

1,392,952.

WITNESS

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MAGNETICALLY-OPERATED VALVE.

1,392,952.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, MAXIMILIAN W. LINK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Magnetically-Operated Valves, of which the following is a specification.

This invention relates to valve mechanism, and more particularly to pilot valves to control the operation of larger or main valves for pressure regulating, temperature control and similar purposes. The improved valve mechanism may also be used as a whistle valve or water control valve, particularly when it is desired to have the valve located at some distance from the point of operation.

The objects of this invention are to provide a valve mechanism of the character specified which is of most simple construction, and is highly efficient and durable, there being a minimum possibility of derangement; a mechanism which is electromagnetically operated and extremely sensitive to such operating means; and a mechanism which is readily assembled. Further objects and advantages incident to my improved construction will be apparent to those skilled in the art to which it appertains. I have illustrated my invention in preferred form in the accompanying drawings, wherein:—

Figure 1 is a longitudinal section of the apparatus; and Fig. 2 is a section on the line 2—2 of Fig. 1.

Referring to Fig. 1, the valve mechanism comprises, in general, a casing or cylinder 3, a piston 11 with its stem 6 provided with the usual packing 7 and packing nut 8, an inlet port 4, and an outlet port 5. The piston is provided with an extension 2 having an enlarged head 13. The head 13 acts as a stop and as a guide for the piston to prevent binding thereof and has rather a loose fit in the cylinder so that the pressure of the fluid acts on both of its faces. The head also acts somewhat as a dashpot. The piston, stem, extension and head are made in one piece, which is adapted to be inserted and removed through an opening in one end of the casing, said opening being normally closed by the threaded plug 14.

One or more passages 12, drilled longitudinally through the piston, puts both

faces thereof under the pressure of the fluid entering at port 4. The area exposed to the pressure is, however, greater on the side away from the stem, because of the unbalanced area of the stem, and the piston is, therefore, normally pressure held in a position uncovering both the ports 4 and 5. But the area of the stem being comparatively small, it will be obvious that only a slight differential of pressure will exist and that only a small force will be necessary to bring about a movement of the piston to port covering position. This insures a very sensitive operation of the valve.

Upon a bracket 15, on the casing 3, is supported the electro-magnetic operating means indicated as an entirety by the letter A. Briefly described, this operating means is of the solenoid type having a coil 16 and a movable core 17. The coil is supported on a spool-like member 18 extending only part way through the central space of the coil. A pin or rod 19 is slidably mounted in this member 18 so as to be readily movable longitudinally of the coil. Its upper end carries a head 20 which limits its downward movement and its lower end is normally out of engagement but is adapted to be engaged thereby upon upward movement of the core when the coil is energized. Convenient terminals 21 are provided for the coil, the current for which may be controlled either by an automatic or a hand-operated switch, as desired, the same being, however, not shown as it forms no part of the present invention. A casing 22 incloses the parts and the whole is fastened in any suitable manner to a main plate or frame 23 which is carried from the bracket 15, as set forth.

The core is provided with a stem 24 which slides in a plug 25 screwed into the bottom of the casing 22. The core when not magnetically attracted is normally gravity held in lower position.

On the plate 23 is pivoted a bell-crank 26, one arm of which engages the stem 6, and the other, the head of the pin 19. When the core is attracted toward the center of the coil, it strikes the pin 19, thereby actuating the bell-crank lever to move the piston 11 against the fluid pressure to cover the outlet port 5, which action, of course, stops the flow of said pressure and effects whatever operation the valve may have been

intended to control. The parting of the valve may be altered to meet the requirements of the particular service to which the valve is to be put.

5 As will be seen, the apparatus is exceedingly simple and has been found to be highly efficient.

What I claim is:

1. A valve mechanism comprising in combination a cylinder provided with a fluid pressure inlet port and with a fluid pressure outlet port intermediate its ends, a piston in said cylinder normally pressure held in a position uncovering both of said ports, a piston rod, a lever having one arm in a position to move said rod in a direction opposed to that of the pressure, and electro-magnetic means acting on the other arm of the lever to move the piston rod and piston to cover the outlet port.

2. A valve mechanism comprising in combination a casing closed at its ends and laterally provided with an inlet port and with an outlet port, a piston adapted for movement in said casing to cover at least one of said ports, said piston being normally pressure held in port uncovering position, and an electro-magnetic means for operating said piston to its port covering position and in a direction opposed to that of the pressure.

3. A valve mechanism comprising in combination a casing closed at both ends and provided laterally with an inlet port and with an outlet port, a piston adapted for movement in said casing to cover at least one of said ports, said piston being normally pressure held in port uncovering position, electro-magnetic means for operating said piston to its port covering position in a direction opposed to that in which the pressure is exerted, the path of movement of the armature of which is at an angle to the path of movement of the piston, means for supporting the electro-magnetic means from said casing, and a pivoted member interposed between said armature and the piston.

4. A valve mechanism comprising a casing adapted to be interposed in a fluid pressure line, a piston reciprocable in said casing and presenting continuously to the inlet pressure in the casing unequal pressure areas at opposite ends of said piston whereby said piston is continuously urged toward open position by the fluid pressure within said casing, and means independent of fluid pressure

for moving said piston against the pressure in the casing into position to shut off the flow of fluid therethrough.

5. A valve mechanism comprising a casing adapted to be interposed in a fluid pressure line, a reciprocatory piston mounted in said casing, provided at one end with an extension terminating in a guiding head and provided at the other end with a stem projecting through the end of the casing, the effective pressure area of the stem end of said piston being less than the effective area of the opposite end whereby said piston is normally maintained in inoperative position by fluid pressure within the casing, and means outside said casing operable upon said stem for moving said piston in opposition to the fluid pressure within the casing into position to shut off the flow of fluid through said casing.

6. A valve mechanism comprising a casing adapted to be interposed in a fluid pressure line, a piston in said casing adapted to shut off the flow of fluid therethrough, said piston being constructed to present unequal pressure areas at opposite ends so that the pressure within the casing serves to normally maintain said piston in inoperative position, a stem connected to said piston and projecting through a wall of said casing, a lever mounted in position to engage the end of said stem, and magnetically operated means for actuating said lever, to thereby move said piston in opposition to the fluid pressure within the casing into position to shut off the flow of fluid through said casing.

7. A valve mechanism comprising a casing provided with inlet and outlet ports disposed at different distances from the ends of said casing and adapted to be connected to a fluid pressure line, a piston within said casing adapted in one position to cover said outlet port, said piston having pressure areas at opposite ends of unequal size whereby said piston is normally maintained in inoperative position by the fluid pressure within said casing, and means outside said casing for moving said piston in opposition to the fluid pressure within the casing into position to cover said outlet port whereby the flow of fluid through said casing is shut off.

In testimony whereof, I have hereunto signed my name.

MAXIMILIAN W. LINK.