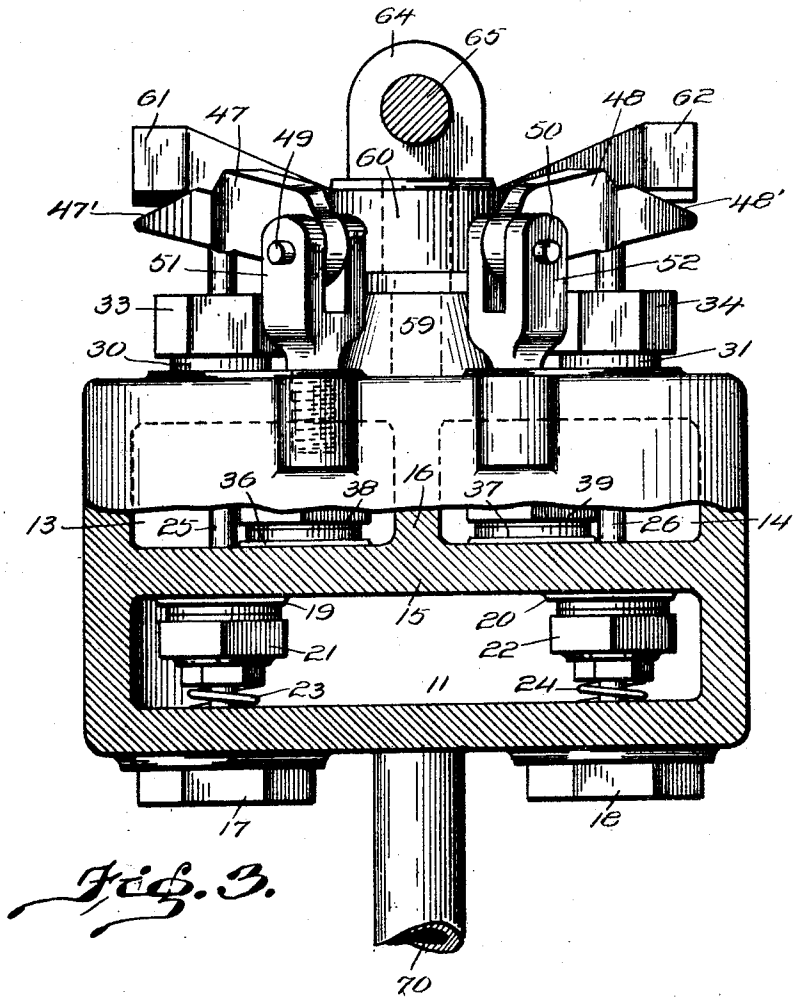


Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN E. MILLARD, OF PORTSMOUTH, OHIO.

HYDRAULIC VALVE.

Application filed April 24, 1922. Serial No. 556,293.

To all whom it may concern:

Be it known that I, JOHN E. MILLARD, a citizen of the United States, residing at Portsmouth, in the county of Scioto and State of Ohio, have invented certain new and useful Improvements in Hydraulic Valves, of which the following is a specification.

This invention appertains to certain improvements in valves generally, and more particularly to a type of the same for controlling the admission and exhaust of water from the cylinder or cylinders of hydraulic motors and the like.

The principal object of the invention is to provide for a valve of the class mentioned, and one of a mechanically refined construction and arrangement whereby to greatly facilitate the proper admission and exhaust of water to and from the cylinder or cylinders of hydraulic motors and the like, and to otherwise increase the efficiency of operation of such motors.

Another object of the invention is to provide for a valve as hereinbefore characterized, and one involving a novel form of valve operated mechanism of a nature and design to be readily adapted for use in connection with a two-way, a three-way, or a four-way valve, and wherein to operate in a manner to affect an opening of the exhaust valve or valves slightly in advance of the opening of the admission valve or valves.

With the foregoing and other objects in view, the invention resides in the certain novel and useful construction, arrangement and operation of parts as will be hereinafter more fully described, set forth in the appended claims, and illustrated in the accompanying drawings, in which:—

Figure 1 is a vertical longitudinal section taken on the line 1—1 of Fig. 2,

Fig. 2 is a top plan view, partly in section, and,

Fig. 3 is an end elevation, partly in section.

Referring to the drawings, the numeral 10 designates the valve body in its entirety, and the same comprises a casting formed to provide an admission chamber 11 and an exhaust chamber 12 disposed in spaced parallel relation one with respect to the other, and transversely of the lower side of the body, and a pair of upper chambers 13 and 14 disposed side by side longitudinally of the upper side of the body with their opposite ends overlying the admission and exhaust chambers 11 and 12. The lower chambers 11 and 12 are separated from the upper chambers 13 and 14 by means of an integral horizontal wall 15, and the latter chambers one from the other by means of an integral vertical wall 16.

