R. R. JAMES.

AUTOMATIC VALVE FOR WATER HEATERS.

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1,024,263.

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Fig. 1.

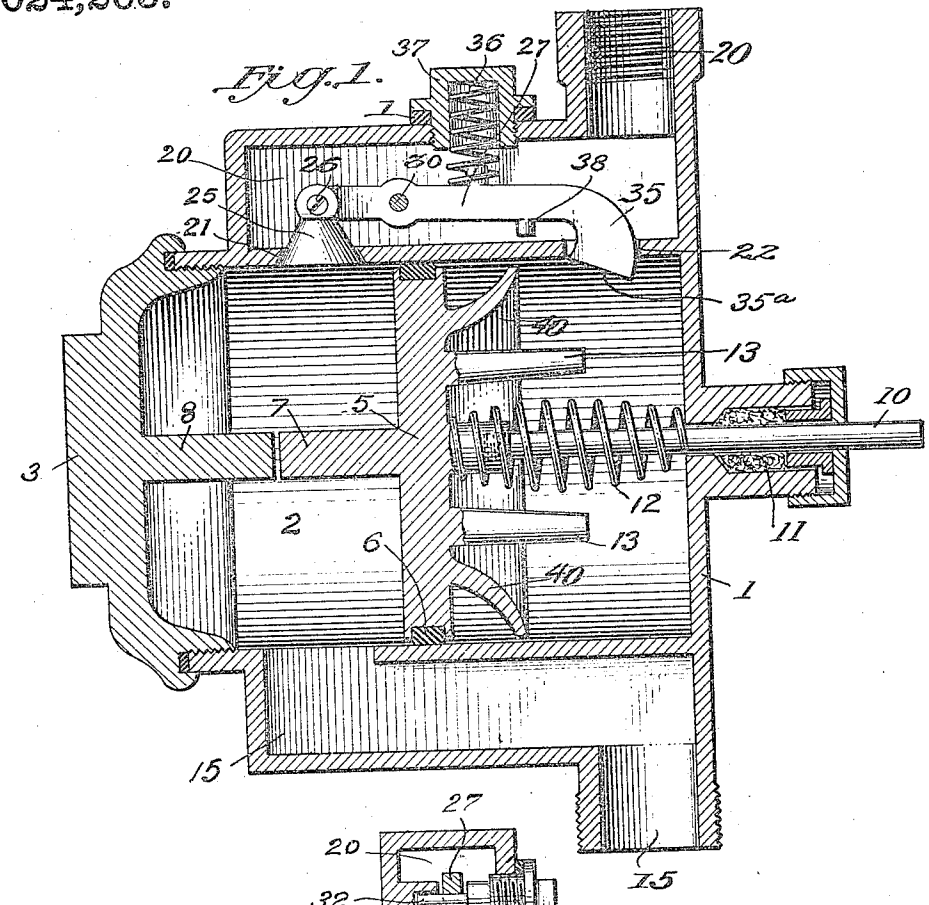
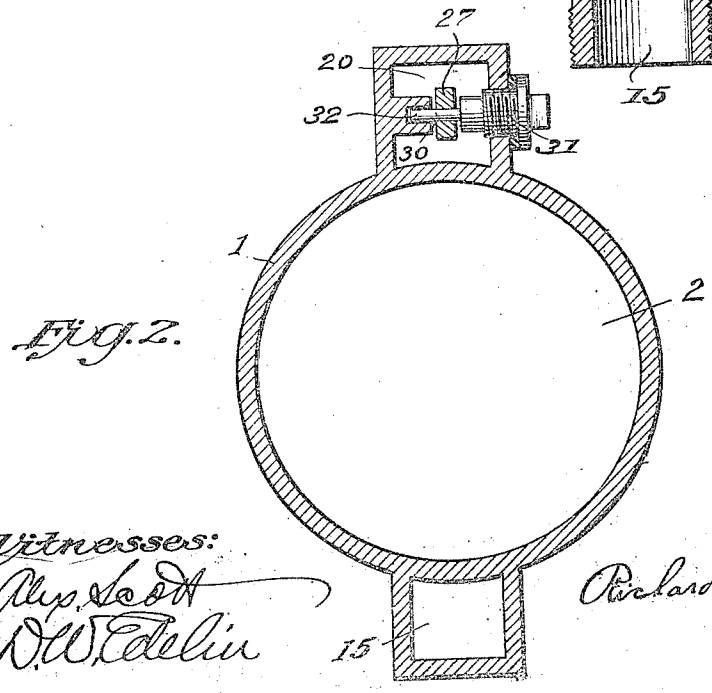


Fig. 2.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC VALVE FOR WATER-HEATERS.

1,024,263. Specification of Letters Patent. Patented Apr. 23, 1912.

Application filed December 27, 1911. Serial No. 668,170.

To all whom it may concern:

Be it known that I, RICHARD R. JAMES, a citizen of the United States, and resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Automatic Valves for Water-Heaters, of which the following is a specification.

