April 15, 1924. 1,490,360

H. W. BRADEN

PILOT VALVE OR MASTER CONTROL VALVE

Filed March 27, 1922

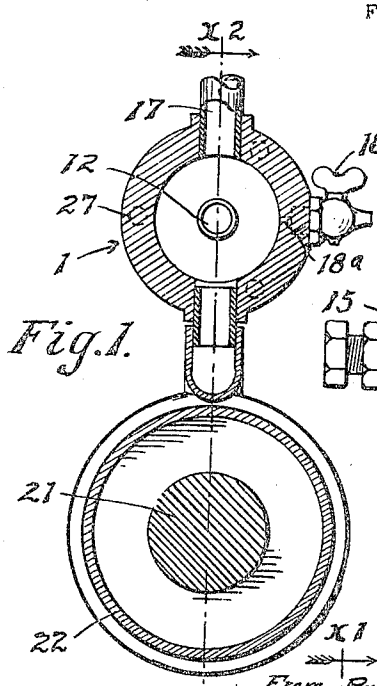


Fig. 1.

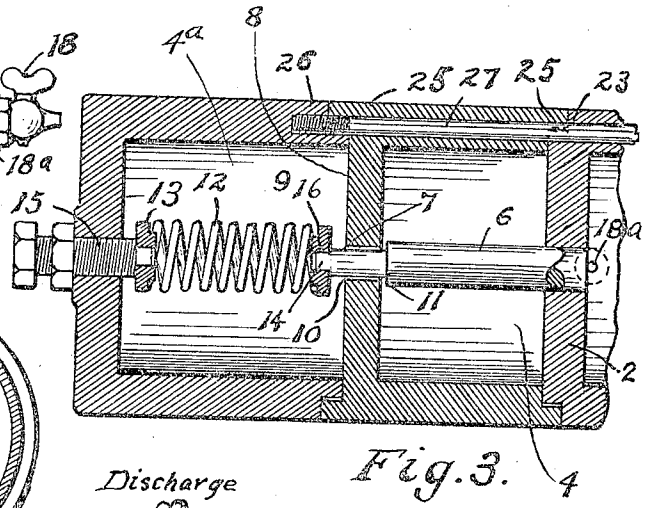


Fig. 3.

