

No. 851,165.

PATENTED APR. 23, 1907.

C. F. FERNALD.
VALVE.

APPLICATION FILED JUNE 22, 1905.

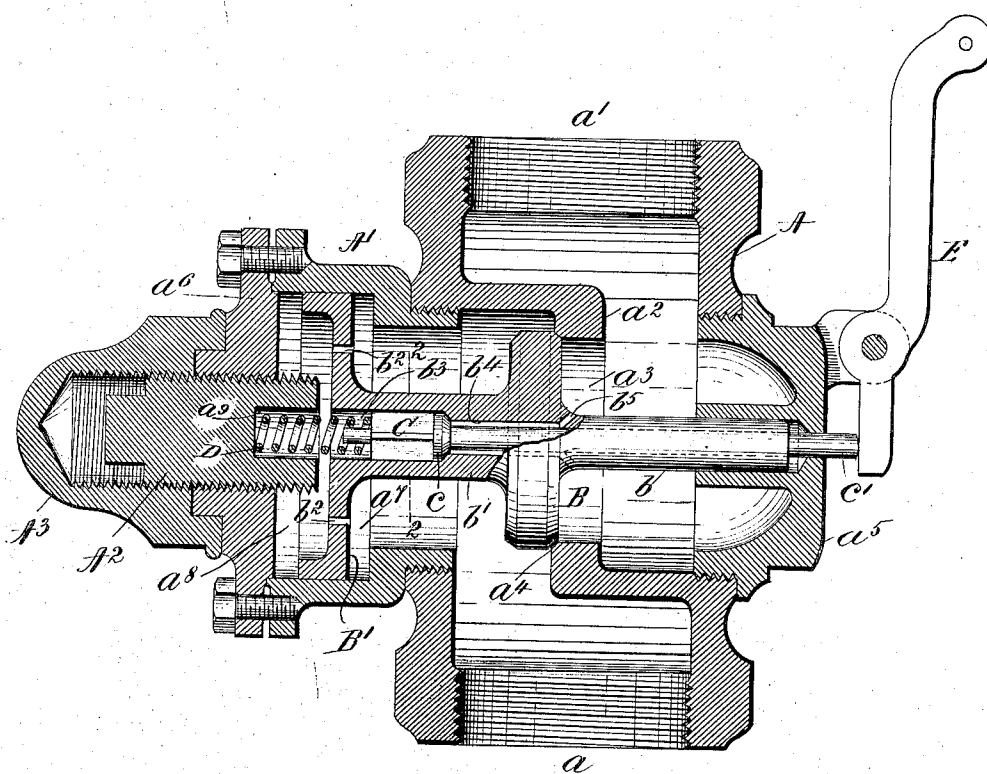


Fig. 1.

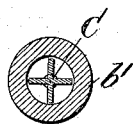


Fig. 2.

WITNESSES:

R. E. Brewer
M. V. Foley.

INVENTOR:

Charles F. Fernald
by Charles F. Fernald
his atty.

UNITED STATES PATENT OFFICE.

CHARLES F. FERNALD, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO STAR BRASS MANUFACTURING COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

VALVE.

No. 851,165.

Specification of Letters Patent.

Patented April 23, 1907.

Application filed June 22, 1905. Serial No. 266,391.

To all whom it may concern:

Be it known that I, CHARLES F. FERNALD, of Boston, in the county of Suffolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Valves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

My invention relates to that type of valve which is operated by an overbalanced piston, or in other words, that type of valve controlling pressure inlet and outlet passages, which has joined to it a piston normally held by the pressure in a state of equilibrium or until by exhausting or eliminating the pressure on one side of the piston it may be actuated by the pressure on the other side thereof and operate the valve.

The special object of my invention is to provide an improved means by which the pressure on one side of the piston may be directly exhausted into the main pressure outlet passage of the valve.

My invention can best be seen and understood by reference to the drawings, in which—

Figure 1 shows the improved valve mainly in vertical cross section. Fig. 2 shows a cross section of the same on the line 2—2 of Fig. 1.

