J. W. GAMBLE.

METERING HEATER.

APPLICATION FILED MAY 15, 1915.

1,205,189. Patented Nov. 21, 1916.

FIG. 1.

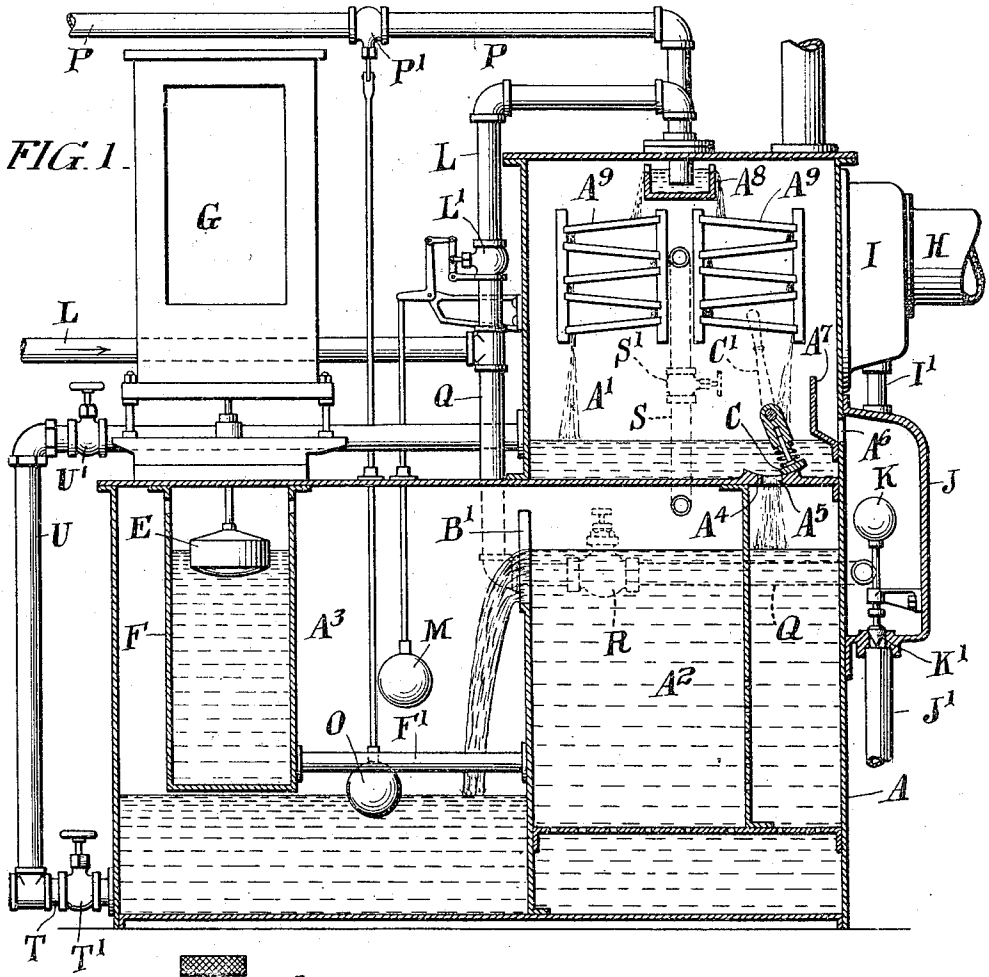


FIG. 2.

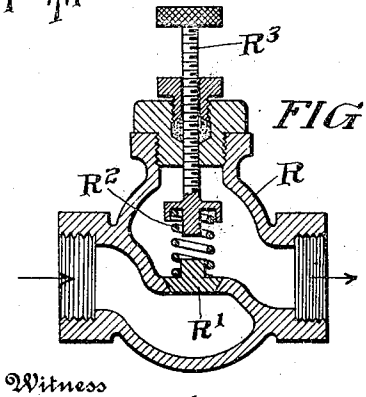
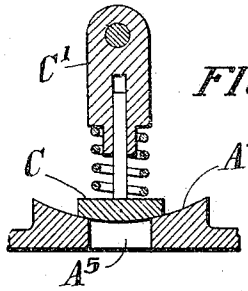


FIG. 3.



Witness

Daniel Webster Jr.

Inventor

Joseph W. Gamble

By Francis T. Chambers

his

Attorney

UNITED STATES PATENT OFFICE.

JOSEPH W. GAMBLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO JOSEPH S. LOVERING WHARTON, WILLIAM S. HALLOWELL, AND JOHN C. JONES, ALL OF PHILADELPHIA, PENNSYLVANIA, TRADING UNDER THE FIRM-NAME OF HARRISON SAFETY BOILER WORKS OF PHILADELPHIA, PENNSYLVANIA.

METERING-HEATER.

1,205,189. Specification of Letters Patent. Patented Nov. 21, 1916.

Application filed May 15, 1915. Serial No. 28,436.

