

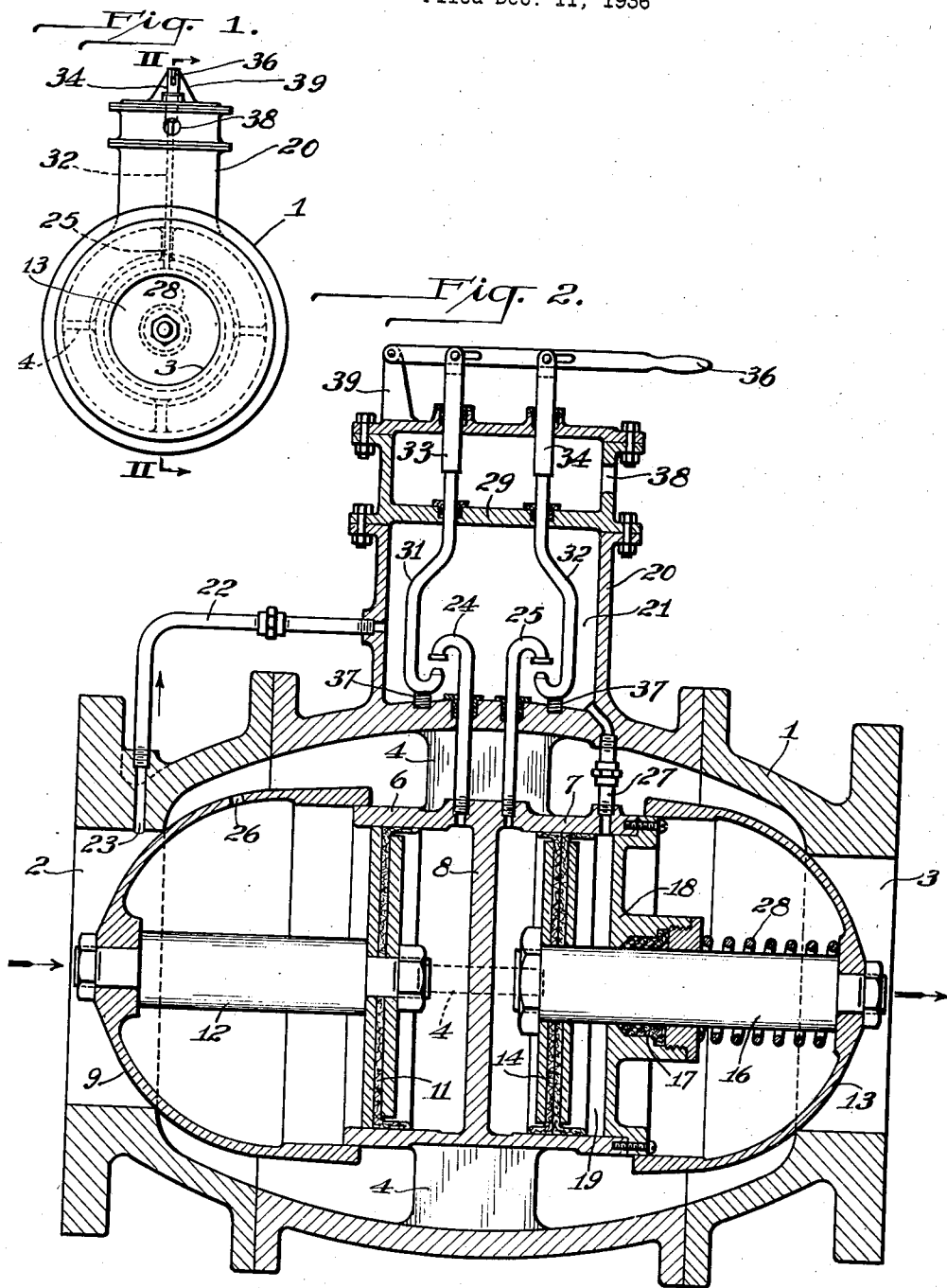
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VALVE

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WITNESSES

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VALVE

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This invention relates to valves, and more particularly to those in which wire drawing wears the valve members and seats and causes them to leak. When a double valve is used, that is, one in which two valve members are movable simultaneously in opposite directions to open or close the valve, the effect of wire drawing on each valve member and seat may be less than when a single valve member is used, but it is still present and eventually the valve will leak.

It is among the objects of this invention to provide a valve which is substantially leakproof and the operation of which is simple and dependable.

The preferred embodiment of the invention is illustrated in the accompanying drawing in which Fig. 1 is a view of the outlet end of my valve, and Fig. 2 is an enlarged vertical section taken on the line II-II of Fig. 1.

In accordance with this invention a valve casing having inlet and outlet ports is provided with a pair of valve members for opening and closing those ports. These valve members are actuated preferably by fluid pressure and in such a way that the inlet valve member is closed before and opened after the outlet valve member. As a result, fluid is not flowing through the valve casing at the time the outlet valve member is opened or closed, and therefore wire drawing is confined to the inlet valve member. Even though the inlet valve member may eventually leak because of this, the non-leaking outlet valve member prevents any fluid from escaping from the casing.

