R. C. SAYER.

AUTOMATIC SUPPLY AND HEATING WATER.

APPLICATION FILED AUG. 12, 1908.

951,514. Patented Mar. 8, 1910.

Fig. 2.

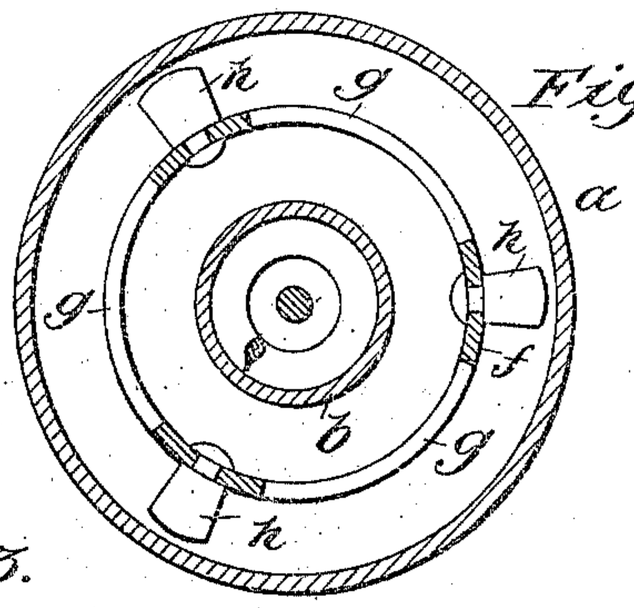


Fig. 1.

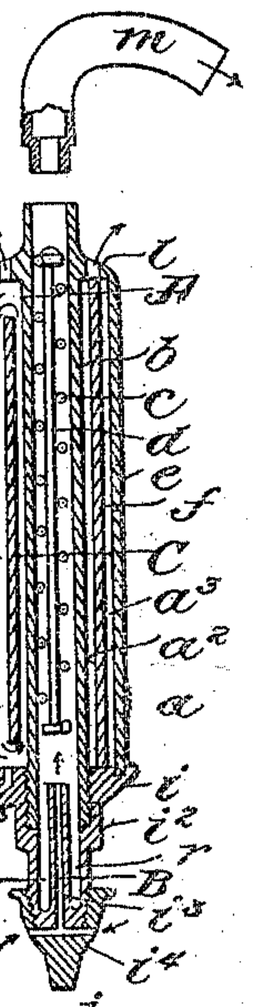


Fig. 3.

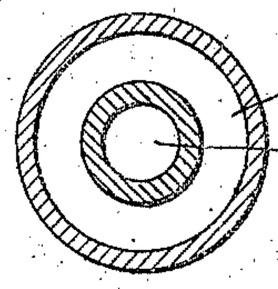


Fig. 4.

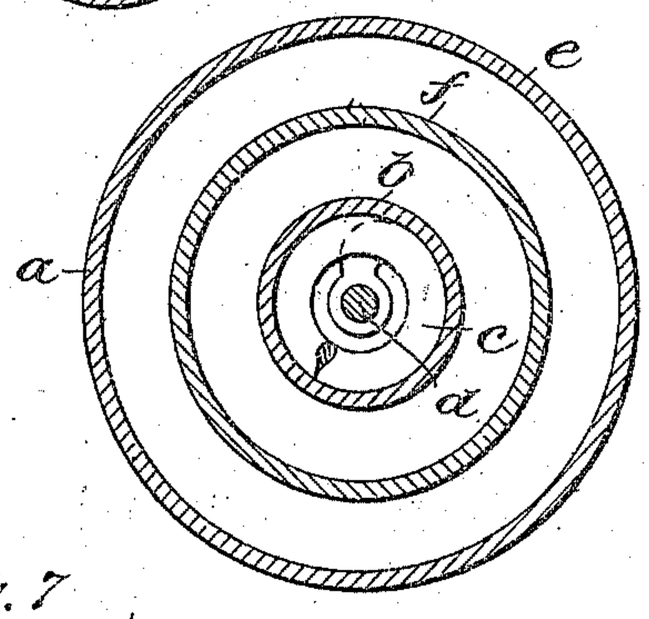


Fig. 8.