To all whom it may concern:

Be it known that I, JOSEPH W. GAMBLE, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Metering-Heaters, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My present invention relates to combined water heating and weir measuring apparatus of the type known as metering heaters and comprises improvements in the flow controlling provisions thereof, devised with the general object of providing simple, effective and compact means for effecting the desired regulation of operation.

One specific object of my invention is to provide improved means for protecting the weir measuring apparatus against flooding when connected in the usual manner to water supply piping into which water is sometimes supplied in excess of the requirements for heated and measured water.

Another specific object of the invention is to provide improved means for cutting the meter proper out of operation when this is desirable, for cleaning, inspection, repairs, or other cause, while at the same time insuring an adequate supply of heated water to the boiler feed pumps or other devices normally supplied by the metering heater.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, and the advantages possessed by it, reference should be had to the accompanying drawings and descriptive matter in which I have illustrated and described a preferred embodiment of my invention.

Of the drawings: Figure 1 is a sectional elevation of a metering heater embodying my invention; Fig. 2 is a sectional elevation of one, and Fig. 3 a sectional elevation of another, of the valves employed.

In the particular embodiment of my invention illustrated in the drawings, A represents the casing of a metering heater which, as shown, is formed with a heating compartment A′, an inlet compartment A^2, or weir chamber proper, and an outlet compartment A^3; the water flowing from the inlet compartment A^2 into the outlet compartment A^3 through the weir notch or notches B′, formed in the upper edge of the weir plate or partition B. As shown, the normally open communication between the compartments A^2 and the compartment A′, which is located above it, may be closed when necessary or desirable by means of a valve C located within the compartment A′. As shown the valve C is of what may be called the rotary slide valve type having a cylindrical seat A^4 formed at the margin of the port A^5 in the partition between the compartments A′ and A^2. The valve C may be rotated to open and close the port A^5 by the external operating handle C′.

F represents a float chamber actually located in the compartment A^3 but connected to the compartment A^2 by the water level equalizing conduit F′ which is located below the lowermost level of flow over the weir. A float E working in the float chamber F operates the usual recording or other exhibiting mechanism located in the case G. Steam, ordinarily exhaust steam, for heating the water is supplied to the compartment A′ by the pipe H which discharges into the compartment A′ through the usual oil separator I. The drip from the separator I passes, as is usual, through a pipe connection I′ into a float trap J. A valve K′ actuated by a float K located in the float box J, automatically opens the waste connection J′ whenever the liquid level in the float trap J rises to a predetermined height. Water may overflow from the compartment A′ into the float box J through the orifice A^6 whenever the water level in compartment A′ at any time builds up to the level of the flange A^7 in front of said orifice.

Normally the major portion of the water to be heated is supplied to the heater from a condenser hot well or like source, through a pipe L, and make up water is supplied to the heater when required, through the pipe P. Each of these pipes discharges into the usual trough A^8 located in the upper end of the compartment A′, the water overflowing

from the trough onto the usual splash trays A^9. The flow of water to the heater through the pipe L is controlled by a throttle valve L′ which is opened or closed by a float M accordingly as the water level in the compartment A^3 falls below, or rises toward a predetermined height. The supply of water to the heater through the pipe P is controlled by the normally closed valve P′, operated by a float O also responsive to the height of water level in the compartment A^3, and opening and closing the valve P′ accordingly as the water level in compartment A^3 falls below or rises to a predetermined height lower than the level at which the float M moves the valve L′ into its wide open position. The pipe L is connected, at the inlet side of the valve L′, to one end of a branch pipe Q. The other end of the pipe Q is connected to the float trap J. The flow of water through the pipe Q is normally prevented by the loaded check valve R which is adapted to open and permit flow through the pipe L to the float box J when the pressure in the pipe L exceeds that in the float box J by a predetermined amount.

As shown, the valve R comprises a movable disk R′ normally pressed to its seat by a spring R^2, but rising from its seat when the differential of the pressures acting on the opposite sides of the valve R′ overcomes the seating load formed by the weight of the valve member R′ and the tension of the spring R^2. The tension of the spring R^2 may be adjusted by the screw spindle R^3, and advantageously the latter may be also adjusted to lock the valve disk R′ against its seat. The compartment A′ is connected to the compartment A^2 by the pipe connection S opening to each of said chambers adjacent its upper end and serving to equalize the vapor pressure in the compartment A′ with that in compartments A^2 and A^3. The equalizing connection S may be closed when this is desirable, by means of a valve S′.

Normally, the heated and measured water passes out from the compartment A^3 through the valve T′ and pipe T. A branch pipe U, normally closed by the valve U′, forms a by-pass connection between the pipe T and the compartment A′ about the compartments A^2 and A^3 and valves C and T′. By opening the normally closed valve U′, and closing the normally open valves C, S and T′, it is thus possible to supply to the device fed with water through the pipe T, hot water taken from the compartment A′ without passing this water over the weir. This makes it possible to open the weir compartments A^2 and A^3 for cleaning or repairs without interrupting the supply of hot water to the apparatus fed by the pipe T. With this arrangement no loss of heat occurs in normal operation, as the water passes from the heating chamber through the internal valve port A^5 from the heating chamber to the weir chamber. The external valve U′ which in practice must be of a type more expensive to make and more apt to injury by the erosive action of the water passing through it than the internal valve mechanism shown for controlling the flow through the port A^5, is normally closed and not subjected to the erosive action of the water passing through the metering heater.

