June 13, 1933. A. C. FREEMAN 1,913,923

HEATING UNIT FOR RADIATORS

Filed Feb. 10, 1932 2 Sheets-Sheet 1

Fig. 1.

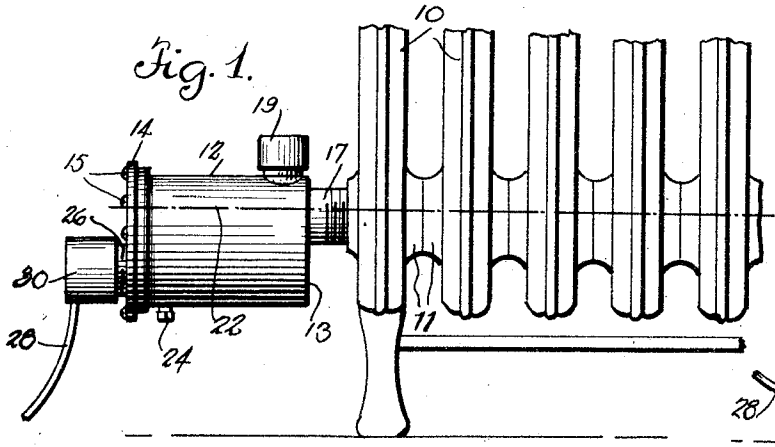


Fig. 2.

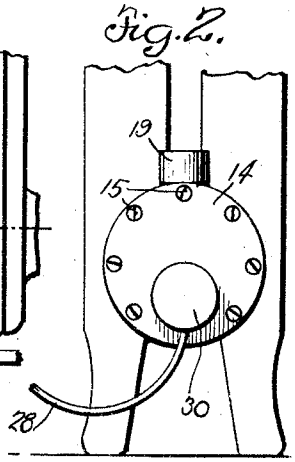


Fig. 3.

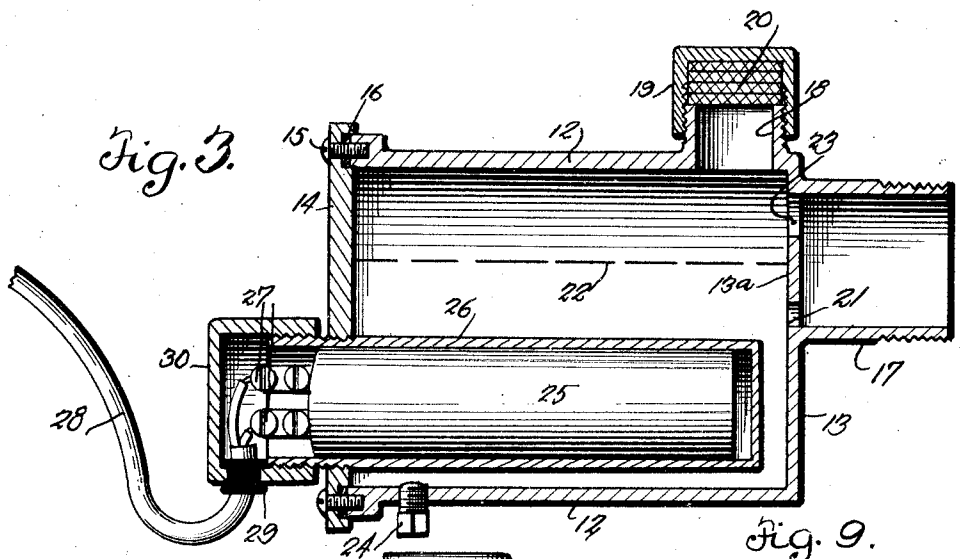


Fig. 4.

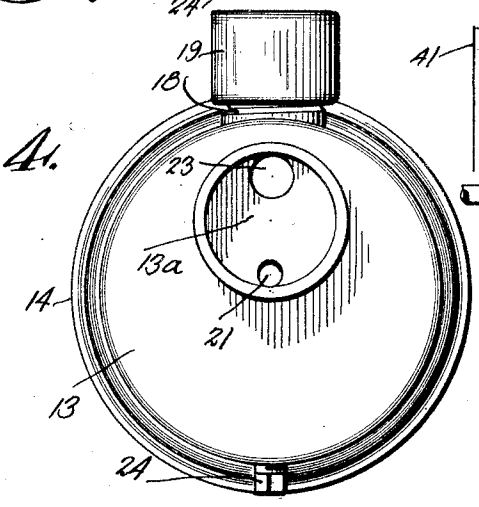
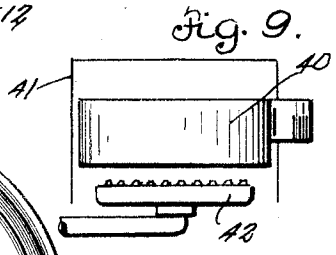


Fig. 9.