Referring to the drawings:—A represents the valvular casing or shell having a pressure inlet a and outlet a^1 through which the fluid is adapted to pass. I prefer that these inlet and outlet passages be in line with one another. Inside the casing A separating the inlet and outlet passages is a partition a^2 through which is a port or opening a^3 . Around this port or opening is formed a valve seat a^4 against which the main valve B is adapted to close. This main valve is arranged upon forward and rear extending stems or rods b , b^1 , respectively. The stem b extends forward and has bearing in the wall of the valve casing or rather in a detachable plug a^5 forming a part thereof. The stem b^1 extends backward into a cylinder A^1 which also forms a detachable part of the valve casing and the end of which is closed by a head a^6 which is bolted or otherwise fastened to the end of the cylinder.

On the end of the stem or rod b^1 inside the

cylinder A^1 is a piston B^1 . This piston is larger in area than the valve B with which it connects and its location inside the cylinder is such that there are formed therein chambers a^7 , a^8 , respectively, on either side of the piston. The chamber a^7 forward of the piston communicates directly with the inlet passage and the chamber a^8 in the rear of the piston is in communication with the chamber a^7 and so with the inlet passage by means of ports or openings b^2 in the piston.

Threaded into the head a^6 and extending through the same in line with the piston is what may be termed a stop A^2 inasmuch as its forward end inside the cylinder would act as a stop to limit the backward movement of the piston. The end of this stop outside the cylinder is covered and protected by a cap A^3 screwing onto the same.

Proceeding from the chamber a^8 in the rear of the piston, straight in through the piston and valve stem b^1 , is a vent passage b^3 . This passage is continued by a contraction b^4 , thereof into and through the main valve and empties into the outlet passage a^1 through the by-passage b^5 .

Contained in the vent passage b^3 is a winged valve C the head c of which is adapted to close upon a valve seat formed at the entrance to the contracted passage b^4 . This valve is so made and adapted that when fast upon its valve seat the vent passage or passages which as before described lead directly from the chamber a^8 into the outlet passage a^1 , are closed so that communication between said chamber and the outlet passage is entirely shut off. When the valve is open, however, and moved away from its valve seat communication between said chamber and the outlet passage is open so that the fluid pressure in said chamber may be exhausted therefrom and pass directly into the outlet passage. The adaptation of this auxiliary valve is also such that when the valve is open the fluid pressure may be exhausted from the chamber a^8 faster than it will enter the same from the outlet passage through the holes or openings in the piston.

The auxiliary valve C would normally be held closed on its valve seat by the pressure entering from the chamber a^8 . This is supplemented, however, by a compression spring D which is socketed partly in the vent

passage back of the valve so as to bear against it, and partly in a socket a^2 formed in the end of the stop A^2 back of the piston. For opening this auxiliary valve C I have provided it with a long stem c^1 which extends forward from the head of the valve through the contracted vent passage b^4 and from thence is continued straight out through the forward valve stem b to project through the wall of the valve casing or plug a^5 forming a part thereof in which the end of the stem b has bearing. Engaging with this projecting end of the stem is the arm of a lever E so mounted on the side of the valve casing or plug a^5 that upon operating the lever its arm will press against the projecting end of the stem and through it will unseat or open the auxiliary valve.

The adaptability and operation of the parts of the valve are as follows:—The pressure will enter at the inlet a and act upon the back of the main valve. The pressure will at the same time enter from the inlet passages into the chambers on both sides of the piston, entrance into the chamber a^8 back of the piston being made through the holes or openings b^2 in the piston. The auxiliary valve C controlling the vent passage or continuation of passages from the chamber a^8 into the outlet passage a^1 of the valve, will at this time be closed, both by the pressure and also by the compression spring D, so the effect is, with the parts thus normally arranged, for the piston to be held in a state of equilibrium and the main valve closed upon its valve seat. Now upon operating the lever E its lever will press against the stem c^1 of the auxiliary valve projecting through the wall of the valve casing, thereupon opening it against the pressure of its seating spring. The chamber a^8 back of the piston will then become exhausted through its exhaust passage or passages, by the auxiliary valve, into the outlet passage. The chamber will become exhausted, for as before described, the relationship of the parts is such that, when the auxiliary valve is open, the pressure will exhaust from the chamber a^8 faster than it will enter it through the holes or openings in the piston. By exhausting the chamber a^8 the pressure is relieved on the back side of the piston. The pressure will continue to press on the front side of the piston as well as upon the main valve, but inasmuch as the area of the piston is larger than said valve the pressure will act to press back the piston; it will, in other words, become overbalanced and the main valve automatically drawn open. As for the stop A^2 , besides providing a cavity or socket for the retention of the spring D, it acts also to limit the backward movement of the piston when the chamber a^8 is exhausted, so limiting or gauging the amount or degree of opening of the main valve as occasion may demand.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States:—