My invention relates to automatic valves for water heaters of the type known as "instantaneous" in which the operation of the valve caused by the opening and closing of the service cock of the water heater automatically operates the gas supply valve of the gas heater.

The purpose of my invention is to simplify and improve the construction and operation of this type of automatic water valve and to this end I provide a casing formed with a piston chamber, having a water inlet passage communicating with said chamber at one end and a water outlet passage communicating with said chamber at both ends, a piston operating in said chamber between the two communications of the water outlet passage, an outlet valve normally closing the port from the inlet end of the chamber to the water outlet passage, and means actuated by the movement of the piston for opening and closing said outlet valve. The piston rod is extended beyond the casing to actuate the usual gas valve in a manner well understood. The means whereby the piston operates the outlet valve comprise preferably a lever pivoted between its ends in the outlet passage and supporting the outlet valve upon one end and having its opposite end projected through the other port into the path of the piston by which it is actuated. A spring normally holds the lever of the outlet port in closed position. The controlling piston is provided with limiting stops or lugs to confine its movements and the usual spring engages the piston to hold it in its normal retracted position when the water is shut off. This simple form of automatic valve mechanism is positive in action and not liable to stick and get out of order. The controlling piston can be provided with an oil soaked packing which operates upon the unbroken inner surface of the piston chamber so that it is subjected to less wear than pistons of some valve mechanisms heretofore used.

In order that my invention may be fully understood I will first describe the same with reference to the accompanying drawing and afterward point out the novelty more particularly in the annexed claims.

In said drawing Figure 1 is a longitudinal sectional view of my improved automatic valve mechanism. Fig. 2 is a transverse sectional view of the same.

In producing the improved valve according to my invention I form a suitable casing 1 with a cylindrical piston chamber 2 closed at one end by a removable cap 3. Operating in the chamber 2 is a piston 5 having a suitable packing 6. The inner end of the piston is formed with a limiting lug 7, which in the normal retracted position of the piston engages a similar lug 8 projecting from the inner face of the removable cap 3. A piston rod 10 projects from the outer face of the piston 5 through gland or stuffing box 11 formed upon the casing 1. The piston rod 10 is designed to operate the gas supply valve of the gas heater in the usual manner. A spring 12 surrounds the piston rod 10 and is confined between the outer face of the piston 5 and the solid head of the chamber 2. The spring 12 tends to hold the piston 5 in its normal retracted position.

13—13 indicate lugs projecting from the outer face of piston 5 in position to engage the end wall of chamber 2 to limit the outward movement of the piston under the action of the water hereinafter described.

At one side of the casing, I provide a water inlet passage 15 communicating with the inner end of the piston chamber 2 at the inner side of piston 5. This passageway 15 has the cold water supply pipe connected with it in the usual manner. At the opposite side of the casing 1 I provide an outlet water passage 20 which extends longitudinally of the chamber 2 and communicates with the chamber at its inner end through a port 21 and at its outer end through a port 22. The port 21 is provided with a valve seat to receive a valve 25 which normally closes the port 21. The valve 25 may be of any suitable construction but is shown in the drawing as a conical valve which is pivotally mounted at 26 upon the end of a valve controlling lever 27 which is mounted in the outlet passage alongside of the piston chamber 2. The lever 27 is pivotally mounted between its ends upon a pivot pin 30 formed with a threaded head 31 seated in a threaded opening in the side

wall of passage 20 and having its inner end engaging an alined socket 32 in the opposite wall of said passage 20. The end of lever 27 opposite to the valve 25 is formed with an inwardly presented cam head 35 which projects through the port 22 into the path of the controlling piston 5. This head 35 has an inclined or cam face 35ª presented at an angle to the line of movement of the piston 5. A spring 36 engaging the lever 27 is confined by removable screw cap 37 threaded into a suitable opening in the casing. This spring 36 holds the lever 27 in normal position with the valve 25 closed. A limiting pin or lug 38 may be provided upon the lever 27 to engage the inner wall of passageway 20 for positively limiting the valve closing movement of the lever. Piston 5 is shown with a flaring flange 40 extending from its outer face in position to engage the cam head 35 of lever 27 for opening and closing the valve 25.

It will be understood from the above description that when my improved automatic valve is applied to an "instantaneous" water heater, and the water is shut off, the water pressure upon opposite sides of the piston 5 will be practically equal so that the spring 12 will hold the piston in its normal retracted position, allowing the outlet valve 25 to rest in closed position. In this normal position of the valve the gas supply valve is closed. When the hot water service cock is open the flow of water from the outlet passage 20 and the piston chamber 2 on the outer end of the piston 5 will disturb the equilibrium of the piston and permit the excess of water pressure from the service pipe through inlet passageway 15 to move the piston 5 in its chamber, causing the flange 40 to engage the cam head 35 of lever 27 to open the outlet valve 25. This allows the water to pass freely from the inner end of the chamber 2 through the outlet passage 20 to the heater. This outward movement of piston 5 opens the gas supply valve in the manner well known and understood in the art. When the hot water service cock is closed the pressure of water upon the opposite sides of the piston 5 becomes equalized and the spring 12 will gradually move the piston back to its normal retracted position permitting the spring 36 to close the outlet valve 25 when the mechanism is in readiness for another operation such as just described.