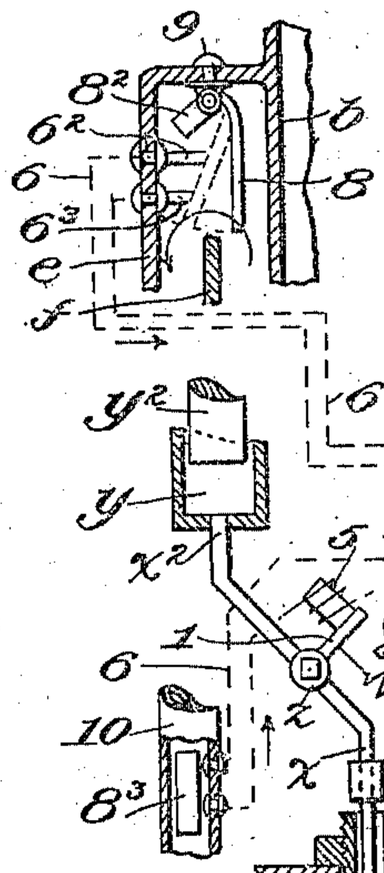


Fig. 7

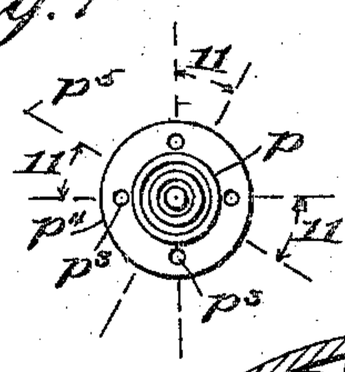


Fig. 5.

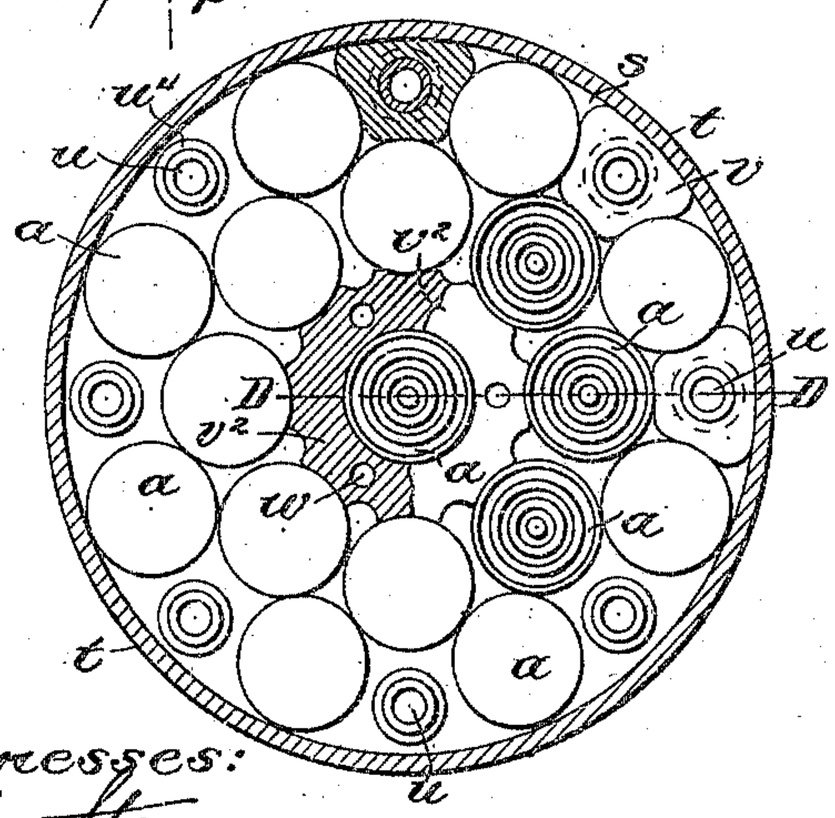
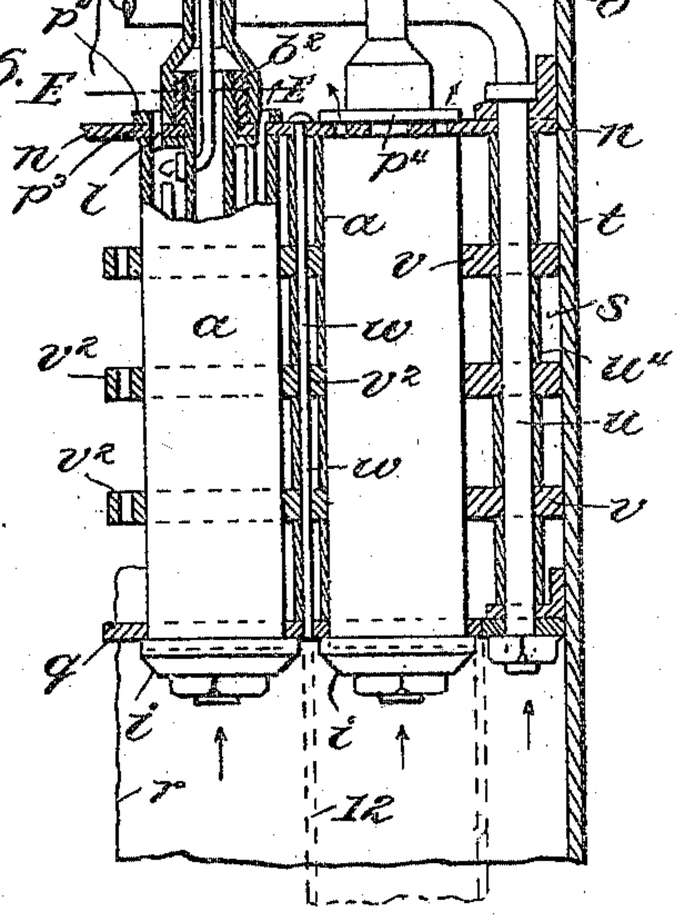