Inventor
Arthur C. Freeman.
by
D. K. Bryant
Attorney.

June 13, 1933. A. C. FREEMAN 1,913,923

HEATING UNIT FOR RADIATORS

Filed Feb. 10, 1932 2 Sheets-Sheet 2

Fig. 5.

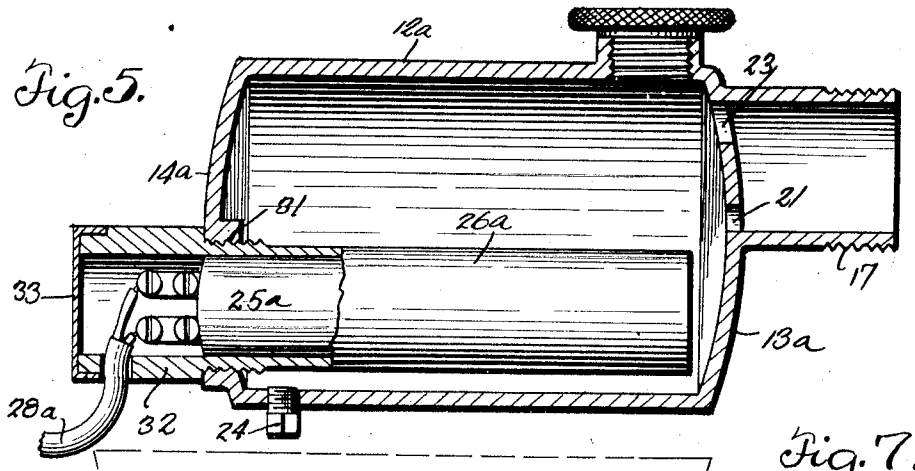


Fig. 7.

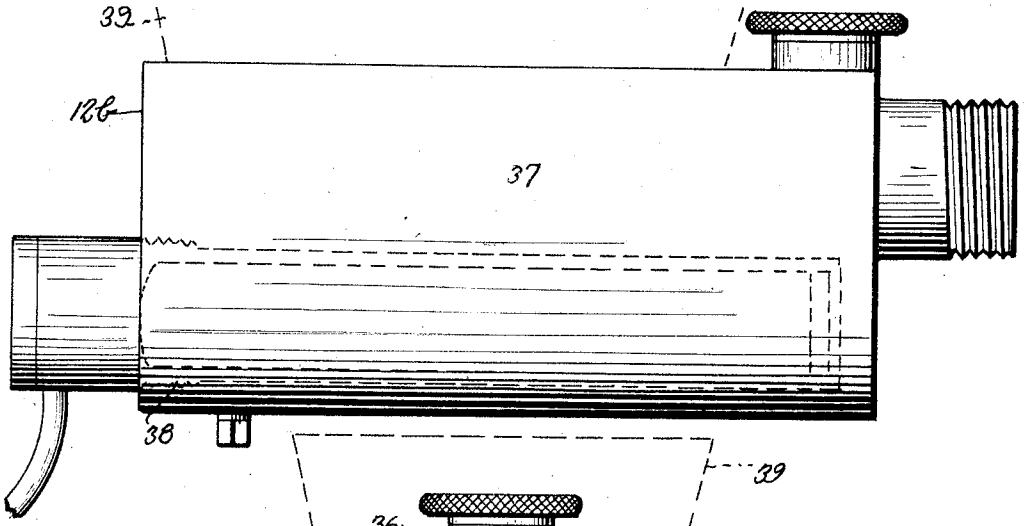
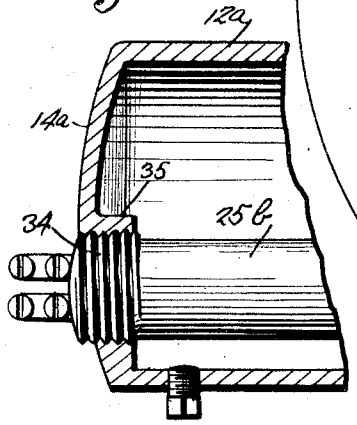


Fig. 6.



