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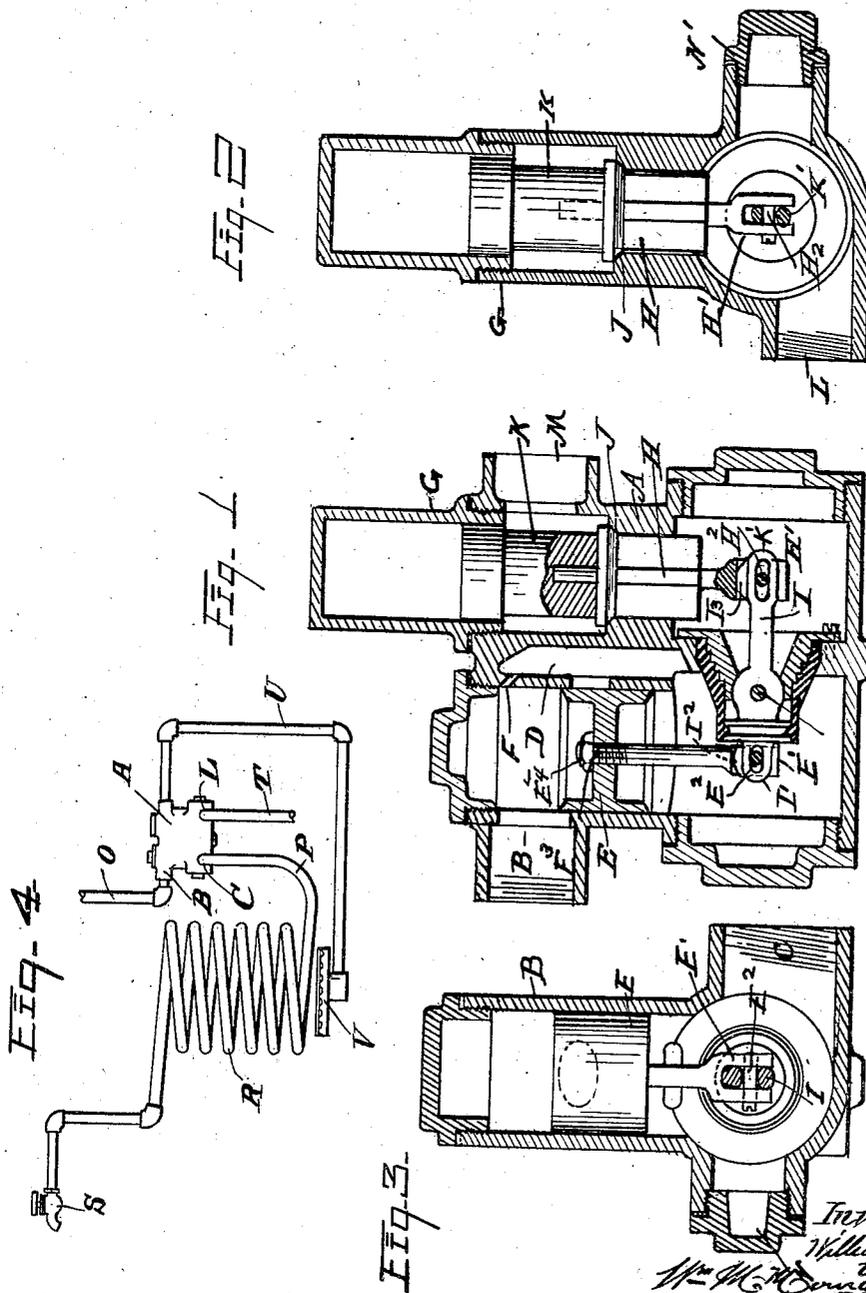
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W. E. KAY

HYDRAULIC VALVE FOR WATER HEATERS

Original Filed Aug. 9, 1919



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UNITED STATES PATENT OFFICE.

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HYDRAULIC VALVE FOR WATER HEATERS.

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To all whom it may concern:

Be it known that I, WILLIAM E. KAY, a citizen of the United States, and resident of Elyria, in the county of Lorain and State of Ohio, have invented certain new and useful Improvements in Hydraulic Valves for Water Heaters, of which I hereby declare the following to be a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention has for its object to provide increased practicability and efficiency, in action in the controlling valve by means of which water and gas are supplied to an instantaneous water heater, or analogous device, and particularly an improvement upon the device described in the Letters Patent No. 863,402, granted to Eugene E. Kehnert of Lorain, Ohio, on the 13th day of August, 1907 and assigned to me.

The improvement is also designed to overcome danger of weakening and breaking of the valve operating parts, to provide a positively acting weight for closing the gas admission valve, and also to provide means for cutting off the gas supply promptly, to prevent useless consumption of gas. In the aforesaid prior patent, the hydraulic piston is connected with the gas admission valve by means of an oscillating member, and made heavier than the gas admission valve with the intention of closing the gas admission valve by gravity of the piston, but owing to the change of gravity under water pressure on the sides of the vertical hydraulic piston, the action of the hydraulic piston cannot be depended upon to close the gas admission valve.