Referring to the drawing, a substantially egg-shaped valve casing 1 is provided at its ends with axially aligned inlet and outlet ports 2 and 3 adapted to be connected in a fluid line or conduit. Supported in the center of the casing and spaced from the wall thereof by integral webs 4 are a pair of cylinders 6 and 7 having a common inner end wall 8. Each cylinder is in axial alignment with the adjacent casing port which it faces.

Slidably mounted on inlet cylinder 6 is a dome-shaped shell forming a valve member 9 for closing the inlet port. The valve member is moved into closing position by a piston 11 disposed in the cylinder and rigidly connected to the outer end of the shell by a rod 12.

The outlet port in the casing is likewise closed by a dome-shaped shell or valve member 13 the inner end of which is slidably mounted on cylinder 7. This valve member is connected to a piston 14 within the cylinder by a rod 16 which is slidable in a packing gland 17 in a head 18 secured to the outer end of the cylinder. A chamber 19 is thus formed between the head and piston 14, such

a chamber being lacking in the other cylinder.

It is a feature of this invention that in spite of the injury generally done a valve by wire drawing, this valve is substantially leakproof. To obtain this desirable result the valve is constructed in such a manner that the inlet port is always closed before the outlet port and is opened after it so that there is no flow of fluid through the valve while the outlet port is being opened or closed. Consequently, valve member 13 that controls the outlet port is not subjected to wire drawing all of which is confined to valve member 9 and its seat at the inlet port. It will thus be seen that even though this eventually causes the inlet valve member to leak, the pressure of the fluid that leaks past it into the casing is not enough to have a deleterious effect on the outlet valve member as it is opened or closed. Furthermore, the latter prevents any fluid that has leaked into the casing from escaping through the outlet port.

In accordance with this invention this desirable result is preferably, though not necessarily, obtained in the following manner. Mounted on the valve casing is a housing 20 forming a pressure chamber 21 connected to the high pressure end of the valve by a conduit 22 and a radial passage 23 in the wall of the inlet port. Pressure chamber 21 is connected to the inner ends of cylinders 6 and 7 by a pair of conduits 24 and 25, respectively, so that fluid pressure from the main line is used to force the two pistons and associated valve members outwardly to close the inlet and outlet ports. Outward pressure on the inlet valve member is normally greater because the area of the inner face of piston 11 is larger than that of its outer face which is in communication with fluid in the valve by an aperture 26 in shell 9. Likewise, the diameter of the piston is greater than the diameter of the inlet port. Chamber 21 is connected to chamber 19 in the outer end of cylinder 7 by a conduit 27, but as the effective area of the inner face of piston 14 is greater than that of the outer face of the piston, due to rod 16, fluid pressure in housing 20 normally holds the piston and valve member 13 in their outer positions. If desired, outward or closing movement of the outlet valve member can be hastened by a coil spring 28 encircling rod 16 where it is compressed between the packing gland and the outer end of the valve member.

To control flow of fluid to and from cylinders 6 and 7, the ends of conduits 24 and 25 in the housing are turned downwardly as shown and provided with seats, while slidably mounted in a par-

tion 29 in the housing is a pair of tubes 31 and 32 the lower ends of which are curved upwardly directly beneath the conduit seats. These tubes are normally held in their lower positions, in which they are spaced from the ends of the conduits, by plungers 33 and 34 slidably mounted in the top of the housing where they are held down by a lever 36 loosely connected thereto by pin and slot connections. The lower ends of the plungers are provided with seats for receiving the upper ends of the tubes so that the plungers also serve as closure members that prevent the fluid in the housing from escaping through the tubes when in the position shown in Fig. 2. When the lever is lifted the fluid pressure in the housing, aided by coil springs 37 if desired, raises the tubes until their lower ends seat in the open ends of conduits 24 and 25. Continued upward movement of the lever lifts the plungers off the top of the tubes so that some of the fluid in the inner ends of the valve cylinders can escape through the conduits and tubes into the upper part of the housing from which it escapes through a vent 38. This escape of fluid occurs when lever 36 is raised and fluid pressure in the inner ends of the cylinders is thereby reduced to atmospheric, because the then higher pressure on the end of the inlet valve member forces it inwardly, and the higher pressure in chamber 19 in the outer end of cylinder 7 forces piston 14 inwardly which withdraws valve member 13 from the outlet port.

However, the opening and closing of the valve members does not occur simultaneously, because the end of lever 36 nearest the inlet end of the casing is pivoted to a bracket 39 mounted on housing 26, so that as the free end of the lever is slowly lifted tube 32 is connected to conduit 25 leading to the outlet valve cylinder, and plunger 34 is removed from the upper end of that tube, shortly before plunger 33 is raised from tube 31. As a result, the inner end of the outlet valve cylinder is connected with the atmosphere before the inlet valve cylinder is thus connected, so that the outlet port has already been opened to some extent before the inlet port starts to open, whereby the deleterious effect of wire drawing is confined to the inlet valve member and its seat.