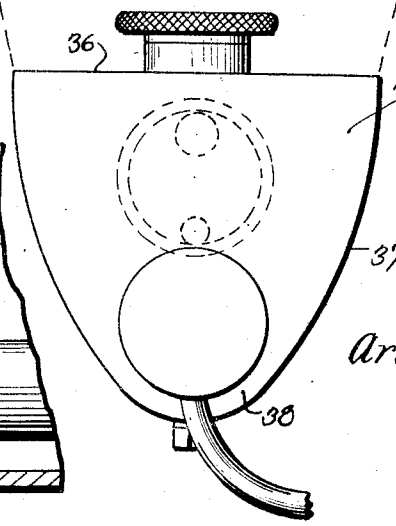


Fig. 8.

Inventor
Arthur C. Freeman.
by
W. L. Bryant
Attorney.

Patented June 13, 1933 1,913,923

UNITED STATES PATENT OFFICE

ARTHUR C. FREEMAN, OF NORFOLK, VIRGINIA

HEATING UNIT FOR RADIATORS

Application filed February 10, 1932. Serial No. 592,174.

This invention relates to certain new and useful improvements in furnishing heat by gas, oil or electricity.

The primary object of the invention is to provide a heating unit for radiators of the steam, hot water, vacuum or other existing standard types in the form of an attachment which is adapted to be connected to a radiator of any character without in any way changing or modifying the construction of the radiator and to be used to furnish constant heat or intermittent heat for hotels, dwellings, offices etc., where rooms or apartments are only occupied at times or for brief periods so that a material saving of heat energy can be effected, as heat is only used when needed. Each radiator may be equipped with an individual heating unit or a master unit may be used for a part or the whole of the system.

If electricity is used as the source of heat, individual heating units are applied to the radiator. It becomes a portable radiator and can be plugged into any socket for use. If gas is used as a source of heat, it only will be used when required and the use of a flexible tube connecting with the gas pipe makes same a portable radiator. If oil is used it is entirely portable.

A further and important object of this invention is its use on shipboard to heat, there not being required the vast amount of steam piping which will mean a great saving of weight of ship construction which will add to the cargo carrying capacity of ship, every pound that is saved in weight.

A still further object of the invention is to provide a heating unit attachment for radiators that is of simple construction and inexpensive to manufacture and one that may be attached to a radiator in any existing heating system in private homes or elsewhere that may be used before the cold is severe to justify the furnace being used and which may be shut off when cold is positive and likewise in early spring when it is too warm for furnace, yet heat is required. The furnace may be cut out and unit used on such space as required.

This invention is so devised that water in the steam chest may be brought to a temperature above boiling and yet the adjacent water in reservoir of radiator and connected to same will be at a lower temperature and be used to supply the water loss from evaporation into steam.

The invention embodies other improvements in the art to which it relates and particularly offers improvements over patent issued to Arthur C. Freeman for Steam heating device on November 4, 1924, Patent No. 1,514,453 in which patent a heater attachment for radiators is illustrated and described as supplying steam to a radiator with condensation in the radiator returning to the attachment, but in the present application, the attachment is associated with a radiator in a manner whereby the radiator has the lower end thereof constituting a water reservoir for replenishing the attachment with water.

With the above and other objects in view that will become apparent as the nature of the invention is better understood, the same consists in the novel form, combination and arrangement of parts hereinafter more fully described, shown in the acompanying drawings and claimed.

In the drawings:—

Figure 1 is a fragmentary side elevational view of a radiator equipped with the heating unit attachment, the heating unit being horizontally aligned with the base chamber portion or lower end reservoir of the radiator;

Figure 2 is a fragmentary end elevational view of the radiator with the heating unit in position thereon;

Figure 3 is an enlarged vertical longitudinal sectional view of the heating unit detached from the radiator and showing the removable end wall of the heating unit chamber to facilitate positioning of the cylindrical casing for the heating unit in the end wall and chamber together with openings in the opposite end wall of the chamber for the flow of steam therefrom into the radiator and for the flow of water in the base reservoir of the radiator into the chamber;

Figure 4 is an end elevational view of the heating unit;

Figure 5 is a vertical longitudinal sectional view of another form of heating unit wherein the cylindrical casing for the electric resistance member is threaded into an integral end wall of the heating unit chamber;

Figure 6 is a detail sectional view of another form of the invention wherein the electrical resistance member is of the immersion character and is directly threaded into the end wall of the heater unit chamber;

Figure 7 is a side elevational view of another form of heating unit having a flattened upper surface for the support of a humidifying device;

Figure 8 is an end elevational view of the heating unit shown in Figure 7; and

Figure 9 is a side elevational view of another form of heating unit using gas or oil as the source of heat associated with the radiator.