Fig. 6.



Witnesses:
I. Stern
E. Schallinger

Inventor:
Robert Cooke Sayer
by R. Singer
Attorney

UNITED STATES PATENT OFFICE.

ROBERT COOKE SAYER, OF REDLAND, BRISTOL, ENGLAND.

AUTOMATIC SUPPLY AND HEATING WATER.

951,514. Specification of Letters Patent. Patented Mar. 8, 1910.

Application filed August 12, 1908. Serial No. 448,229.

To all whom it may concern:

Be it known that I, ROBERT COOKE SAYER, a subject of the King of Great Britain and Ireland, residing at 11 Clyde road, Redland, Bristol, England, have invented certain new and useful Improvements in Automatic Supply and Heating Water, of which the following is a specification.

This invention relates to water heaters.

An object of the invention is to provide a heater, wherein liquid is evaporated, said heater having a compendious form and being adapted to be handled and transported easily.

Another object is to provide a heater, wherein the liquid is supplied automatically, as soon as steam is developed.

Another object is to provide a plurality of heater units of the aforedescribed kind in one large vessel and to arrange them so that any heater unit may be easily detached therefrom without changing the position of the other heater units.

Other objects will be more fully understood from the following specification and drawings and will be more clearly pointed out in and by the appended claims.

In the drawing, Figure 1, is a vertical section through a heater unit, one part of the heater being shown detached. Fig. 2, is a section on line A—A of Fig. 1 on a larger scale. Fig. 3, is a section on line B—B of Fig. 1 on a larger scale. Fig. 4, is a transverse section on line C—C of Fig. 1 on a larger scale. Fig. 5, is a transverse section through a contrivance comprising a plurality of heater units, as shown in the previous figures, the section being taken on line B—B of Fig. 6. Fig. 6, is a longitudinal section on line D—D of Fig. 5. Fig. 7, is a detail view. Fig. 8, is a longitudinal section through a detail of the apparatus.