1. A valve of the character specified having a valve casing with inlet and outlet passages inside the same in line with one another, a partition separating said passages having therein a port or opening connecting the passages, a valve controlling said port or opening, a piston larger than said valve, a piston-rod connecting said valve with the piston, a cylinder casing making separable connection with said valve casing for containing said piston, means for closing the end of said cylinder casing, means whereby pressure from the inlet passage may be obtained on both sides of said piston, a passage through said piston providing outlet from the chamber in the rear thereof into the outlet passage, a valve for controlling said passage, and means for controlling said valve from a point outside the valve casing.

2. A valve of the character specified having pressure inlet and outlet passages, a main valve controlling said passages, a piston, a piston rod connecting the same with the main valve, a chamber on either side of said piston in communication with the pressure inlet passage, a vent passage for the chamber in the rear of the piston and leading through the same and also through the piston rod and main valve into the pressure outlet passage, an auxiliary valve normally seated inside said vent passage for controlling the same, and means for operating said valve.

3. A valve of the character specified having pressure inlet and outlet passages, a main valve controlling said passages, a piston, a piston rod connecting the same with the main valve, a chamber on either side of said piston in communication with the pressure inlet passage, a vent passage for the chamber in the rear of the piston leading through the same and also through the piston rod and main valve into the pressure outlet passage, an auxiliary valve normally seated inside said vent passage for controlling the same, and a rod connecting with said valve and extending forward to a point outside the valve casing, whereby said auxiliary valve may be operated.

4. A valve of the character specified having pressure inlet and outlet passages, a main valve controlling said passages, a valve stem extending forward from said main valve having bearing in the side of the valve casing, a piston larger than said valve, a piston rod connecting said piston and valve, a casing containing said piston forming a chamber on either side thereof in communication with the pressure inlet passage, means for exhausting the chamber in the rear of said piston, whereby the piston may become overbalanced to operate the main valve, the

same comprising a vent passage leading out of said chamber through the piston, thence through the piston rod and main valve into the pressure outlet passage, an auxiliary valve contained within the piston rod for controlling said vent passage, and a rod connecting with said valve and extending through the valve stem to project through the wall of the casing.

5 5. A valve of the character specified having pressure inlet and outlet passages, a main valve controlling said passages, a piston connecting with said main valve, a chamber formed on either side thereof in communication with the pressure inlet passage, a vent passage leading out of one chamber through the piston and communicating with the pressure outlet passage, a stop for said piston, an auxiliary valve in said vent passage for controlling the same, a socket or cavity formed in the end of said stop and a compression spring contained partly in said socket or cavity and partly in said vent passage for holding said auxiliary valve closed.

10 15 20

means for holding said valve normally seated, and means for moving the valve from its valve seat.

6. A valve of the character specified having pressure inlet and outlet passages, a main valve between said passages, a piston connecting with said main valve, a chamber formed on either side thereof in communication with the pressure inlet passage, a vent passage leading out of one chamber through the piston and communicating with the pressure outlet passage, a stop for said piston, an auxiliary valve in said vent passage for controlling the same, a socket or cavity formed in the end of said stop and a compression spring contained partly in said socket or cavity and partly in said vent passage for holding said auxiliary valve closed.

25 30 35 40

CHARLES F. FERNALD.

In the presence of—
R. E. BREWER,
J. E. R. HAYES.