W. R. SAVAGE.

RADIATOR.

APPLICATION FILED AUG. 21, 1913.

1,267,700.

Patented May 28, 1918.

3 SHEETS—SHEET 1.

Fig. 1.

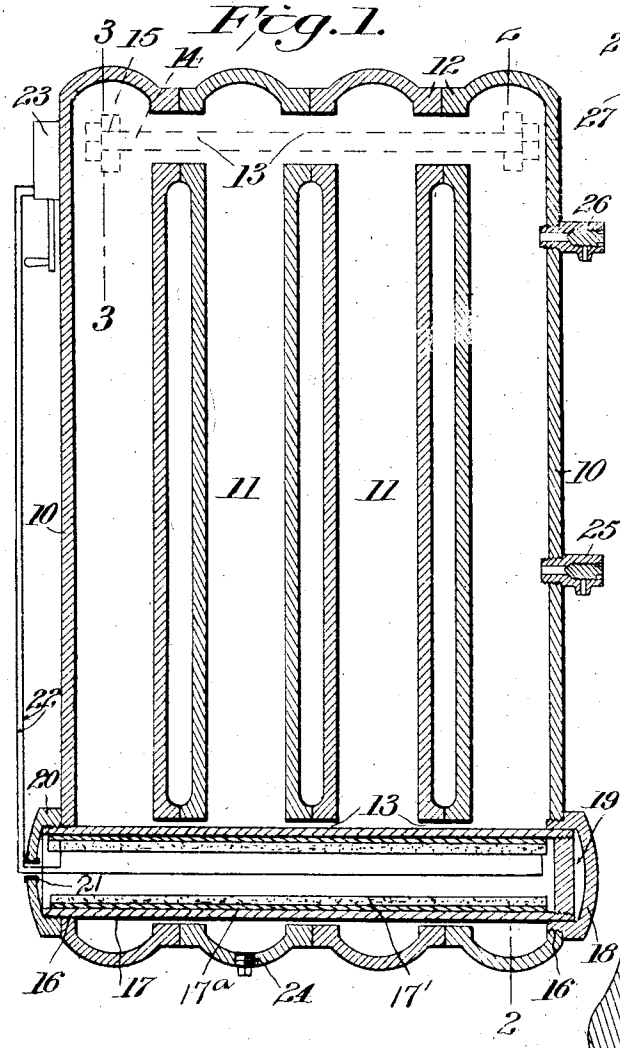


Fig. 2.

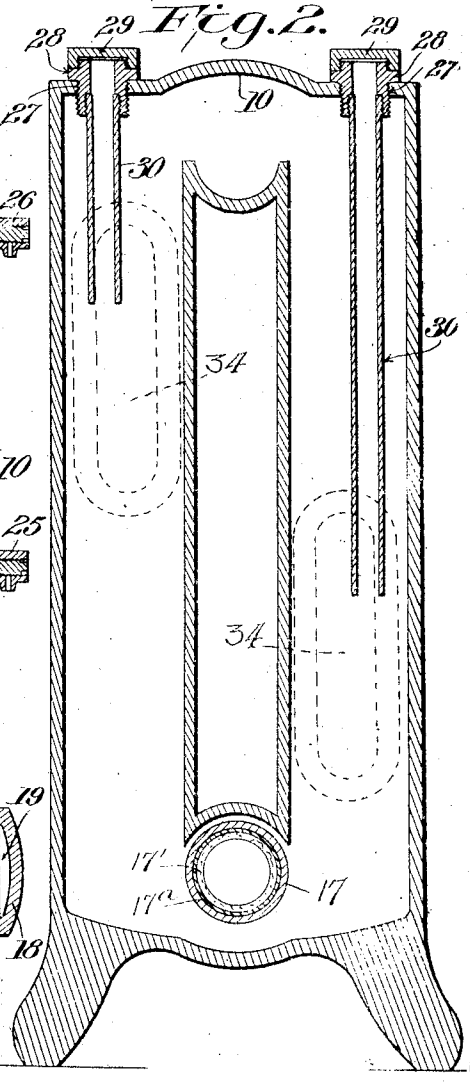
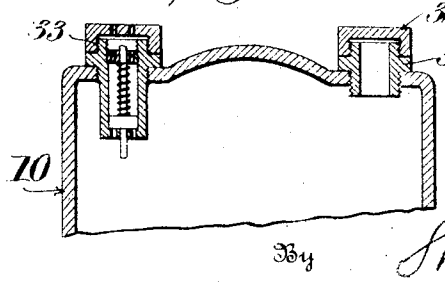


Fig. 3.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 4.

