

C. E. SEMPLE, JR.
PRESSURE CONTROLLING VALVE.
APPLICATION FILED MAY 18, 1906.

Fig. 1.

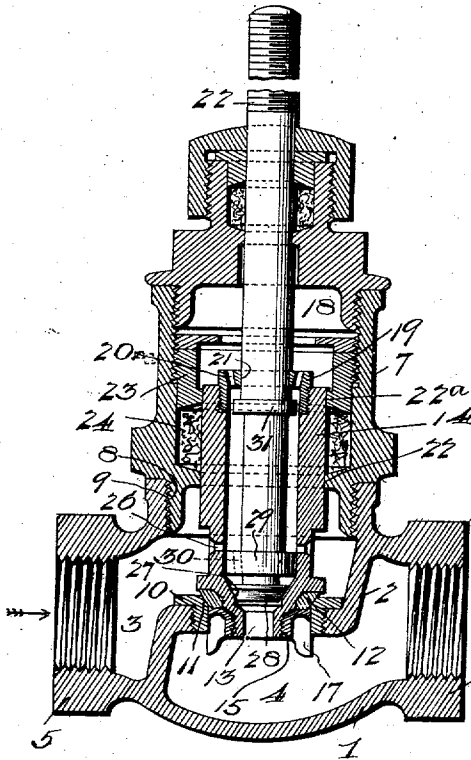


Fig. 2.

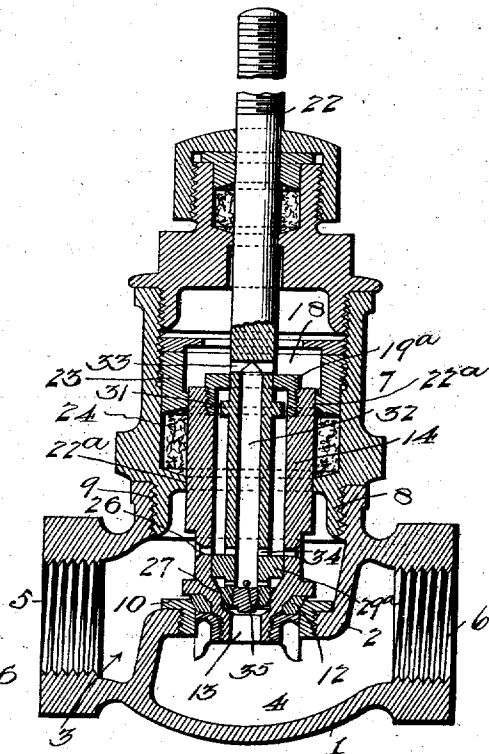
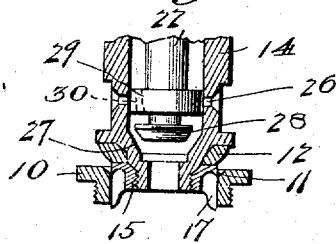


Fig. 3.



Witnesses

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S. J. Moxham

334

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UNITED STATES PATENT OFFICE.

CHARLES E. SEMPLE, JR., OF YOUNGSTOWN, OHIO, ASSIGNOR OF ONE-HALF TO CHARLES E. SEMPLE, SR., OF YOUNGSTOWN, OHIO.

PRESSURE-CONTROLLING VALVE.

No. 838,466.

Specification of Letters Patent.

Patented Dec. 11, 1906.

Application filed May 18, 1906. Serial No. 317,604.

To all whom it may concern:

Be it known that I, CHARLES E. SEMPLE, Jr., a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented certain new and useful Improvements in Pressure-Controlled Valves, of which the following is a specification.

This invention relates to that type of valves which are semi-automatic in their action under the influence of the steam or other pressure in connection with which they are employed.

To this end the invention contemplates a simple, practical, and effective construction of a pressure-controlled valve capable of general application to fluid-pressure systems, though possessing special utility in combination with steam-traps designed to collect and dispose of condensation in steam-pipes.

With these and other objects in view, which will readily appear to those skilled in the art as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

The essential features of the invention involved in the mounting of the main cut-off and relief valves and the relative positions and movements of these valves in connection with the fluid circulation are necessarily susceptible to structural change without departing from the scope of the invention; but preferred embodiments thereof are shown in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal sectional view of a pressure-controlled valve embodying the present invention and shown closed. Fig. 2 is a sectional view showing a modified arrangement for circulating the fluid (whatever it may be) into and out of the pressure-chamber behind or beyond the valve-plunger. Fig. 3 is a vertical sectional view showing the relation of the main cut-off valve and relief-valve when open.