The heater unit *a* comprises a tubing *e*, which is closed at its top and bottom and wherein two concentric tubings *b* and *f* are disposed, one inside the other and a helical metal spiral *c* is arranged longitudinally within the innermost tubing *b*, the ends of said spiral being fastened to a metal rod *d*. The attachment of the spiral to the metal rod prevents overlarge elongation of the spiral under action of the heat. The intermediary tube *f* is at the top and bottom provided with a plurality of openings *g*, as may be clearly seen from Fig. 2, and with spacing elements *h*. The outer tubing *e* is at the top provided with a plurality of apertures *l*. The lower end of the outer tubing *e* is closed by means of a nut *i*, engaging the bottom end of said tubing and fastened by means of a threaded portion at the foot end of the innermost tubing *b*. A lateral tap *k* is attached to said nut *i*, the tap being provided with a passage for admitting and discharging water or any other liquid to be evaporated. A burner i^2 is fastened to the lower end of the innermost tube *b* adjacent to the closing nut *i*. The burner comprises a trough *r* and a preferably capillary tubing i^3, projecting longitudinally into said trough. A preferably capillary transverse passage i^4 is provided in a ferrule *j*, which is threaded to the bottom end of the burner i^2, forming the bottom member of the heater *a*.

The trough *r* of the burner i^2 is filled with combustion liquid, which is ignited, and fastened to the apparatus, air being supplied for the combustion through the transverse passage i^4. The apparatus has been filled previously either through the tap *k* or through the apertures *l* with water or some other liquid, which then is contained in the interspaces a^2, between the innermost tube *b* and intermediary tube *f*, and a^3, between the intermediary tube *f* and the outer tube *e*. As soon as the liquid evaporates, the vapors in the interspace a^2 will circulate through the openings *g* on top of tubing *f*, and heat the liquid in the interspace a^3, which will be in communication with the interspace a^2 through the lower openings *g*. By this means a continuous heating and circulation of liquid and steam is obtained. A certain quantity of the developed steam will escape through the openings *l* on top of the tube *e*.

m indicates a handle which may be fastened to the top of the heater unit *e* so that the same may be transported easily.

In Figs. 5 and 6, an apparatus is shown, wherein a plurality of the aforementioned heating units are arranged within a vessel *t;* the heating units are disposed between two transverse walls *q* and *n*. The lower part of the vessel forms the common furnace or burner *r*, while a common chamber *o* is arranged above the upper wall *n*. The upper ends of the heating units are provided with extensions, projecting through the top wall n^2, which forms the closing member of the chamber *o*. Every heating tube *e* is provided with a flange p^4 and a plurality of apertures p^3 in said flange are adapted to

register with the apertures l previously described. By this means the vapors discharged through the apertures l and p^3 enter the chamber o above the heating apparatus. These vapors in the chamber o are then superheated by the following means. A plurality of auxiliary tubes u in preferably parallel arrangement with the heaters e extend through the heating apparatus and open into the furnace or burner r, the upper extensions u^2 of said tubes u being arranged in serpentine form in the chamber o. Broken portions of the serpentine extensions u^2 only are shown in the drawing; their openings are designated by u^3. v indicates a plurality of transverse flanges disposed between the heating tubes, said flanges being separated from each other by the spacing tubes u^4, which surround the auxiliary heating tubes u. Flanges v^2 in the center of the contrivance are held in their place by means of the bolts w as indicated in Fig. 6. Extension p of the heating tubes are fastened to threaded portions b^2 at the upper end of the heating devices a and the water is supplied through said extensions, a supply pipe x being fastened to every one of said extensions by means of the nipple x^4.