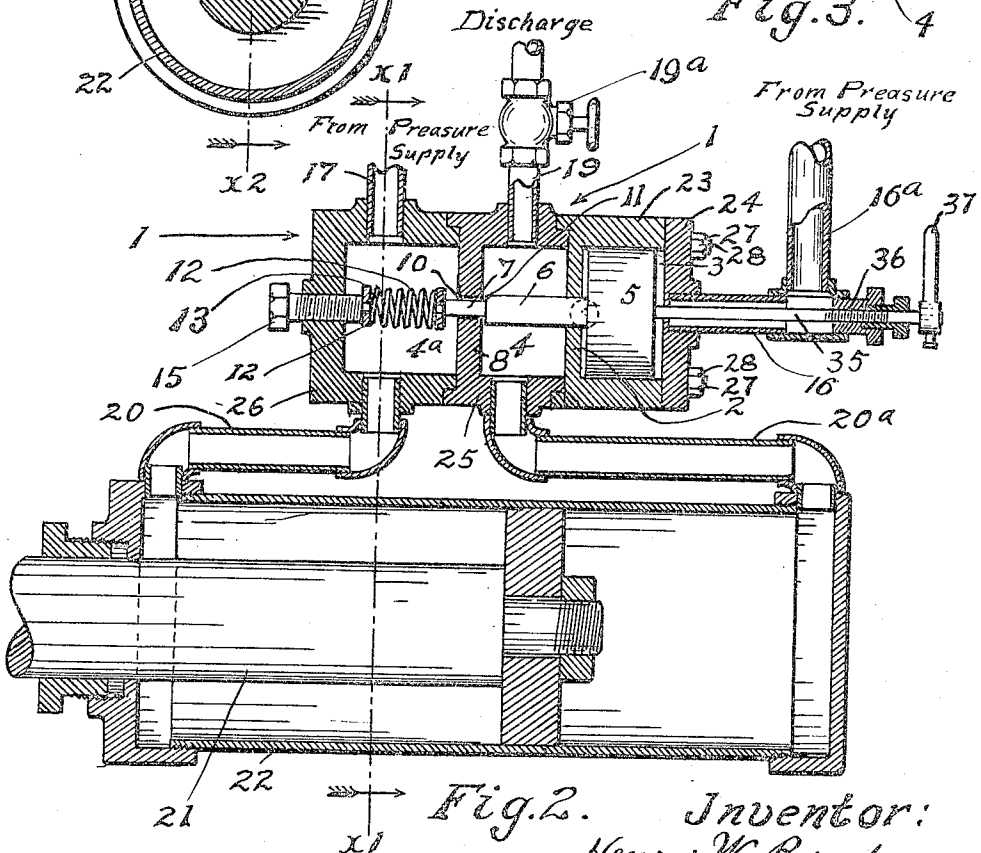


Fig. 2.

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UNITED STATES PATENT OFFICE.

HENRY W. BRADEN, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, OF ONE-HALF TO R. L. HAYES.

PILOT VALVE OR MASTER CONTROL VALVE.

Application filed March 27, 1922. Serial No. 547,050.

To all whom it may concern:

Be it known that I, HENRY W. BRADEN, a citizen of the United States, residing in the city and county of Los Angeles, State of California, have invented a new and useful Pilot Valve or Master Control Valve, of which the following is a specification.

This invention relates to an improvement upon the pilot valve forming a part of the pressure regulating apparatus set forth in Patent No. 970,736, issued September 20, 1910, to Spencer G. Neal and Joseph M. Childress. The construction of the pilot valve herein described is radically different from that of the pilot valve described in said patent, but the object for which it is intended is in general the same as that of the pilot valve of said patent.

The gain in simplicity obtained by the present invention is such that I am able to dispense with a number of the parts shown in said patent.

Another advantage is the addition of a manual control to the automatic control shown in said patent.

Other advantages with respect to simplicity of construction and efficiency of operation will appear from the following description and the accompanying drawings forming a part of the specification.

Referring to said drawings, Figure 1 is a vertical section on line x^1—x^1 of Fig. 2.

Fig. 2 is a transverse section on line x^2—x^2 of Fig. 1.

Fig. 3 is an enlarged sectional detail of an adjusting spring and parts adjacent thereto as seen in the upper left-hand portion of Fig. 2.

Referring in detail to the drawings, the pilot valve proper comprises a main cylinder 1 having a wall 2 extending diametrically of said cylinder to divide the same into two chambers, a chamber 3 which is the piston chamber proper, and an intermediate chamber 4, there being also an adjusting chamber 4^a. Within the piston chamber 3 is a piston 5 having a rod 6 extending slidingly through said wall 2. Said rod 6 has a reduced portion or stem 7, extending through the end wall 8 at the end of intermediate chamber 4 which is farthest from the piston proper. Outside of said wall 8 is the adjusting chamber 4^a already referred to, communication between said chambers 4^a and 4 being through a valve passage 10 around stem 7. The shoulder 11 of piston rod 6 forms a closure to control communication through said passage 10. When said shoulder 11 is seated to close passage 10, piston 5 is preferably about one-fourth of an inch from wall 2.

Within chamber 4^a is an adjusting spring 12 operating at one end (as best shown in Fig. 3) against a shouldered collar 13 which fits on to a small projection 14 on the end of the stem 7. The other end of said spring 12 is mounted in a similar manner upon the inner end of an adjusting screw 15 tapped into the outer wall of the adjusting chamber 9.

The initial pressure enters the piston chamber proper 3 through conduits 16 and 16^a, and an equal pressure from the same supply source (not shown) is at all times furnished to the adjusting chamber 4^a through conduit 17. Pet-cock 18 opens vent 18^a to afford relief for the pressure within the piston chamber proper, thereby preventing pressure from equalizing on opposite sides of the piston owing to any leakage therearound.

The exaust pipe 19 controlled by valve 19^a at all times affords relief of the pressure within chamber 4^a. Conduits 20 and 20^a afford communication with the main cylinder 22 on opposite sides of the piston 21 therein.

In what is at present deemed the preferred embodiment of the invention, the casing of the pilot valve consists of three cup-shaped members, the right-hand member 23 as seen in Fig. 2 being closed by a head 24. There is a male and female joint between the two right-hand members 23 and 25 as seen in Fig. 2, and the same kind of a joint also between the central member 25 and the left-hand member 26. Through the two right-hand members extend a plurality of studs 27, externally threaded at each end, the left-hand ends of said studs being tapped into the end of the left-hand member 26. The two other members 23 and 25 slide loosely over said studs, the cylinder head 24 being held in place by nuts 28 screwing on to the outer ends of said studs.