Referring more in detail to the acompanying drawings and particularly to Figures 1 to 4, there is illustrated a heating unit attachment for radiators, the latter being of the type comprising vertical leg sections 10 connected at their lower ends as at 11 in a manner to provide fluid comumnication between the several leg sections 10 with the lower portion of the radiator constituting a water chamber or reservoir. The radiator may be entirely independent of any heating apparatus, such as a furnace or the like, or the same may be connected in the piping system of furnace heating apparatus, but when the heating unit attachment is placed into operation, the usual hand valve carried by the radiator may be closed to shut off communication between the radiator and the furnace. The heating unit is attached to the radiator at the lower end thereof in line with the lower water chamber portion or reservoir and this attachment may be accomplished by removal of the end leg plug opposite the hand valve or by providing a T-fitting at the hand valve for the mounting of the unit, the latter comprising a cylindrical casing 12 having an integral end wall 13 and a removable head or end wall 14 retained in position on the casing 12 by screw devices 15 and rendered water-tight bv the interpositioning of the gasket 16 between the casing 12 and the end wall 14. An outwardly directed externally threaded nipple 17 is carried by the end wall 13 at the upper side of the casing 12 for threaded engagement with the radiator as shown in Figure 1. An externally threaded water filling nipple 18 rises from the upper side of the casing 12 adjacent the end wall 13 and is closed by a cap nut 19 that houses a series of sealing gaskets 20, the nipple 18 facilitating the charging of the casing with water that seeks its level in the lower water chamber or reservoir of the radiator by flowing through the opening 21 in the end wall section 13*a* surrounded by the nipple 17 to enter the water chamber in the radiator, water being supplied in a quantity to obtain the water level 22 indicated by dot and dash lines in Figure 1 and by the broken line 22 in Figure 3. The end wall section 13*a* surrounded by the nipple 17 has a larger opening 23 formed therein above the opening 21 and at the upper side of the nipple 17 for the escape of steam from the casing 12 into the upper leg portions 10 of the radiator. The opening 21 is located at the lower side of the nipple 17 while the opening 23 is located at the upper side thereof. A drain plug 24 is threaded into the lower side of the casing 12 to be removed for the drainage of sediment and for the cleaning of the device.

The heating means is preferably of an electrical character, comprising a cylindrical resistance member 25 in the form of an elongated plug that is housed within a cylindrical casing 26 supported by the removable end wall 14 and extending into the casing 12. In mounting the resistance element casing 26 in the casing 12, it is necessary to remove the end wall 14, the threaded open end of the cylindrical casing 26 being threaded through the lower portion of the end wall 14 at the inner side thereof to project outwardly of the end wall, the latter being then secured to the open end of the casing 12 in a manner as previously described. The conductor wires for the resistance element 25 have their ends attached to terminals 27 carried by the resistance element, the conductor wires being in the form of a cable 28 passing through an insulation bushing 29 in the side wall of a cap nut 30 that is threaded upon the projecting externally threaded end of the cylindrical casing 26.

As stated, water is introduced into the casing 12 and the lower-reservoir portion of the radiator by means of the nipple 18 and seeks its level at the line 22 in the casing 12 and radiator reservoir by means of the lower opening 21 in the end wall section 13*a*. It will be observed that a comparatively small quantity of water is contained in the casing 12 and this small quantity of water being subjected to the resistance element 25, the temperature thereof quickly rises above the boiling point for the generation of steam, the steam at the upper side of the casing 12 escaping through the opening 23 above the water level to enter the upper leg sections 10 of the radiator, condensation thereof in the radiator seeping downwardly for return to the lower water chamber portion or reservoir in the radiator, the water in the casing 12 being replenished by the water in the reservoir of the radiator through the opening 21 to maintain a constant supply of water within the restricted area surrounding the cylindrical casing 26 and defined by the casing 12. The pressure of the water head in the reservoir is sufficient to overcome any tendency

toward the circulation of hot water through the opening 21, the water in the reservoir of the radiator merely constituting a supply for the casing 12 of the heating unit. The steam condensed in the radiator sections precipitates to the reservoir and is re-used, while there may be some loss of water, due to evaporation or otherwise, the same may be replenished through the filler nipple 18. If desired, one of the heating units may be attached to each end of a radiator for quicker heat radiation and it is to be understood that the heating unit may be made of any size desired, particularly proportionate to the radiator to which it is to be associated.

