W. KANE.

AUTOMATIC REGULATOR.

APPLICATION FILED NOV. 8, 1913.

1,098,733.

Patented June 2, 1914.

FIG. 2.

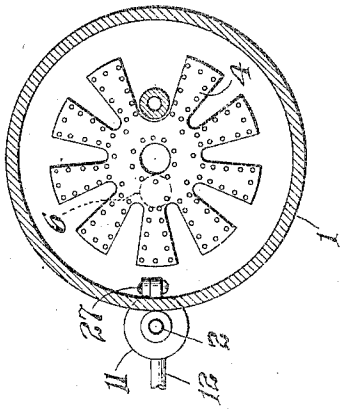


FIG. 3.

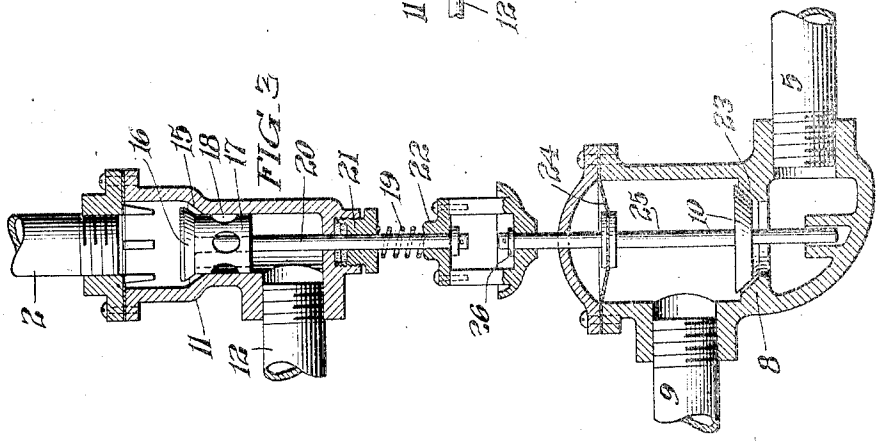
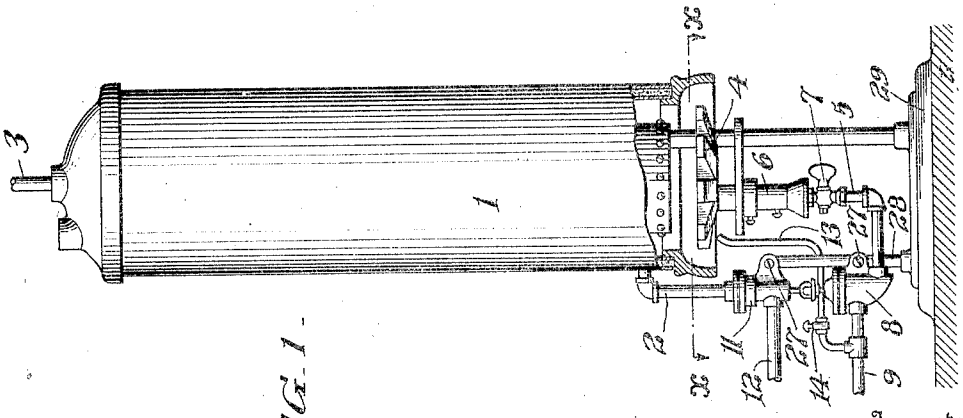


FIG. 1.



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UNITED STATES PATENT OFFICE.

WILLIAM KANE, OF PHILADELPHIA, PENNSYLVANIA.

AUTOMATIC REGULATOR.

1,098,733. Specification of Letters Patent. **Patented June 2, 1914.**

Original application filed August 17, 1912, Serial No. 715,529. Divided and this application filed November 8, 1913. Serial No. 799,858.

To all whom it may concern:

Be it known that I, WILLIAM KANE, citizen of the United States, and resident of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Automatic Regulators, of which the following is a specification.

My invention has reference to automatic regulators, more especially adapted for hot water boilers and consists of certain improvements, the nature and objects of which are fully set forth hereinafter.

The present application is a division of my application Serial No. 715,529, filed August 17, 1912.

The object of my invention is to employ automatic means for providing a supply of hot water to a water system whereby the heat is supplied to the water commensurately with the requirements, more or less instantaneously, upon inducing a flow by opening of a hot water spigot or spigots in the house supply system.