Under some conditions it is desirable to manually operate the valve controlled by the travel of the piston 5. For this purpose I provide an operating rod 35 threaded

through an internally threaded guide 36 within conduit 16, and provided with an operating handle 37. The inner end of said rod 35 operates against the outer side of the head of piston 5 against the opposition of spring 12, said spring at all times holding said head against the end of said rod. By inserting guide 36 into the end of pipe 16 and having said rod extend axially through said pipe, a compact inexpensive construction is provided for the manually operable means. Said pipe 16 extends parallel to the direction of movement of piston 5.

In operation, the discharge valve 19^a is set in a very slightly open position, and the adjusting screw 15 is regulated against the opposition of compression spring 12 in order to maintain the desired amount of opposition against the fluid pressure upon the right hand face (see Fig. 2) of the piston head 5. If, for example, screw 15 is set at eighty pounds pressure, then a pressure of slightly over eighty pounds entering pipes 16, 16^a will move piston 5 and rod 6 toward the left, thus closing the annular passage 10. When this occurs, the pressure against the end of the large piston 21, gradually falls on account of leakage through pipe 20^a, chamber 4 and pipe 19. This causes the pressure around piston 21 to move the same to the right, thus operating any desired balance valve (not shown). The pressure causing this last mentioned movement is supplied through pipes 20, chamber 4^a and pressure supply pipe 17. Piston 21 will continue to move to the right until it reaches the limit of its travel, but will return to its initial position as soon as pressure in chamber 3 decreases enough to allow spring 12 to move rod 6 to the right and reopen annular passage 10, causing pressure to equalize in both ends of cylinder 22, moving piston 21 to the left because of the area of its left face being less than that of its right face.

I claim:

1. In a pilot valve, a cylinder, a wall to divide said cylinder into an end chamber and an intermediate chamber, a piston within said end chamber, an adjusting chamber in communication with said intermediate chamber, communication between said intermediate chamber and adjusting chamber being controlled by the movements of said piston, and a spring opposing said piston to determine the pressure required to open such communication, there being inlet and outlet ports to supply pressure to and relieve pressure from said piston.

2. In a pilot valve, a cylinder, a wall to divide said cylinder into an end chamber and an intermediate chamber, a piston within said end chamber, said piston having a rod extending movably through said wall, a portion of said rod extending through the end of said cylinder farthest from the piston proper to constitute a valve at that point, an adjusting chamber in communication with said intermediate chamber through a passage controlled by said valve, and a spring opposing said piston to determine the pressure required to open said valve, there being inlet and outlet ports to supply pressure to and relieve pressure from said piston.

3. In a pilot valve, a cylinder, a wall extending diametrically of said cylinder to divide the same into an end chamber and an intermediate chamber, a piston within said end chamber, said piston having a rod extending through said wall, said rod having a reduced portion or stem extending through the end of said cylinder farthest from the piston proper to constitute a valve at that point, an adjusting chamber in communication with the passage controlled by said valve, a spring operating against said piston rod to regulate the pressure to open said valve, means to regulate the tension of said spring, there being a source of pressure supply to said adjusting chamber, outlet ports leading from said adjusting chamber and intermediate chamber and an exhaust outlet from said intermediate chamber.

4. In a pilot valve, a cylinder, a wall to divide said cylinder into an end chamber and an intermediate chamber, a piston within said end chamber, an adjusting chamber in communication with said intermediate chamber, communication between said intermediate chamber and adjusting chamber being controlled by the movements of said piston, a spring opposing said piston to determine the pressure required to open such communication, there being inlet and outlet ports to supply pressure to and relieve pressure from said piston, and manually operable means to move said piston in opposition to said spring.

5. In a pilot valve, a cylinder, a wall to divide said cylinder into an end chamber and an intermediate chamber, a piston within said end chamber, an adjusting chamber in communication with said intermediate chamber, communication between said intermediate chamber and adjusting chamber being controlled by the movements of said piston, a spring opposing said piston to determine the pressure required to open such communication, there being inlet and outlet ports to supply pressure to and relieve pressure from said piston, an inlet pipe extending parallel to the direction of movement of said piston, a rod extending axially of said inlet pipe, said rod having endwise engagement with said piston to move the same in opposition to said spring, and manually operable means to actuate said rod.

HENRY W. BRADEN.