In the form of invention illustrated in Figure 5, the casing 12*a* has the end walls 13*a* and 14*a* cast integral therewith and the cylindrical chamber 26*a* that houses the resistance element 25*a* is of a character to be introduced into the casing 12*a* through an opening provided in the end wall 14*a* with the cylindrical casing 26*a* having threaded engagement with the end wall 14*a* as at 31, the outer projecting end 32 of the cylindrical casing 26*a* having a side opening therein through which the electric conductor 28*a* passes while the open outer end of the casing portion 32 is closed by a removable cap 33. The operation of this form of the invention is the same as described in connection with the showing in Figures 1 to 4.

In Figure 6, the casing 12*a* is the same as shown in Figure 5, but the resistance element 25*b* is of the immersion type, being directly introduced into the casing 12*a* in the absence of an inclosing casing by having a threaded portion 34 at its outer end engaged with an internally threaded boss 35 formed on the end wall 14*a*. The resistance element 25*b* is disposed adjacent the lower side of the casing 12*a* is to be immersed in water and to be disposed below the opening 21.

In the form of the invention illustrated in Figures 7 and 8, the heater unit casing 12*b* is of trough shape, having a flat top wall 36 and symmetrically curved side walls 37 forming a narrowed chamber portion 38 at its lower end that houses the resistance element, the trough shape of the casing requiring a lesser amount of water to effect immersion of a resistance element or a resistance element and its cylindrical casing for the quicker heating of the water and the generation of steam while the flat top wall 36 may provide a support for a humidifier or the like as illustrated at 39 that may comprise a water pan or other device. The operation of the heating unit in this form of the invention is the same as described in connection with Figures 1 to 4.

In each of the foregoing forms of the invention, the heating element has been of an electrical character, but it is to be understood that the heating medium may also be oil or gas, Figure 9 showing a heating unit 40 to be attached to a radiator and covered by a casing 41 with a burner head 42 disposed therebeneath, the heating unit 40 comprising a water chamber with a baffle wall section therein, similar to the wall section 13*a* for directing the flow of water in the reservoir of the radiator into the heating unit and for directing the generated steam in the heating unit into the radiator.

From the above detailed description of the invention, it is believed that the construction and operation thereof will at once be apparent, the particular uses and advantages of the heating unit being heretofore set forth herein, the principal object of the invention being the conservation of the heating medium, either electrical, oil or gas, it being possible to heat a single room or apartment without recourse to the operation of an entire heating plant. Also, the heating unit may be attached to all radiators of any construction without in any manner changing the construction thereof. It has herein been shown and described that the flow of water from the reservoir in the radiator to the casing of the heating unit and that the flow of steam from the heating unit to the radiator is accomplished by vertically spaced openings in a partition wall separating the heating unit casing from the radiator, but it is to be understood that baffles of other characters may be provided, this phase of the invention only being limited by the fact that the water level in the heating unit casing and radiator reservoir should always be above the point forming communication between the radiator reservoir and the heating unit casing and below the point of steam communication between the heating unit casing and radiator. It is to be understood that the heating unit may be plugged into an ordinary lighting circuit so that operation of the radiator may be constant or intermittent as desired. Also, a thermostatic element may be associated with the heating unit for automatically opening and closing the same for instance in the early morning hours for the heating of a room. The invention is also capable of uses in other arts, wherever it is desired to produce heat by steam radiation or hot water heating, such uses including association with the radiator of an automobile and by the use of low voltage, the water in the automobile radiator may be maintained in a warm condition during cold weather, thus enhancing easy and quick starting of the motor.

While there are herein shown and described the preferred embodiments of the invention, it is nevertheless to be understood that minor changes may be made therein without departing from the spirit and scope of the invention as claimed.