Like references designate corresponding parts in the several figures of the drawings.

The invention embodies in its general organization a valve-body, (designated in the drawings by the numeral 1,) which valve-body is of the general conventional form and is provided therein with a valve-seat partition 2, which separates the inlet-chamber 3 from the

outlet-chamber 4, said inlet-chamber being in communication with the inlet-neck 5 and the outlet-chamber 4 being in communication with the outlet-neck 6, to which necks is coupled the line of piping with which the valve is associated.

A distinctive feature of the present invention resides in equipping the valve-body 1 with a pressure-cylinder 7, rigidly connected with the body. This connection may be effected in different ways; but a preferable construction is shown in the drawings and consists in providing the cylinder 7 at one end with a threaded neck 8, secured in the internally-threaded coupling-collar 9, projected from one side of the valve-body in the longitudinal plane of the cylinder and in the transverse plane of the valve-seat opening in the partition 2 of the valve-body.

The valve-seat opening in the partition 2 has removably screwed therein a flanged valve-seat bushing 10, provided at one corner thereof with a beveled valve-seat 11, against which contacts the complementary beveled face of the main cut-off valve 12. The main cut-off valve 12 is designed to close the orifice through the bushing and is preferably in the form of a ring placed around the inner contracted valve-head portion 13 of the plunger 14. The said valve-head portion 13 of the plunger 14 is contracted, so as to project through the valve-seat orifice or opening of the partition 2, and at its extremity is threaded to accommodate thereon the internally-threaded binding-nut 15, arranged to hold the valve or valve-disk 12 in place or to bind the same against the lower or under end of the plunger 14. The said binding-nut 15 in addition to performing the function referred to is provided with a plurality of radial guiding-wings 17, which act as guiding members operating within the orifice of the valve-seat bushing 10 and constitute a guide for the inner valve-carrying portion of the plunger 14.

The plunger 14 is of a tubular or hollow formation throughout, and the lower end thereof opens directly into the outlet-chamber 4 of the valve-body, while the upper or outer end is designed to communicate with the upper pressure-chamber 18, formed in the upper part of the pressure-cylinder 7. In the preferred construction (shown in Fig. 1) this communication with the upper pres-

sure-chamber 18 is effected through a perforated cap 19, fitted in the open upper end of the plunger 14 and provided with circulating-holes 20 and also with a central guiding-opening 21 to accommodate the valve-operating stem 22, to be presently referred to.

Reverting to the reciprocal tubular valve-plunger 14, it will be observed that the same is slidably mounted within the pressure-cylinder 7 and is adapted to have a fluid-tight fit on a plurality of guiding-surfaces 22^a, provided upon the interior of the cylinder 7. In this connection it is preferable to equip the interior of the pressure-cylinder with a stuffing-box comprising a screw-mounted gland 23 and packing 24, arranged about the plunger and held in place by the gland. Also the stuffing-box 23 24 carries one of the guiding-surfaces 22^a, so that the plunger may be effectively and accurately guided in the cylinder, as may be plainly seen from the figures of the drawings.

Referring again to the structural features of the reciprocal plunger, it is to be noted that the diameter of the main body of the same is somewhat greater than that of the opening at the upper face of the valve-seat 11. Also this plunger is provided with a plurality of circulating-ports 26, piercing the wall thereof above the plane of the valve 12, thereby providing communication between the inlet-chamber 3 and the internal chamber of the hollow valve-plunger 14. Below the plane of said ports 26 the said valve-head portion of the plunger is provided with an internal valve-seat 27, upon which is designed to be seated the interior auxiliary pressure-relief valve 28, carried at the extreme lower or inner end of the stem 22.

In the construction shown in Figs. 1 and 3 the said stem 22 carries therewith in spaced relation to the valve 28 a piston-collar 29, having a sliding working fit within the bore of the valve-plunger 14 and pierced by a plurality of relief-ports 30. In addition to the collar 29 the operating-stem 22 is also provided adjacent to the cap 19 with a stop-collar 31 of less diameter than the internal bore of the plunger 14 and designed to engage against the cap 19 to limit the movement of the piston-collar 29.

