No. 870,104. PATENTED NOV. 5, 1907

D. L. HOLDEN.

HYDRAULIC VALVE.

APPLICATION FILED FEB. 19, 1906.

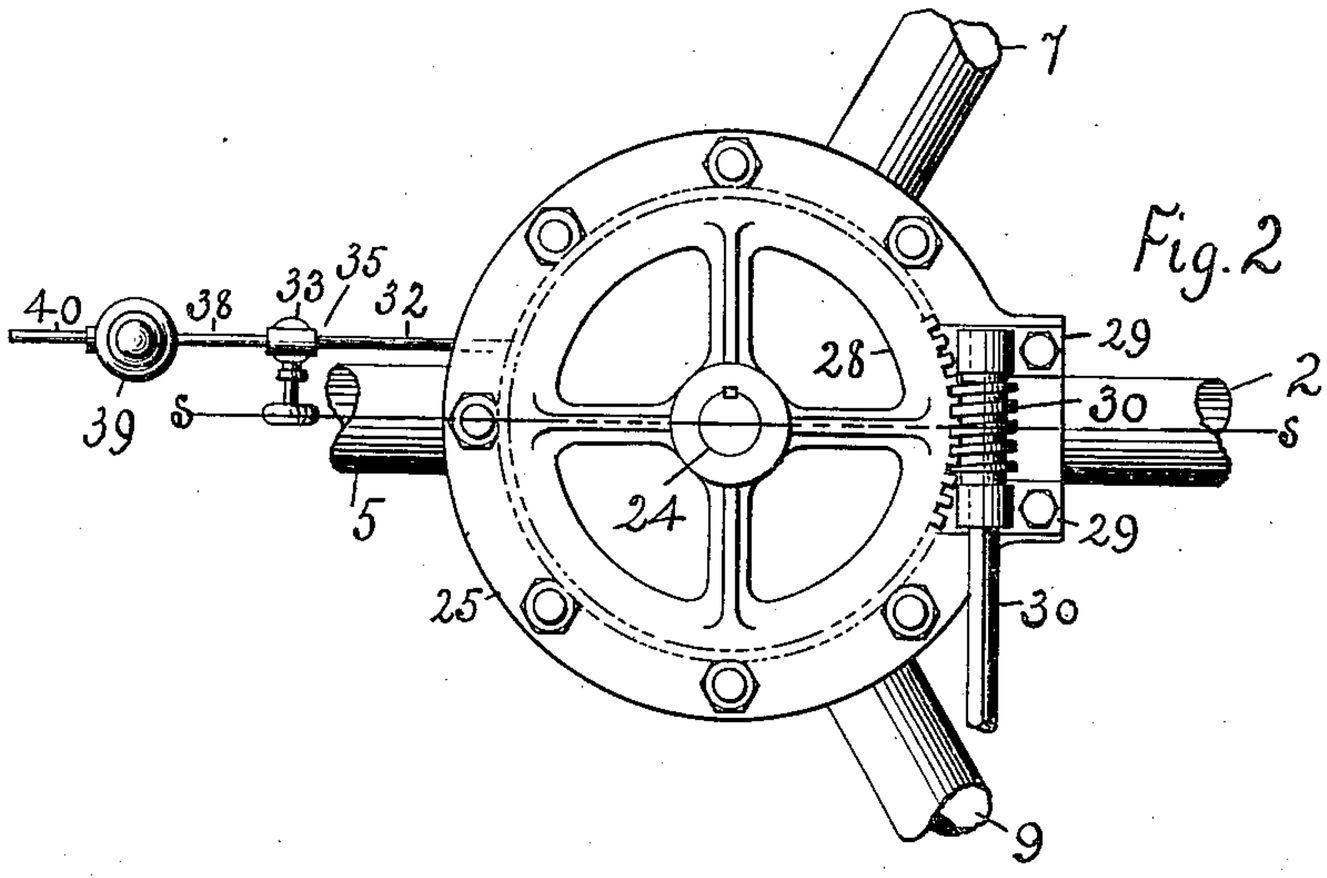

Fig. 2

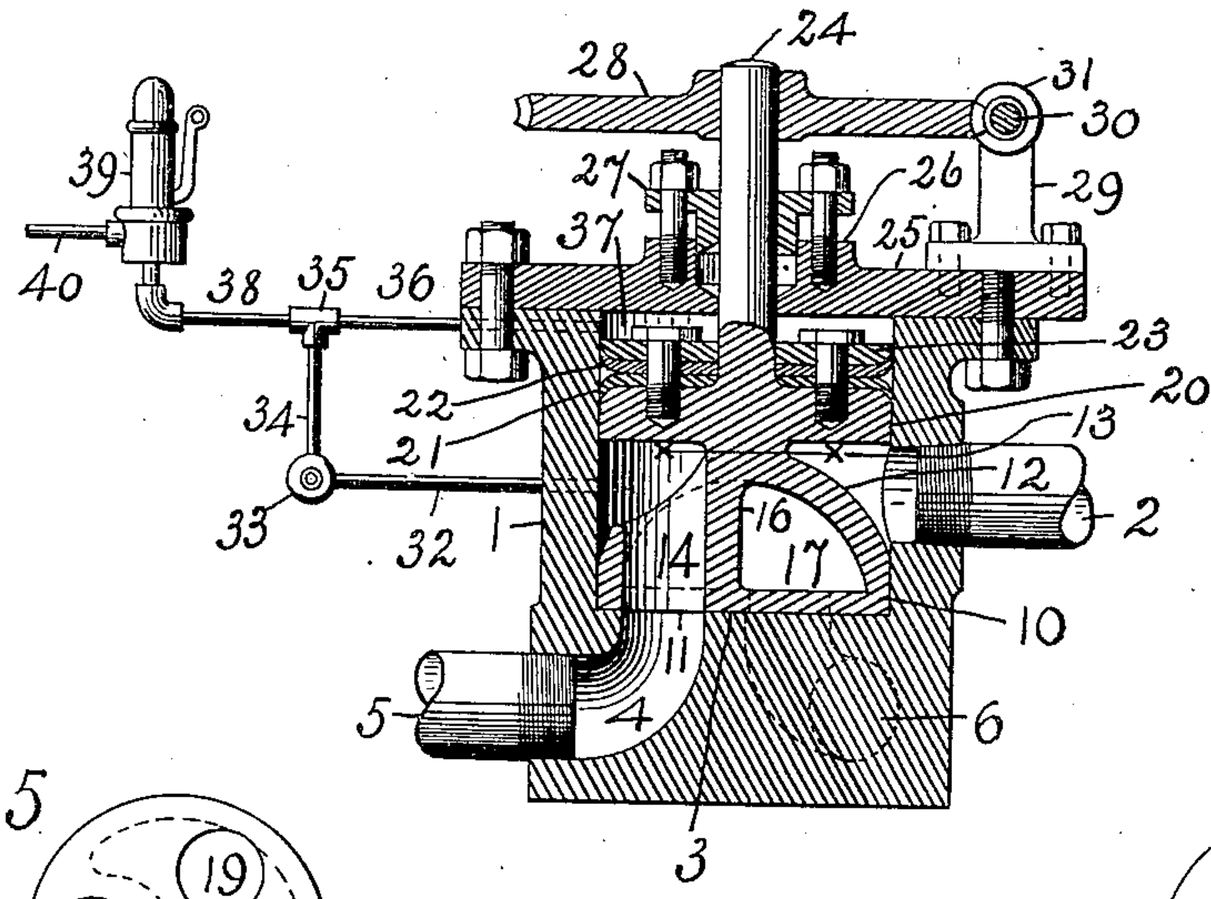

Fig. 1

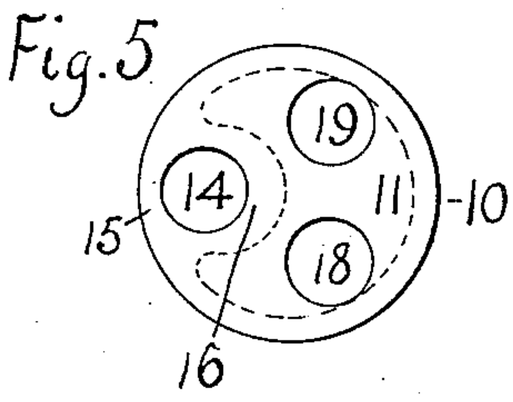

Fig. 5

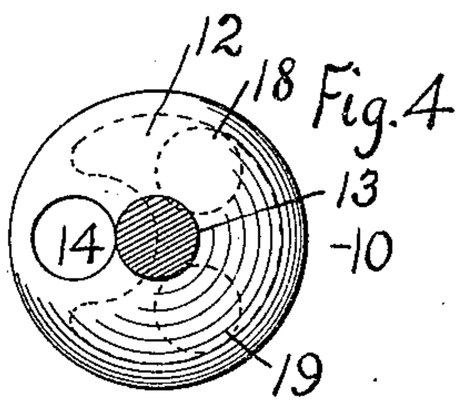

Fig. 4

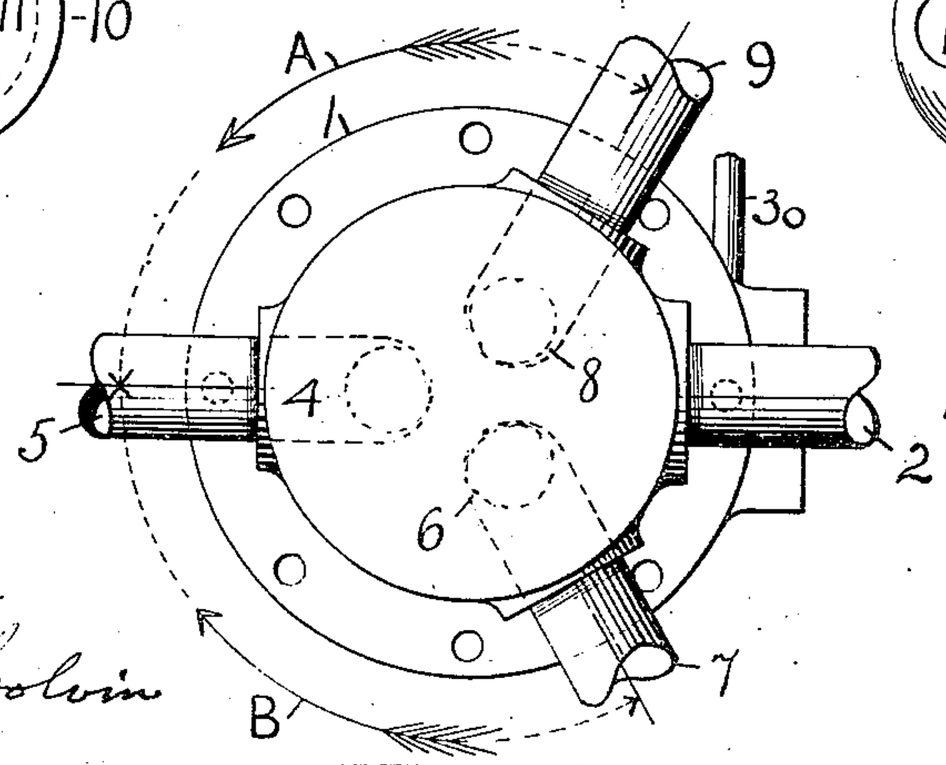

Fig. 3

Witnesses.

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UNITED STATES PATENT OFFICE.

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HYDRAULIC VALVE.

No. 870,104. Specification of Letters Patent. Patented Nov. 5, 1907.

Application filed February 19, 1906. Serial No. 301,795.

To all whom it may concern:

Be it known that I, DANIEL L. HOLDEN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Hydraulic Valves, of which the following is a specification.

This invention relates to a valve for the control of hydraulic pressure, with large openings and passages for the rapid entrance to and discharge from a cylinder wherein is a piston operative by said pressure; also to a means to insure the balancing against great pressure, while permitting the seating of the valve, to prevent leakage, and to means for the operation of the valve by an electrical motor.

The invention is illustrated in the accompanying drawing, in which like parts are designated by like characters of reference, in which

Figure 1 is a central vertical section of the valve and its case on line S S Fig. 2. Fig. 2 is a top view of the case, the worm and gear. Fig. is a bottom view of the case. Fig. 4 is a top view of the valve with the connection to its balancing piston cut on section line X X Fig. 1. Fig. 5 is a bottom view of the valve.