It has for a further object to provide automatic means which will insure the boiler remaining substantially full of water, to the exclusion of material quantities of steam, and in which the pressure conditions within the boiler shall automatically govern the supply of heating medium, so that, while at no time can the boiler and its contents become overheated to cause the generation of steam, a proper heating of the water therein is insured the moment that the pressure within the boiler is reduced by drawing water therefrom by the turning on of a spigot or spigots in the house supply system.

My invention consists of certain features of construction which are fully described hereinafter, and more particularly defined in the claims.

The invention will be better understood by reference to the drawings, in which:—

Figure 1 represents an elevation of a hot water boiler system embodying the automatic regulator of my invention; Fig. 2 is a transverse section of the same taken on line x—x of Fig. 1; and Fig. 3 is a sectional elevation of the regulator embodying my invention.

Similar numerals of reference indicate corresponding parts.

1 designates an upright boiler body of any suitable type having at the bottom a cold water supply pipe 2 and at the top the hot water discharge pipe 3 which leads to the house or other supply system. The specific construction of the boiler, however, forms no part of my invention, and I have therefore in the present drawing shown a conventional form of the type utilizing a gas burner as a heating medium, since the regulator of my invention is more particularly adapted for use with such a burner or its equivalent.

4 designates the gas burner, which is arranged below the boiler so that the heat therefrom in ascending, will pass into contact with the boiler and heat the water passing through the same. The burner 4 may be of any suitable construction and is supplied with gas by the pipe 5, said gas passing through the mixer valve 6, this latter furnishing the requisite quantity of air to provide a smokeless heating flame from the burner. The pipe 5 is preferably provided with a shut-off valve 7, and at its lower end is connected to the discharge port of a valve body 8, the inlet port of which connects with the gas supply pipe 9. Within the valve body 8 there is a gas valve piece 10 which controls the supply of gas to the pipe 5, and is itself automatically operated by a water actuated motor-valve 11, in such a manner that if the pressure of water in the hot water pipe 3 is relieved by the opening of the spigots on the house system, the pressure of the water from the street main, in forcing the water through the valve 11 into the boiler will open the gas valve 10 and supply gas to the burner. It will here be noted that the cold water supply pipe 2 connecting with the bottom of the boiler body has its supply end connected with a pipe 12 leading from the street water main, the connection being made through a special motor-valve 11, which performs the dual function of a check valve and also a motor for operating the gas supply valve 10 which is to supply the gas of the heating medium in accordance with the requirements of the boiler. With this construction in mind, it will be seen that when the pressure in the boiler accumulates by shutting off or reducing the flow of water therefrom, the motor-valve 11 operates to close or partly close the gas valve 10 and thereby shut off or partly shut off the flow of gas. The supply of gas to the burner, in this manner, may be

automatic and in accordance with the period of discharge of the water from the boiler, and also commensurately with the variation in the flow. A pilot light 13 is preferably utilized to provide a means for ignition purposes when the gas is turned on, and may be permitted to burn constantly as will be understood. The pilot light as here shown is controlled by a shut-off valve 14.

The body of the water motor-valve is provided with a valve seat 15, adapted to receive a check valve 16, the function of which is to prevent the escape of water from the boiler 1 back into the supply main. This check valve 16 is preferably provided with a downwardly extending cylindrical body 17 having ports 18 through which the water may flow when the valve is raised, so as to bring the ports above the valve seat 15. As here shown, the cylindrical body 17 makes a substantially sliding fit through the valve seat so that it may act as a piston when the water is flowing into the boiler. The upper or conical part forms the check valve 16 when it rests upon the valve seat, during the periods when no water is being drawn from the boiler. If desired, a spring 19 may be employed to assist in closing the valve 16 and maintaining it seated when the water ceases to flow from the boiler. The valve body 17 is provided with a downwardly extending stem 20 passing through a stuffing box 21 and provided at its lower end with a yoke 22 which is adapted to reciprocate with the valve body 17. The valve body 8 is provided with a conical valve seat 23 to form a seat for the gas valve 10 so that the supply of gas from the pipe 19 to the pipe 5 may be controlled. The upper part of the body 8, that is, on the inlet side, is provided with a flexible diaphragm 24, which is preferably of leather or other suitable flexible material, and has attached to the center the stem 25 of the gas valve 10. The stem 25 in the present instance extends upward through the diaphragm 24 and also through the bottom of the yoke 22 where it is provided with a transverse part 26 which is lifted by the yoke on its up stroke. The connection thus formed is substantially a lost-motion one, so that when the gas valve 10 is seated the water motor-valve may still move sufficiently to seat itself and act as a check valve. Furthermore, this loose connection between the two valve pieces 17 and 10 enables each of them to seat perfectly upon its own seat, and also prevents any possibility of objectionable friction which might make the device fail to operate automatically.