Referring now to the operation of the construction described, and shown in Figs. 1 and 3 of the drawings, it will be assumed that the valve as an entirety is closed and the ports in the positions shown in Fig. 1, thereby closing communication between the inlet-chamber 3 and the outlet-chamber 4. Also assuming that the pressure is on the line of piping connected with the valve, the fluid, whatever it may be, passes through the circulating-ports 26 into the interior chamber of plunger 14 and thence up through ports 20 to the upper pressure-chamber 18, where it exerts a downward pressure upon the up-

per or outer end of the valve-plunger 14, which serves to hold the main cut-off valve 12 firmly to its seat and at the same time exerts a similar pressure upon the upper face of auxiliary valve 28, thus holding it to its seat also. When it is desired to open the valve, the stem 22 is lifted mechanically or manually, thereby simultaneously opening the auxiliary relief-valve 28 and moving the piston-collar 29 to a position for closing ports 26. (See Fig. 3.) This cuts off communication between the inlet-chamber 3 and the pressure-chamber 18, while at the same time a pressure-release circuit is established from the chamber 18 through ports 20, through the bore of the plunger, and through ports 30 to the outlet-chamber 4. As soon as the pressure in chamber 18 is released the pressure in the inlet-chamber 3, acting upon the exposed area of the lower or under end of the plunger 14 in chamber 3, serves to lift the main valve 12 from its seat, thereby opening direct communication between the chambers 3 and 4, and hence through the valve-body.

To close the valve, the stem 22 is moved downwardly or inwardly, thereby simultaneously seating the auxiliary valve 28 and uncovering the ports 26, whereupon communication is reestablished between the inlet-chamber 3 and the pressure-chamber 18. The continued downward or inward movement of the stem 22 after the auxiliary valve is seated serves to close the main valve, and this operation is assisted by the accumulating pressure in chamber 18. When the plunger 14 in its downward course reaches a point where the pressure in chamber 18 exceeds that in the outlet-chamber 4, the operation becomes entirely automatic, and the final movement of the main valve is effected by pressure.

A practical embodiment which may be resorted to is shown in Fig. 2 of the drawings, and consists in providing the valve-operating stem 22 with a hollow or tubular portion 32, having above the plane of an imperforate closing-cap 19^a for the plunger the relief-ports 33 in communication with the chamber 18. Also said stem 22 carries a solid or imperforate piston-collar 29^a and is pierced above and below the plane of said collar by separate sets of circulation-holes 34 and 35, respectively. These circulation-holes permit the fluid above the piston-collar 29^a to freely pass out of the hollow plunger 14 to chamber 4 when said collar is in a closing position with reference to ports 26 in the plunger, the pressure-release circuit being established, when stem 22 is lifted, from chamber 18 through ports 33, tubular portion 32, and ports 34 and 35 to the outlet-chamber 4. In other respects the action and operation of the parts are precisely the same as described in connection with Figs. 1 and 3 of the drawings.

It is thought that from the foregoing the construction, operation, and many advantages of the herein-described valve will be readily apparent without further description.

I claim—

1. In a valve of the class described, a valve-body having a fixed valve-seat, a pressure-cylinder carried by the valve-body and having a pressure-chamber, a reciprocal hollow valve-plunger within said cylinder and having circulating-ports in direct communication with the inlet-chamber of the valve-body and arranged to admit fluid from the said inlet-chamber to said pressure-chamber, said valve-plunger also carrying a main cut-off valve, and a mechanically or manually controlled auxiliary-relief-valve device operating within the hollow plunger and having separate means for respectively closing the outlet from the valve-plunger into the outlet-chamber, and for cutting off the pressure-supply through the circulating-ports of the valve-plunger.

2. In a valve of the class described, a valve-body having a fixed valve-seat, a pressure-cylinder fitted to the valve-body and provided with a pressure-chamber, a reciprocal hollow valve-plunger movable within said cylinder and arranged to provide communication therethrough between said pressure-chamber and the outlet-chamber of the valve-body, said plunger being further provided with circulating-ports in direct communication with the inlet-chamber of the valve-body, and a valve-operating stem carrying an auxiliary relief-valve seated in the bore of the valve-plunger, said stem also carrying a cut-off element for said circulating-ports of the valve-plunger.