I claim:—

1. In a heating unit for radiators, a heating unit adapted to be attached to a radiator

in line with the lower portion thereof and having a water chamber therein, a baffle having vertically spaced openings therein, the lower opening providing a water level in the radiator and water chamber and the upper opening forming steam communication between the water chamber and radiator above the water level.

2. In a heating unit for radiators, a heating unit adapted to be attached to a radiator in line with the lower portion thereof and having a water chamber therein, a baffle having vertically spaced openings therein, the lower opening providing a water level in the radiator and water chamber and the upper opening forming steam communication between the water chamber and radiator above the water level and a heating element in the lower end of the chamber.

3. In a heating unit for radiators, a heating unit adapted to be attached to a radiator in line with the lower portion thereof and having a water chamber therein a baffle having vertically spaced openings therein, the lower opening providing a water level in the radiator and water chamber and the upper opening forming steam communication between the water chamber and radiator above the water level and a heating element in the lower end of the water chamber including an inclosing case extending outwardly of the heating unit.

4. Heating apparatus comprising a heating unit adapted to be attached to a closed chamber having a water reservoir at its lower end, said heating unit being attached to the chamber in alinement with the reservoir, means forming water communication between the reservoir and lower end of the heating unit to form a water level in the chamber and heating unit and means forming steam communication between the lower end of the chamber above the water level and the upper end of the heating unit.

5. A heater attachment for radiators comprising a casing adapted to be attached to the lower end of a radiator, a partition in the casing having vertically spaced openings forming water and steam communication between the casing and radiator with the water level in the radiator and casing being below the steam communicating opening in the partition.

6. In a heater, a casing, a heater element at the lower end thereof and supported in an end wall of the casing and an apertured baffle plate in the other end wall of the casing for admitting water to the casing and the outlet of steam from the casing.

7. A heating unit for radiators comprising a casing of trough shape attached to the lower end of a radiator, a heating element in the lower end of the trough shaped casing, the lower end of the radiator constituting a reservoir for supplying water to the casing and means in the casing to direct steam into the radiator above the reservoir.

8. A heating unit for radiators comprising a casing to be attached to the lower end of a radiator, an end wall of the casing having vertically spaced openings therein forming water and steam communication between the radiator and casing, a cylindrical casing mounted in the other end wall of the aforesaid casing, a heating element in the cylindrical casing and means carried by the casing for charging the casing and lower end of the radiator with water.

9. A heating unit for radiators comprising a casing to be attached to the lower end of a radiator, an end wall of the casing having vertically spaced openings therein forming water and steam communication between the radiator and casing, a cylindrical casing mounted in the other end wall of the aforesaid casing, a heating element in the cylindrical casing, means carried by the casing for charging the casing and lower end of the radiator with water and said casing having a flat upper wall for the support of a humidifier.

10. A heating unit for radiators comprising a casing of trough shape to be attached to the lower end of a radiator, a heating element in the lower end of the trough shaped casing, the lower end of the radiator constituting a reservoir for supplying water to the casing and means in the casing to direct steam into the radiator above the reservoir, and the upper wall of the trough-shaped casing being flat for the support of a humidifier.

11. Heating means comprising a closed chamber containing water and a heating unit having a single pipe connection with the closed chamber, and means separating the main body of water from the heating unit permitting the delivery of water in the closed chamber into the zone of the heating unit through the single pipe connection.

12. Heating means comprising a closed chamber containing water, a heating unit having a single pipe connection with the closed chamber, a baffle wall separating the heating unit from the main body of water in the closed chamber and said baffle wall constructed to permit the water in the closed chamber to move into the zone of the heating unit and steam generated by the heating unit to enter the closed chamber through the single pipe connection.

13. In a heater of the character described, main and auxiliary water chambers, a partition between the chambers having vertically spaced openings therein, the lower opening forming water communication between the chambers with the water level below the upper opening, the upper opening forming steam communication between the chambers and a heater element in the lower end of the auxiliary chamber.

14. In a heater of the character described, main and auxiliary water chambers, a partition between the chambers having an opening therein adjacent its lower end forming water communication between the chambers, a heater element in the auxiliary chamber and said partition preventing the circulation of water from the auxiliary chamber to the main chamber and directing steam generated in the auxiliary chamber into the upper portions of the main and auxiliary chambers.

In testimony whereof I affix my signature.

ARTHUR C. FREEMAN.