Also the bypass through which the water supply passes around the piston is closed by the piston when at the lower point of its stroke and the water pressure cannot be released to close the valve except as the water leaks slowly past the piston in the cylinder, thus requiring the use of an undersized piston, and involving imperfect action and aligning of the parts.

In the improved structure, the parts are inverted and a positively acting weight is attached to the gas admission valve itself, which promptly closes the same, and by means of an additional opening in an elongated bypass, water pressure is received below the piston so as to balance the pressure on both sides of the hydraulic piston and en-

able the weighted gas admission valve to close, also to adjust the relative movements of the hydraulic piston, and gas admission valve to varying water pressures, the hydraulic piston is supplied with an adjustable connection with its stem or rod, and supplied with a lock nut to prevent accidental movement. Improved connections between the oscillating member and the piston rod and valve stem are also made which provide durability, and insure perfect bearing connections and perfect alignment of parts.

Various openings are also made in the casing, and closures provided therefor, which give accessibility to all the moving parts.

The invention is illustrated in the accompanying drawings, hereinafter more fully described and specifically pointed out in the claim.

In the accompanying drawings Fig. 1 is a vertical longitudinal section of the device; Fig. 2 is a section on center line of the gas valve and passage at right angles to Figure 1, Fig. 3 is a vertical section taken along an axial line through the hydraulic valve and cylinder also at right angles to Figure 1.

In these views A is the casing of the improved valve, B is the hydraulic cylinder having the inlet and outlet openings B and C respectively. D is the bypass leading around the hydraulic piston E whose lower outlet opens into the hydraulic cylinder below piston E and whose upper intake is covered by said piston in the upper closed position of the latter, and F is a continuation of the bypass extending beyond its intake end, permitting the water to flow around the piston in small volume and thus forming a pressure bleed opening, to equalize the pressure thereon and permit the gas valve to close quickly. G is the gas cylinder or passage controlled by the valve H, which is operatively connected with the hydraulic piston E, by means of the oscillating member I, and which has its lower portion in the form of cross webs below the gas admission valve seat J. K is a weight mounted upon the valve and designed to positively close this valve when the water pressure is cut off from the hydraulic piston. L and M are gas inlet and outlet openings in the gas cylinder walls.

The oscillating member is provided with slotted extremities I', K', and the piston and valve stem are forked at E' and H' respectively. Horizontal pins E² and H² are se-

cured in said respective forks and pass through the respective slots, thus giving greater flexibility of movement and permitting of quick repair of the parts if they become broken; caps N, N' permit of access to these parts. Also the upper edges of the slotted extremities of the oscillating member are raised and rounded at I², I³ and bear directly upon the forks E' and H', so that there is no liability of the pins E² and H² becoming broken.

This construction gives great flexibility and durability to these connections. The piston rod is also adjustably secured in the piston at E³ and a clamping nut E⁴ prevents it from slipping.

This adjustability is quite essential to successful operation of the device. This device is far superior to the previous device hereinbefore mentioned, since it is positive in action and hence more efficient, and adjustable to variations in water pressure, which is not true of the prior device.

It is quite obvious from the foregoing that the gas valve is controlled by the water piston to the extent that it is opened against the pressure of its closing weight when the piston is forced downwardly upon the opening of the water passage. When such opening takes place in the water passage pressure on the lower side of the piston is reduced and pressure upon its upper side thereupon forces the piston downwardly, the connections between the piston rod and the gas valve operating to open the latter. When the water passage is closed pressure accumulates very quickly below the water piston and as the latter moves upwardly, the extension of the by-pass with its bleed opening operate to permit quick equalization of pressure above and below the piston so that the gas valve can be quickly seated by the weight thereon.

In its use, the valve is adapted for con-

nection like the previous device, and as shown particularly in Fig. 4, wherein the casing A is shown with its fluid intake B connected to a water supply pipe O and with its fluid outlet C connected by a pipe P to a water heating coil R, in turn delivering to a faucet S. A gas supply pipe T leads to the gas intake L and a gas outlet pipe U leads from the gas outlet M to a burner V beneath the coil R, the device as a whole functioning to cut off the gas supply to burner V when the flow of fluid through the casing A stops.

Having described the invention what I claim as new and desire to secure by Letters Patent is:—

In a water controlled gas admission device, a single casing including hydraulic and gas cylinders having respectively a piston and a gas control valve and having intakes and outlets, connections between said piston and said valve for opening the latter when the former is moved to open position, a weight connected with the gas valve for closing the same when the piston moves to closed position, said gas cylinder having an extension above its valve in which the said weight is movable, and said hydraulic cylinder having a by-pass provided with an intake opening at one end and with an outlet opening at its opposite end, the former of which is covered by the piston in the closed position of the latter, said by-pass having an extension beyond its intake opening provided with a pressure bleed opening in communication with the cylinder at a point between the closed position of the piston and the cylinder intake.

In testimony whereof, I hereunto set my hand this 28th day of July, 1919.

WILLIAM E. KAY.

In presence of—

HARRY N. REDINGTON,
JANE HARPER.