The valve is inclosed in a case 1 having an inlet passage 2, above the valve, and from the valve seat 3 there are downwardly and outwardly curved passages located 120° apart, passage 4 with a pipe 5 leading to the operative end of the cylinder (not shown). There is a similar passage 6 and pipe 7 leading to the opposite end of the cylinder and a similar discharge passage 8 and its discharge pipe 9. Within case 1 the valve 10 is placed on seat 3, its bottom part or lower face 11 being flat, and upwardly therefrom at 12 it is semi-spherical and joined by a neck 13 to its balancing piston, to be described later. The valve has a direct perpendicular port 14 passing entirely through it, and inclosed by walls 15, 16. With the exception of the port 14 the valve is closed to any fluid flowing through pipe 2. The top 12, and face 11 inclose a cavity 17 with two ports 18, 19 leading through face 11 in positions to cover passages 6, 8 when port 14 is in communication with passage 4, or, ports 14, 18, 19 are 120 degrees apart. Integrally connected to valve 10 by the neck 13 there is a piston 20 closely fitting within the case 1, and provided with packings 21, 22, held in place by a follower 23. Piston 20 has a stem 24 upwardly passing through cover 25, secured to case 1, and through a stuffing box 26 having a follower 27. A worm wheel 28 is secured to stem 24. At one side of cover 25 there are secured stands 29 supporting a shaft 30 on which is a worm 31 to drive the wheel 28, and an electric motor (not shown) will be provided to rotate the shaft, its worm, the worm wheel and valve. Entering case 1 there is a pipe 32 having a valve 33 and a pipe 34 at right angles to pipe 32, which connects with a **T** 35 having a pipe 36 leading to chamber 37 between follower 23 and cover 25. Outwardly from **T** 35 there is a pipe 38 connected to a safety valve 39 of any suitable construction, with a discharge pipe 40.

As illustrated, pressure entering pipe 2 would flow over valve 10 and under its piston 20 to port 14, passage 4 and pipe 5 to force the piston of the cylinder to which it is connected; at the completion of the stroke or movement of the piston, the motor to be provided will be energized to rotate the valve in the direction of arrow A, Fig. 3, putting port 18 over passage 4, and port 19 over passage 8, when the fluid flow will be through pipe 5, port 18, cavity 17 and port 19 to discharge pipe 9, the movement of the valve 10 placed port 14 over passage 6 so that pressure fluid will flow from inlet passage 2, over the valve, through port 14, passage 6 and its pipe 7 leading to the opposite side of the cylinder piston, and returning it to its original position, valve 10 will then be returned to its original position as indicated by arrow B, Fig. 3. As the pressure fluid flows over valve 10 and under piston 20 they would be balanced, if of equal area, but port 14 destroys the equilibrium, therefore to insure the seating of valve 10, sufficiently to prevent its non-leakage the pipes 32, 34 and 36 connected by **T** 35 and controlled by valve 33 are used to permit fluid pressure to flow from within case 1 to chamber 37 above piston 20; but in order to insure the proper amount of pressure over the piston to keep the valve seated and avoid an excessive pressure, a pipe 38 is secured to **T** 35 and leading to a safety valve 39 which can be so adjusted as to secure only a desired amount of pressure.

I claim.

1. In a hydraulic valve, a case having an inlet and multiple outlets, a rotatable valve having ports to control said outlets, one of said ports passing through the valve, means to rotate the valve for such control; a balancing piston connected to the valve and subjected to the same pressure per square inch upon its under side as the valve has upon its top; a chamber above the piston, a passage from the interior of the case to said chamber, normally open, and supplying the deficiency of pressure above the piston and a valve controlling the passage of fluid therethrough.

2. In a hydraulic valve, a case having an inlet and multiple outlets, a rotatable valve having ports to control said

outlets, one of said ports being through the valve, means to rotate the valve for such control; a balancing piston connected to the valve and subjected to the same pressure per square inch upon its under side as the valve has upon its top; a chamber above the piston, a passage normally open from the interior of the case to said chamber, to supply a deficiency of pressure above the piston, a valve controlling said passage, and a safety valve adapted to limit the pressure introduced into the chamber from the interior of the case, and whereby the pressure of the valve upon its seat is adjusted and limited.

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

DANIEL L. HOLDEN.

Witnesses:
WILLIAM C. STOEVER,
RANSOM C. WRIGHT.