Opening through the lower walls of the admission chamber 11 are a pair of spaced openings which are normally closed by screw plugs 17 and 18, which, when the latter are removed from position, admit of the threading of the removable valve seats 19 and 20 upwardly of admission ports formed in the integral horizontal wall 15 and opening into the upper chambers 13 and 14, respectively. Cooperative with these valve seats 19 and 20 are downwardly opening valves 21 and 22, respectively, and the same are normally tensioned in closed position by means of coiled springs 23 and 24 which have their lower ends seated in inwardly opening bores formed in the screw plugs 17 and 18, and their upper ends engaged over the lower ends of the valve rods or stems 25 and 26, and bearing directly against the undersides of the valves. The valve rods or stems 25 and 26 project upwardly through the valve seats 19 and 20 and through openings formed vertically through the top wall 27 of the valve body, and are guided in their movements of operation through the valve seats 19 and 20 by means of guides 28 and 29 each consisting of a plurality of radially disposed arms having their free ends headed for accurate contact with the walls of the bores of the valve seats 19 and 20.

The upper ends of the valve rods or stems 25 and 26 pass through stuffing boxes formed by cylindrical nipples 30 and 31 rising from the upper side of the top wall 27 for the reception of suitable packing placed under desired compression by packing glands 32 held in position by means of cap nuts 33 and 34.

Similarly, the top wall 27 is formed to provide a pair of openings normally closed by screw plugs 35, through which, upon the removal of the latter, valve seats 36 and 37 are threaded downwardly of the ports formed in the horizontal wall 15 and opening from the chambers 13 and 14 into the lower exhaust chamber 12. Cooperative with the valve seats 36 and 37 are upwardly opening valves 38 and 39, which are ten-

sioned in normally closed position by means of coil springs 40 and 41, which are engaged by vertically disposed valve rods or stems 42 and 43 with their upper ends seated in inwardly opening bores formed in the screw plugs 35 and their lower ends bearing against the upper sides of the valve.

The valve rods or stems 42 and 43 are projected outwardly of the screw plugs 35 and through stuffing boxes formed on the outer end walls of the latter, and each of these stuffing boxes consists of a cylindrical nipple 44 for receiving a suitable packing material which is placed under desired compression by means of a packing gland 45 held in position by a cap nut 46. The lower ends of the valve rods or stems 42 and 43 are projected downwardly through the valves 38 and 39, and into the valve seats 36 for the reception thereon of a guide member 36′, whereby the valves 38 and 39 are accurately guided to and from the valve seats 36.

The admission valves 21 and 22 are operable through the medium of a pair of arms or levers 47 and 48, respectively, which are pivoted at their outer ends on pivot pins 49 and 50, carried in bifurcated studs 51 and 52 threaded into suitably formed openings in the top wall 27 of the valve body casting, and are arranged to have the under faces of their inner end portions resting on the upper free ends of the valve rods or stems 25 and 26. The upper sides of the inner end portions of these arms or levers 47 and 48 are bevelled as at 47′ and 48′ to provide cam like surfaces to be acted upon in a manner to be hereinafter more fully explained, for the proper operation of the valves. Similarly, the exhaust valves 38 and 39 are operated through the medium of arms or levers 53, which are pivoted on pivot pins 54 at their outer ends and directly to the bifurcated upper end portions 55 of the valve rods or stems 42 and 43, and at points intermediate their opposite ends on pivot pins 56 carried in bifurcated studs 57 threaded into suitable openings formed in the top wall 27 of the valve body casting. These arms or levers 53 are disposed at a slightly greater distance above the top wall 27 than are the arms or levers 47 and 48, and as consequence of such arrangement, the inner ends of the same are formed to provide downwardly and forwardly extending portions 58 having their upper faces bevelled as at 58′ and correspondingly to the bevelled faces of the said arms 47 and 48. These several arms or levers 47, 48 and 53 are arranged in pairs at the opposite sides of the longitudinal center of the valve body, one of the arms or levers 53 being complemental to the arm or lever 47, and the other to the arm or lever 48, while the bevelled end portions of each pair of the same are outwardly curved, but in a manner to have their free ends alined one with the other, which free ends are also curved or rounded off in a downward direction.