It will be observed that at all times the water pressure from the pipe 12 is tending to lift the valve 17 of the water motor-valve 11, and thus insures the supply of water to the boiler the instant that water is allowed to pass from the boiler by the pipe 3. The pressure of the gas from the pipe 19 is practically balanced by acting simultaneously upon the valve 10 and the diaphragm 24, and the said valve 10 is therefore only responsive to permit the flow of gas at times when the water is flowing into the boiler. In this way, not only are economical conditions as to the consumption of gas insured, but the construction is such that the pressure of the gas does not materially interfere with the motor action of the water valve. While I have shown these valves and their connections in the form which I have found satisfactory in practice, I do not confine myself to the details, as these may be reasonably modified without departing from the cooperating requirements involved in my invention. It will also be seen that the valve bodies 8 and 11 are securely fastened at 27 to an upright standard 28 extending from the bed plate 29, so that the parts contained within the said body are held in proper alinement and relation to each other, and with the boiler and other connections, all of which are secured to the same base plate. In this way the boiler, regulator and adjuncts may be placed in position or shifted as a unit in installing it in a building, so that all of the operating mechanism, connections and adjustments may be properly made in the machine shop, thereby leaving nothing but the mere coupling connections with the gas main, street main and house supply system to be done at the time of the installation.

In describing the operation of the regulating device, it will be assumed that the boiler is full of water, the gas valve 10 closed to cut off the gas supply and the pilot light burning. Under these conditions, the turning on of any water spigot or spigots in connection with the pipe 3 will instantly cause the pressure in the boiler to be reduced, so that the superior pressure in the water supply pipe 12 will operate the water motor-valve 11 and open the gas valve 10, thereby causing the burner 14 to light from the pilot light 13 and deliver its heat to the boiler 1. This results in substantially instantaneously heating the water of the boiler and causing hot water to be drawn from the pipe 3. When sufficient hot water has been drawn off the water spigot will be closed and the gas supply thereby automatically cut off through the action of the motor-valve 11, and the hot water still remaining in the boiler may be stored until drawn off for future use, at which time the heating operation will be repeated. At no time can the apparatus operate to generate excessive temperature with the accumulations of steam within the boiler with its consequent objections and dangers. Furthermore, the operation of my improved apparatus is economical because it does not

use any gas except in accordance with the specific requirement of heating.

While I prefer the construction shown, the details thereof may be modified without departing from the spirit of the invention.

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

1. In a hot water system, the combination of the boiler and a burner therefor, with a cold water pipe for supplying cold water to the boiler, a gas pipe for supplying gas to the burner, a gas valve to control the supply of gas to the burner, an automatic water motor-valve for operating the gas valve consisting of a valve body having a valve seat between the inlet and the outlet sides, a valve piece adapted to seat upon the valve seat to constitute a check valve to hold the water in the boiler and also provided with a cylindrical portion working through the valve seat and having ports to control the passage of the water when moved vertically as a piston, and a loose connection between the water motor-valve and the gas valve whereby the gas valve may seat independently of the seating of the water valve.

2. In a hot water system, the combination of a boiler and a burner therefor, a cold water pipe for supplying cold water to the boiler, a gas pipe for supplying gas to the burner, a gas valve to control the supply of gas to the burner, a diaphragm connected to the stem of said gas valve on the inlet side thereof, an automatic water motor valve comprising a valve body having a valve seat between the inlet and the outlet sides, a valve piece adapted to seat upon the valve seat to constitute a check valve to hold the water in the boiler and also provided with a cylindrical portion working through the valve seat and having ports to control the passage of the water in certain positions thereof, a valve stem connected to said water valve piece, spring means for normally holding said stem outwardly pressed to close said valve piece, and means forming a lost motion connection between the valve stems respectively of the water valve and the gas valve, whereby said valves may seat independently of each other.

In testimony of which invention, I hereunto set my hand.

WILLIAM KANE.

Witnesses:
R. M. HUNTER,
HORACE D. REEVE.