It will be understood that the movement of the piston 5 is very slight and that the packing of the piston operates only upon the finished interior surface of the chamber so that an effective packed fit between the piston and its chamber may be maintained without difficulty since it is subjected to a minimum amount of wear. The outlet valve 25 and its seat are preferably made of noncorroding materials so that practically no difficulty will be experienced from the valves sticking or getting out of order. In addition to the simplicity of the valve I consider it of great importance to provide for the passage of the water from the inlet pipe 15 around the piston, thus avoiding the necessity of impairing the effectiveness of the piston by forming a valved passage through it.

What I claim is:

1. In a gas valve operating device the combination of a casing having a piston chamber, a piston operating in said chamber, water inlet and outlet passages exterior to said chamber and both communicating with said chamber upon the same side of said piston, said inlet passage being in substantially free communication with said chamber, an outlet valve normally closing the communication from said chamber to said outlet passage, and means actuated by said piston for opening said outlet valve when the gas valve has been opened by said piston.

2. In a gas valve operating device the combination of a casing having a piston chamber, a piston operating in said chamber, a water inlet passage freely communicating with one end of said chamber, a water outlet passage exterior to said chamber communicating with both ends of said chamber, an outlet valve normally closing the communication from the inlet end of said chamber to said outlet passage, and means actuated by said piston for opening said outlet valve when the gas valve has been operated by said piston.

3. The combination of a casing having a piston chamber, a piston operating in said chamber, a water inlet passage communicating with one end of said chamber upon one side of said piston, a water outlet passage exterior to said chamber communicating with both ends of said chamber upon opposite sides of said piston, an outlet valve normally closing the communication from the inlet end of said chamber to said outlet passage, and a valve operating device mounted in said outlet passage and projecting into said chamber in position to be actuated by said piston.

4. In a gas valve operating device the combination of a casing having a piston chamber, a water inlet passage communicating with one end of said chamber, and a water outlet passage communicating with both ends of said chamber, with a piston operating in said chamber, an outlet valve normally closing the communication from the inlet end of said chamber to said outlet passage, a pivotally mounted valve supporting lever, and means connected with said piston for operating said lever to open the valve when the gas valve has been operated by said piston.

5. The combination of a casing having a piston chamber, a water inlet passage communicating with one end of said chamber, and a water outlet passage communicating with both ends of said chamber, with a piston operating in said chamber, an outlet valve normally closing the communication from the inlet end of said chamber to said outlet passage, and a valve supporting lever mounted in said outlet passage and projecting into said chamber in position to be operated by said piston.

6. The combination of a casing having a piston chamber, a water inlet passage communicating with one end of said chamber, and a water outlet passage communicating with both ends of said chamber, with a piston operating in said chamber, an outlet valve normally closing the communication from the inlet end of said chamber to said outlet passage, a valve supporting lever pivotally mounted in said outlet passage, and a cam head upon one end of said lever projecting into said chamber in the path of said piston to be operated thereby.

7. The combination of a casing having a piston chamber, a water inlet passage exterior to said chamber in free communication with said chamber adjacent to one end, and a water outlet passage also exterior to said chamber and communicating through outlet and equalizing ports with both ends of said chamber, a piston operating in said chamber between said outlet and equalizing ports, a valve normally closing said outlet port, and a valve supporting lever pivoted in said outlet passage and projecting through said equalizing port into the path of said piston.

8. The combination of a casing having a piston chamber, a water inlet passage in free communication with said chamber adjacent to one end, and a water outlet passage communicating through outlet and equalizing ports with both ends of said chamber, a piston operating in said chamber between said outlet and equalizing ports, a valve normally closing said outlet port, a valve supporting lever pivoted in said outlet passage and projecting through said equalizing port into the path of said piston, and a spring engaging said lever and holding said valve normally in closed position.

9. The combination of a casing having a piston chamber, a water inlet passage in free communication with said chamber adjacent to one end, and a water outlet passage communicating through outlet and equalizing ports with the opposite ends of said chamber, a piston operating in said chamber between said outlet and equalizing ports, a spring holding said piston normally in its inner position, a valve normally closing said outlet port, a valve supporting lever pivoted in said outlet passage and projecting through said equalizing port into said chamber, and a part projecting from said piston adapted to engage said lever.

In witness whereof, I have hereunto set my hand in the presence of two witnesses.

RICHARD R. JAMES.

Witnesses:

RICHARD C. DAGGETT,

LAWRENCE O. POWERS, Jr.