Formed on the longitudinal center of the top wall 27 of the valve body casting is a substantially frusto-conical bearing member 59, which has its vertical transverse center disposed in a plane medially of the spaces between the opposed ends of the pairs of oppositely disposed valve operating arms or levers, and mounted on this bearing member 59 is a cast member 60 formed to provide a pair of oppositely disposed and outwardly inclined arms 61 and 62, which are normally disposed to have their outer inclined ends overlie the spaces between the adjacent ends of the said valve operating arms or levers 47, 48 and 53. This case member 60 is pivoted for an oscillatory movement on the bearing member 59, by means of a shoulder pivot screw 63 threaded centrally into the upper flat face of the latter for the purpose. For the operation of the member 60, the same is formed to provide an angularly disposed lug or ear 64 at one side thereof for the securing thereto of an arm 65, which is provided with a hand grip 66 at its outer end. Projecting radially from the member 60, at a point diametrically opposite the lug or ear 64, is a locking lug 67, which is cooperative with a centrally disposed depression 68 formed in a resilient keeper 69, which is secured in position on the top wall of the valve body by means of screws 69′, and whereby the member is maintained in its neutral or inoperative position. The undersides of the outer free end portions of the oppositely disposed arms 61 and 62 of the member 60, are oppositely bevelled for cooperation with the correspondingly bevelled upper faces of the arms or levers 47, 48 and 53, for the operation of the several valves 21, 22, 38 and 39 in accordance with the movements imparted to the member 60 from the hand lever 65.

In the use of the control valve thus provided, the admission chamber 11 will have its inlet connected by a pipe 70 to a suitable source of fluid supply (not shown), and the upper chambers by means of the pipes 71 and 72 to the opposite ends of a hydraulic cylinder or the like containing a double acting piston, or to a double hydraulic cylinder construction having a single acting piston in each cylinder, while the exhaust chamber 12 will have its outlet connected to an exhaust pipe 73. With the valve body thus connected, the admission chamber 11 will be filled at all times, and upon the manipulation of the hand arm or lever 65, as for instance to the left, Figure 2, the arm 61 of the operating member 60 will move into engagement with the inclined face of the arm or lever 53 and in a manner to start the opening movement of the

exhaust valve 38 in advance of the arm 63 moving into engagement with the inclined face of the arm 48 for effecting the opening movement of the admission valve 22 at the opposite side of the valve body. Similarly, when the hand lever or arm 65 is swung to the right, Figure 2, the arm 62 will move into engagement with the other of the exhaust valve actuating arms or levers 53 in advance of the arm 61 acting to depress the actuating arm 47 for the opening of the admission valve 21.

From the foregoing, it will be readily apparent that, while a preferred embodiment of the device has been described and illustrated herein in specific terms and details of construction, arrangement and operation, various changes in and modifications of the same may be resorted to without departing from the spirit of the invention, or the scope of the claims appended hereto.

Having thus fully described the invention, what is claimed, is:—

1. A hydraulic controlling valve mechanism comprising an admission valve, an exhaust valve complemental to said admission valve, a valve stem for each of said valves, pivoted cam levers for shifting said valves to open position, said levers acting on said stems, the pivot of one of said levers arranged at one end thereof and the pivot of the other of said levers positioned intermediate the ends thereof, one of said levers having one end connected with one of said stems and the other of said levers seating intermediate its ends on the other of said stems, and a manually operated pivoted actuating member common to and alternately riding on the inner terminal portions of said levers for actuating them to open said valves.

2. A hydraulic controlling valve mechanism comprising an admission valve, an exhaust valve complemental to said admission valve, a valve stem for each of said valves, pivoted cam levers for shifting said valves to open position, said levers acting on said stems, the pivot of one of said levers arranged at one end thereof and the pivot of the other of said levers positioned intermediate the ends thereof, one of said levers having one end connected with one of said stems and the other of said levers seating intermediate its ends on the other of said stems, and a manually operated pivoted actuating member common to and alternately riding on the inner terminal portions of said levers for actuating them to open said valves, the cam lever for the exhaust valve being arranged above the cam lever for the admission valve to provide for the operation of the exhaust valve in advance of the operation of the admission valve when the actuating member is shifted to actuate the cam levers.

3. A hydraulic controlling valve mechanism comprising two pair of complementally arranged admission and exhaust valves, two pair of levers for operating said valves, said levers mounted on horizontally disposed pivots, one of the levers of each pair of levers loosely connected at one end to the upper end of the stem of one of the valves of a pair and the other lever of said pair of levers seating on the upper end of the stem of the other valve of said pair, an actuating member mounted on a vertical pivot and provided with a pair of oppositely extending arms each common to a pair of levers for alternately actuating the same, said member providing means for alternately actuating one of said exhaust valves and the complemental admission valve to open position, the levers for the exhaust valves being arranged above the admission valves to provide for the operation of the first mentioned levers in advance of the operation of the second mentioned levers, and means for normally retaining said member in its normally inoperative position.

In testimony whereof, I affix my signature hereto.

JOHN E. MILLARD.