

UNITED STATES PATENT OFFICE.

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AUTOMATIC VALVE.

SPECIFICATION forming part of Letters Patent No. 705,344, dated July 22, 1902.

Application filed October 28, 1901. Serial No. 80,327. (No model.)

To all whom it may concern:

Be it known that we, CHARLES W. HALL, Jr., and BENNET J. BERWALD, citizens of the United States, residing at Bradford, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Valves; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to automatic valves for use in connection with automatic water-heaters for automatically controlling the supply of gas by the turning on or off of the water at a distant cock or cocks in communication with such heater.

To this end our invention consists in the novel features hereinafter described, reference being had to the accompanying drawing, which illustrates one form in which we have contemplated embodying our invention, and said invention is fully disclosed in the following description and claims.

Referring to the said drawing, the figure represents a vertical sectional view of our improved valve.

In the drawing, A represents the casing of our improved valve, which may be made in one or more parts, as desired, and comprises two chambers—a water-chamber B, preferably located in the upper part of the casing, and a gas-chamber C, located, preferably, below the water-chamber and separated therefrom by a slightly-flexible diaphragm D, of metal or other suitable material. The water-chamber B is provided with an inlet *b*, to be connected with the water-main, and with an outlet *b'*, to be connected with an automatic water-heater of any desired form. The upper part of the water-chamber is in the form of a cylinder *b*², in which is located a piston E, arranged to work in said cylinder, and the outlet *b'* is in the wall of said cylinder and so arranged that when the piston is in its lowest position it will close said outlet, as shown in the drawing.

*b*³ represents an auxiliary outlet-passage formed in the water-chamber and connecting the part of cylinder *b*² above the piston directly with the outlet *b'*, as shown. The head

of the piston E is also provided with a relief aperture *e* and valve *e'*, said valve being preferably so constructed as to remain open when the pressure of water is equal on both sides of the piston-head. In this instance the valve *e'* is located on the lower side of the piston-head and has its stem extending through aperture *e* and provided with a retaining device *e*² on the upper side of said head, the valve being adapted to hang downwardly in open position by its own weight when the pressure is equalized above and below the piston.

The gas-chamber is provided with an inlet *c*, to be connected with the gas-main, and an outlet *c'*, to be connected with the burner of the automatic water-heater, and said chamber is also provided with a partition *c*³, in which an aperture *c*⁴ is arranged.

C' is the gas-valve, of large area and located on the side of said partition *c*³ adjacent to the main, said valve closing the aperture *c*⁴ and being held normally in closed position by the pressure of the gas from the main. The valve *C'* is provided on the side adjacent to the water-chamber with a stem *c*⁶, passing through the partition or diaphragm D, and provided with nuts *c*⁸ and packing-washers *c*⁹ to prevent leakage. The valve *C'* is also preferably provided with a stem *c*⁵, extending on the side opposite the water-chamber and engaging a guiding-recess *c*⁷ in the casing A to assist in bringing the valve always squarely upon its seat.

Within the water-chamber B the stem *c*⁶ of the gas-valve is connected with the piston E, preferably in such manner that the movement of the valve will be less than that of the piston. In this instance a lever F is pivoted to a bracket *f*, secured to the casing A, and said lever is pivotally connected between its ends to the stem *c*⁶ of the gas-valve. The other end of the lever F is connected by a link *f'* with the piston.

The operation of the valve is as follows: Supposing the water-pipes leading from the heater to be closed, the pressure in the water-chamber will be equal above and below the piston, and the pressure of water above the diaphragm D and of gas in the gas-chamber above the valve *C'* will hold it in closed position. If a water-cock connected with the

heater is now opened, the pressure of water above the piston E will be lessened, owing to the auxiliary outlet-passage b^3 , and the pressure of the water below the piston will close the relief-valve and raise the piston, thereby opening the outlet b' and raising the gas-valve off of its seat, and thus supplying water and gas simultaneously to the heater. When the draw-off cock is again closed, the pressure on both sides of the piston is again equalized, the relief-valve will open by its own weight, and the pressure of water above the diaphragm D and of gas upon the gas-valve will close it, thereby drawing down the piston and closing the water-outlet b' .

It is to be observed that should there be a leak or break in the water-main before it reaches the valve it could not in any way affect the valve, as the pressure of gas on the gas-valve would hold the parts in the positions shown. It is also to be noted that there are no springs in the construction to get out of order and interfere with the proper operation of the valve.

What we claim, and desire to secure by Letters Patent, is—

1. An automatic valve comprising among its members, a water-chamber, a gas-chamber, a diaphragm separating said chambers, said water-chamber being provided with an inlet and outlet, a piston working in said chamber and adapted to normally close said outlet, when at one extreme of movement, and to be moved to open said outlet by the pressure of water in the chamber, said gas-chamber being provided with an inlet, an outlet, and a controlling-valve connected to said diaphragm adapted to be held in closed position by the pressure of gas in said chamber, and the pressure of water on said diaphragm, and connections from said piston to said gas-controlling valve, substantially as described.

2. An automatic valve comprising among its members, a water-chamber, a gas-chamber, a diaphragm separating said chambers, said water-chamber being provided with an inlet and outlet, a piston working in said chamber and adapted to normally close said outlet, when at one extreme of movement, and to be moved to open said outlet by the pressure of water in the chamber, said chamber having an auxiliary passage from the outlet to the side of the piston opposite that exposed to the water-pressure and a relief-vent in said piston adapted to communicate with said pas-

sage, said gas-chamber being provided with an inlet, an outlet and a controlling valve connected with said diaphragm and held normally in closed position by the gas-pressure in said chamber and the pressure of water on said diaphragm, and connections between said piston and said gas-valve, substantially as described.

3. An automatic valve comprising among its members a water-chamber, provided with an inlet and outlet, a piston in said chamber normally closing said outlet, and adapted to be moved by the pressure of water below the piston to open said outlet, said chamber being provided with an auxiliary passage from the other side of the piston to said outlet, a normally open relief-valve in said piston, adapted to be closed by the pressure of water below the piston, a gas-chamber, a diaphragm separating the gas-chamber from the water-chamber, a gas-controlling valve in the gas-chamber connected with said diaphragm and held normally closed by the pressure of the gas from the main and the pressure of water on said diaphragm, and connections between said gas-valve and the piston in the water-chamber for opening the gas-valve, and a connection between said diaphragm and said gas-valve, substantially as described.

4. An automatic valve comprising among its members, a water-chamber and a gas-chamber each provided with independent inlets and outlets and a diaphragm separating said chambers, said water-chamber having a cylinder, a piston working therein and arranged to close the outlet when at one extreme of movement, said water-chamber having an auxiliary passage from said cylinder, above the piston, to said outlet, a relief-valve in said piston held normally open by its weight and adapted to be closed by pressure of water in the chamber, a gas-valve in said gas-chamber normally held closed by the gas-pressure in said chamber and the pressure of water on said diaphragm, a lever connected to said gas-valve, and also connected to said piston, and connections between said diaphragm and the gas-valve, substantially as described.

In testimony whereof we affix our signatures in the presence of two witnesses.

CHARLES W. HALL, JR.
BENNET J. BERWALD.

Witnesses:

EDWIN E. TAIT,
R. B. TAIT.