In normal operation, the supply of water to the heating chamber A′ through the pipes L and P is regulated by the floats M and O and valves L′ and P′ in response to the demand for measured water. In some cases, as where the water normally passed to the heater through the main supply conduit L consists wholly or in part of heating system "returns," or water of condensation from steam pipes and the like, it is desirable that this water should not be allowed to accumulate and build up an undesirable back pressure in the piping L. This is prevented from occurring with the apparatus shown, by the valved bypass pipe Q connecting the pipe L to the waste trap J. Normally the valve R is closed and prevents the passage of water from the pipe L through the pipe Q to the float box J and thence to waste. As soon, however, as the accumulation of water in the pipe L is such as to subject the under side of the valve member R′ to a force overbalancing the weight of the valve member and the tension of the spring R^2, the valve member R′ lifts and thus permits water to pass until the accumulation of water in the piping L diminishes. As the water thus passed to waste is not passed through the heating chamber A′ there is no such waste of heat as could be involved if the water were passed through the heating chamber before being passed to waste.

It will be apparent to those skilled in the art that the apparatus disclosed is exceedingly compact, effective and reliable for the purposes described. One of the advantages of the invention, is that the compactness of the pipe arrangements, which it is possible to employ when the various compartments are connected as shown, makes it feasible to prepare the various pipe connections and apply them to the heating and measuring tank before shipping the latter from its place of manufacture.

While in accordance with the provisions of the statutes I have herein described and illustrated the best forms of my invention now known to me, it will be apparent to those skilled in the art that changes can be made in the form of my invention without departing from its spirit, and that some features of my invention can be used in some cases without a corresponding use of other features of the invention.

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

1. Weir measuring apparatus comprising in combination a weir chamber, an outlet compartment receiving the overflow from said weir chamber, supply piping for conveying liquid to be measured to said weir chamber, a valve in said piping, means responsive to the height of water level in said outlet compartment for closing and opening said valve as said water level rises to and falls below a predetermined level, and a waste connection to said pipe at the inlet side of said valve, said waste connection comprising a loaded valve normally closed, but opening to permit a discharge to waste on a predetermined increase in pressure in said pipe at the inlet side of said weir.

2. A metering heater comprising a weir chamber, a heating chamber freely discharging liquid heated therein into said weir chamber, and an outlet compartment receiving the overflow from the weir chamber, a waste connection leading from said heater, water supply piping leading to said heating chamber, a valve in said pipe controlling the flow therethrough to said heating chamber, and means for closing and opening said valve as the water level in said outlet compartment rises to and falls below a predetermined value, and a loaded valve controlling communication between said piping at the inlet side of said valve and said waste connection, said valve being normally closed but automatically opening when the pressure in said piping rises to a value at which it overcomes the loading force.

3. A metering heater comprising a weir chamber, a heating chamber freely discharging liquid heated therein into said weir chamber, and an outlet compartment receiving the overflow from the weir chamber, a waste connection to said heater including a float trap, water supply piping leading to said heating chamber, a valve in said pipe controlling the flow therethrough to said heating chamber, and means for closing and opening said valve as the water level in said outlet compartment rises to and falls below a predetermined value, a pipe connection extending between said piping at the inlet side of said valve and said float trap, and a loaded valve located in said pipe connection, said valve being normally closed but automatically opening when the pressure in said piping rises to a value at which it overcomes the loading force.

4. A metering heater comprising a weir chamber, a heating chamber freely discharging liquid heated therein into said weir chamber, and an outlet compartment receiving the overflow from the weir chamber, an oil separator, means for passing steam therethrough to said heating chamber, a waste connection leading from said heating chamber including a float trap receiving the drip from said oil separator and overflow from said heating chamber, water supply piping leading to said heating chamber, a valve in said piping and means for closing and opening the valve as the water level in said outlet compartment rises to and falls below a predetermined value, a pipe connection leading from said pipe at the inlet side of said valve to said float trap, and a loaded valve located in said pipe connection, said valve being normally closed but automatically opening when the pressure in said piping rises to a value as to overcome the loading force.

5. A metering heater comprising a casing divided into a weir chamber, an outlet chamber receiving the overflow from the weir chamber, and a heating chamber discharging into said weir chamber through a valve seated port located within said casing, a valve controlling said port, a delivery pipe leading from said outlet chamber and including a valve, and a valved bypass external to said casing and connecting the heating chamber thereof to said delivery pipe at the outlet side of the valve in the latter.

JOSEPH W. GAMBLE.