When it is desired to close the valve the lever is slowly depressed. Plunger 33 engages and closes the upper end of tube 31 and forces this tube downwardly and out of engagement with conduit 24 before plunger 34 does likewise with tube 32. Consequently, the inner end of cylinder 6 is connected with the fluid under pressure in housing 20 before the inner end of cylinder 7 is connected with that fluid. The inlet valve member is therefore forced outwardly to closing position before the outlet valve member starts to move, and again the latter is not subjected to wire drawing.

As the outlet valve member and its seat are not worn and caused to leak by wire drawing, it follows that even though the inlet valve member may leak there will be no leakage through the outlet port.

According to the provisions of the patent statutes, I have explained the construction and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A valve comprising a casing having inlet and outlet ports, a valve member associated with each port, means for closing each of the valve members by fluid pressure, means for releasing said pressure from the outlet valve member before the inlet valve member, and means for connecting the inlet valve member with said fluid pressure before connecting the outlet valve member with the pressure whereby the inlet valve member opens after and closes before the outlet valve member.

2. A valve comprising a casing having inlet and outlet ports, a pair of cylinders mounted in the casing one in axial alignment with each port, a piston and piston rod disposed in each cylinder, a valve member mounted on the outer end of each piston rod for closing the adjoining port, conduits for supplying fluid under pressure to said cylinders to actuate said valve members, and means for connecting said conduits with the atmosphere, the conduit leading to the cylinder for the inlet valve member being connected to the atmosphere before the conduit leading to the other cylinder.

3. A valve comprising a casing having aligned inlet and outlet ports, a pair of cylinders mounted in the center of the casing with a partition between them, said cylinders being aligned with said ports, a piston and piston rod disposed in each cylinder, a valve member mounted on the outer end of each piston rod for closing the adjoining port, a housing connected with a source of fluid under pressure, conduits connecting said housing with the inner ends of said cylinders whereby normally said pressure fluid maintains said valve members in closed position, means for venting the inner ends of said cylinders to the atmosphere to reduce the pressure therein, and means for opening said outlet valve member when said pressure is reduced in the inner end of its cylinder.

4. A valve comprising a casing having axially aligned inlet and outlet ports, a pair of cylinders mounted in the center of the casing with a wall between them, said cylinders being in axial alignment with said ports, a piston and piston rod disposed in each cylinder, a valve member mounted on the outer end of each piston rod for closing the adjoining port, a housing associated with said casing and provided with a chamber communicating with the high pressure end of the valve, a pair of conduits connecting said chamber with the inner ends of said cylinders whereby fluid from said high pressure end of the valve normally maintains said valve members in closed position, a pair of tubes slidably mounted in a wall of said housing and adapted to connect said conduits with the atmosphere, closure means for the outer ends of said tubes, said closure means also serving to hold the tubes away from the conduits, means for removing the closure members from the tubes whereby said pressure fluid moves the tubes into communication with the conduits, a head in the outer end of the outlet valve member's cylinder forming a chamber in the outer end of that cylinder, and a conduit connecting said two chambers together to cause the outlet member to open when pressure in the inner end of the cylinder is reduced.

5. A valve comprising a casing having axially aligned inlet and outlet ports, a pair of cylinders mounted in the center of the casing with a wall between them, said cylinders being in axial alignment with said ports, a piston and piston rod disposed in each cylinder, a valve member mounted on the outer end of each piston rod for closing

the adjoining port, a housing associated with said casing and provided with a chamber communicating with the high pressure end of the valve, a pair of conduits connecting said chamber with the inner ends of said cylinders whereby fluid from said high pressure end of the valve normally maintains said valve members in closed position, a pair of tubes slidably mounted in a wall of said housing with their inner ends adapted to connect with the outer ends of said conduits to connect the latter with the atmosphere, closure means for the outer ends of said tubes, a lever loosely connected to said closure members for holding them against the tubes and for forcing the inner ends of the tubes inwardly away from the end of said conduits, means for pivoting to said housing the end of said lever adjacent the conduit leading to the inlet valve member cylinder whereby when said lever is swung outwardly said conduit is connected to the atmosphere after the other conduit and is closed before the latter when the lever is swung back.

6. A valve comprising a casing having inlet and outlet ports, a cylinder mounted in the cas-

ing in axial alignment with one of said ports, a piston and piston rod disposed in said cylinder, a valve member mounted on the outer end of the piston rod for closing the adjoining port, a housing associated with said casing and provided with a chamber communicating with the high pressure end of the valve, a conduit connecting said chamber with the inner end of said cylinder whereby fluid from said high pressure end of the valve normally maintains said valve member in closed position, a tube slidably mounted in a wall of said housing and adapted to connect said conduit with the atmosphere, closure means for the outer end of said tube, said closure means also serving to hold the tube away from the conduit, means for removing the closure member from the tube whereby said pressure fluid moves the tube into communication with the conduit, a head in the outer end of said cylinder forming a chamber in the outer end thereof, and a conduit connecting said two chambers together to cause said valve member to open when pressure in the inner end of the cylinder is reduced.

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