3. In a valve of the class described, a

valve-body having a fixed valve-seat, a pressure-cylinder fitted to the valve-body and having an interior stuffing-box and a pressure-chamber beyond the latter, a hollow reciprocal valve-plunger carrying a main cut-off valve and providing communication therethrough between said pressure-chamber and the outlet-chamber of the valve-body, said plunger being further provided with an internal valve-seat, and above the plane of the latter with side circulating-ports in direct communication with the inlet-chamber of the valve-body, and a suitably-operated valve-stem carrying an auxiliary relief-valve working on the internal seat of the valve-plunger, and above said auxiliary valve with a piston-collar arranged to cover and uncover said circulating-ports of the valve-plunger.

4. In a valve of the class described, a valve-body having a fixed valve-seat, a pressure-cylinder fitted to the valve-body and having a pressure-chamber, a reciprocal hollow valve-plunger carrying a main cut-off valve, and being of greater diameter than the seat of said main cut-off valve, said plunger being further provided with circulating-ports in communication with the inlet-chamber of the valve-body, and a valve-operating stem carrying an auxiliary relief-valve seated within the valve-plunger, and a pair of collars also located within the valve-plunger, one of said collars operating as a piston cut-off for said circulating-ports of the valve-plunger.

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

CHARLES E. SEMPLE, JR.

Witnesses:

A. HERD,
W. M. OMSLEY.

Correction in Letters Patent No. 838,466.

It is hereby certified that in Letters Patent No. 838,466, granted December 11, 1906, upon the application of Charles E. Semple, Jr., of Youngstown, Ohio, the title of the invention was erroneously written and printed on the face of the patent and in the heading to the specification and drawings as "Pressure-Controlling Valves," whereas the said title should have been written and printed *Pressure-Controlled Valves*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of January, A. D., 1907.

[SEAL.]

H. B. Bush
atty Chas. E. Semple, Jr.

F. I. ALLEN,
Commissioner of Patents.

It is thought that from the foregoing the construction, operation, and many advantages of the herein-described valve will be readily apparent without further description.

I claim—

1. In a valve of the class described, a valve-body having a fixed valve-seat, a pressure-cylinder carried by the valve-body and having a pressure-chamber, a reciprocal hollow valve-plunger within said cylinder and having circulating-ports in direct communication with the inlet-chamber of the valve-body and arranged to admit fluid from the said inlet-chamber to said pressure-chamber, said valve-plunger also carrying a main cut-off valve, and a mechanically or manually controlled auxiliary-relief-valve device operating within the hollow plunger and having separate means for respectively closing the outlet from the valve-plunger into the outlet-chamber, and for cutting off the pressure-supply through the circulating-ports of the valve-plunger.

2. In a valve of the class described, a valve-body having a fixed valve-seat, a pressure-cylinder fitted to the valve-body and provided with a pressure-chamber, a reciprocal hollow valve-plunger movable within said cylinder and arranged to provide communication therethrough between said pressure-chamber and the outlet-chamber of the valve-body, said plunger being further provided with circulating-ports in direct communication with the inlet-chamber of the valve-body, and a valve-operating stem carrying an auxiliary relief-valve seated in the bore of the valve-plunger, said stem also carrying a cut-off element for said circulating-ports of the valve-plunger.

3. In a valve of the class described, a

valve-body having a fixed valve-seat, a pressure-cylinder fitted to the valve-body and having an interior stuffing-box and a pressure-chamber beyond the latter, a hollow reciprocal valve-plunger carrying a main cut-off valve and providing communication therethrough between said pressure-chamber and the outlet-chamber of the valve-body, said plunger being further provided with an internal valve-seat, and above the plane of the latter with side circulating-ports in direct communication with the inlet-chamber of the valve-body, and a suitably-operated valve-stem carrying an auxiliary relief-valve working on the internal seat of the valve-plunger, and above said auxiliary valve with a piston-collar arranged to cover and uncover said circulating-ports of the valve-plunger.

4. In a valve of the class described, a valve-body having a fixed valve-seat, a pressure-cylinder fitted to the valve-body and having a pressure-chamber, a reciprocal hollow valve-plunger carrying a main cut-off valve, and being of greater diameter than the seat of said main cut-off valve, said plunger being further provided with circulating-ports in communication with the inlet-chamber of the valve-body, and a valve-operating stem carrying an auxiliary relief-valve seated within the valve-plunger, and a pair of collars also located within the valve-plunger, one of said collars operating as a piston cut-off for said circulating-ports of the valve-plunger.

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[SEAL.]

H. B. Busch
actg. Chy. Div. B.

F. I. ALLEN,
Commissioner of Patents.