In the upper part of Fig. 6 and in Fig. 8, the automatical regulation of the water supply is illustrated. z in supply pipe x designates a tap, said tap being provided with the lateral extension 1. The lateral extension is under the control of a spring 2, which coacts with the extension 1, so that under normal condition the tap is in position to admit water through the pipe. A cam 4 in continuous rotation by suitable means (not shown) is provided with a nose 3 adapted to engage the extension 1 in its rotation. Through the rotation of the cam 4 and the engagement of the extension 1 with the nose 3, said extension is moved in direction toward an electro-magnet 5; the electro-magnet is in circuit with a battery or some other suitable source of electrical energy and is connected by means of conductors to metallic elements, disposed in a water gage 10, which preferably is arranged at the outside of the entire heating device. The tubing for the water gage is preferably made from some insulating material, so that the elements to which the conductors 6 are connected, form the terminals of a normally open circuit. This circuit may be closed by a float 8^3. By this means the electro-magnet is energized and retains the lateral extension 1 of the tap z in closing position against the action of the spring 2, when the float 8^3 is in a position to close the circuit through the two aforementioned terminal points in the gage. The upper extension of the pipe x is designated by x^2 and opens in a cylinder y, wherein the water supply is kept under a preferably constant pressure by means of the piston y^2. The aforementioned water gage 10 facilitates the inspection of the water supply within the heating units.

In multiple with the aforedescribed circuit is a second circuit, which is closed as soon as the water level in the interspaces a^2 and a^3 is high enough to cause circulation through the upper openings g. As indicated in the upper part of Fig. 8, the circuit comprises a switch 8, easily movable and pivotally mounted on the fastening member 9 in the top closing portion of the heater tube e. A counterweight 8^2 is fastened to the end of the switch 8 and serves for keeping the same normally in open position, as shown in full lines. The switch is adapted to be closed by action of the circulating water, which swings it against two contacts 6^2 and 6^3 respectively, said contacts forming terminals of a normally open circuit. The contacts are fastened to the outer heating tube e by means of rivets or in some other suitable way, but they must be insulated from each other. It is obvious that the circulating water will force the switch against the contacts 6^2 and 6^3, so that the energized electro-magnet 5 will retain the extension 1 of the tap z in closing position, thereby cutting off the water supply until the water level is lowered, after the development of steam has started and the introduction of more water is necessary for the generation of more steam.

For the purpose of removing one of the heating units a from the vessel t, the flange p^4 is rotated, so that the holes p^3 provided in said flange do not register any more with the apertures l. This is indicated in Fig. 7 by the angle 11. The apertures p^3 will then be in a position indicated by p^5. The connection p^2 of the heater a may then be loosened and the respective heater may then be withdrawn through a tubing 12, inserted for this purpose in the furnace r, after the nipple x^4 has been moved in detaching position.

I claim:

1. In a portable heater of water at atmospheric pressure comprising in combination a central flue, a spiral in said central flue with fixed ends, an inner and an outer concentric tube carried on said central flue providing for two concentric films of water, the inner film in contact with said central flue, means of communication between said films, a ferrule for said flue and tubes provided with an air inlet, a means for supplying heat to said central flue, and means for admitting water into said heater substantially as specified.

2. In a portable heater of water at atmospheric pressure, the combination of inner and outer concentric tubes providing for concentric films of water, a flue disposed in one of said tubes, a spiral disposed in said

flue, said films being adapted to be circulated by heat rising spirally in said flue, a water inlet and vapor exit, and means for supplying heat to said central flue.

3. In a portable heater of water at atmospheric pressure the combination of a heated central flue, concentric tubular retainers for films of water adapted to be circulated by contact with said central flue, inlets for the water to said films, an exit for the vapor, means of communication between said films, a heater for said central flue and an air chamber for said heater.

4. In a portable heater of water at atmospheric pressure comprising in combination concentric retainers for concentric films of water adapted to be circulated by heat, a central heating flue for contact with one of said films, a water inlet and a vapor outlet, a means for grouping a series of said heaters into one portable heater, a pressure chamber for said group, a means for supplying heat to the series and for neutralizing the expansive force of the group of heaters, and means for connecting the individual members of said group with said pressure chamber substantially as specified.

In testimony whereof I have affixed my signature, in presence of two witnesses.

ROBERT COOKE SAYER.

Witnesses:
I. PERRY WORDEN,
GEORGE T. PITCHER.