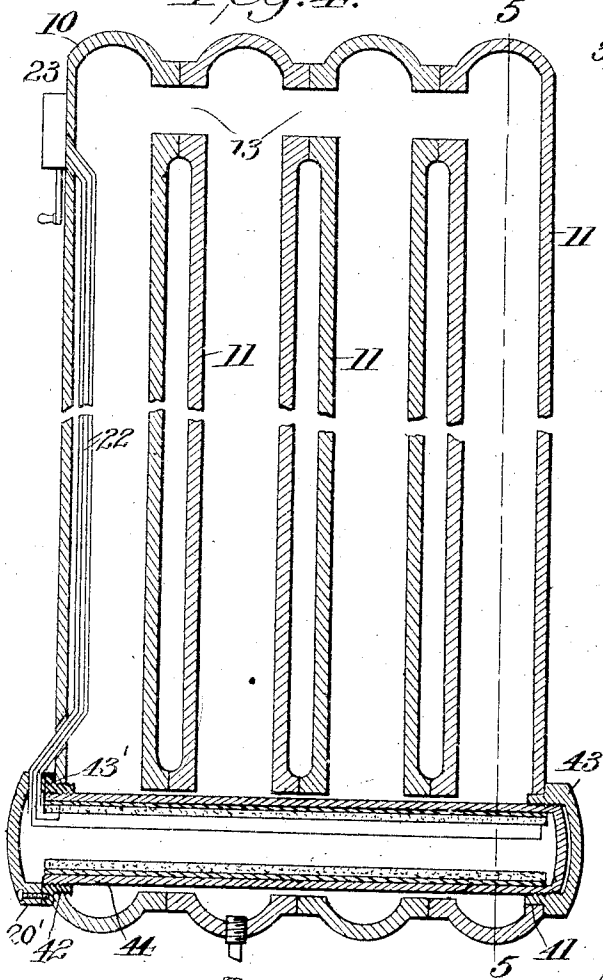


Fig. 5.

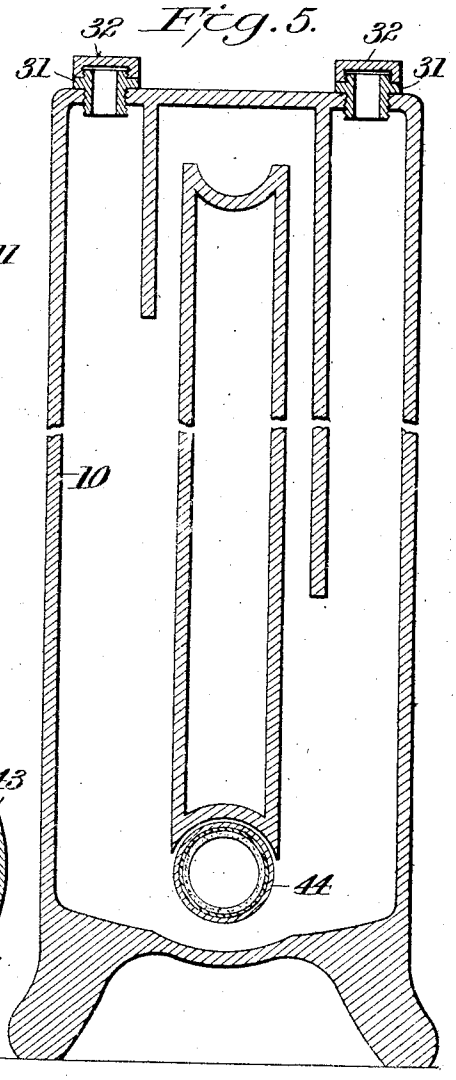
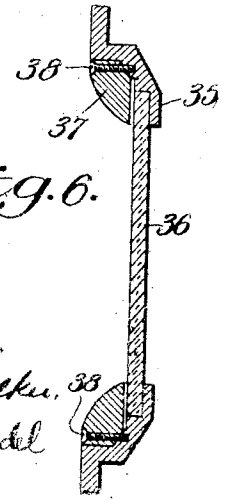


Fig. 6.



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3 SHEETS—SHEET 3.

Fig. 7.

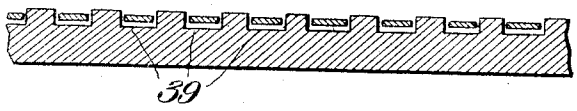


Fig. 8.

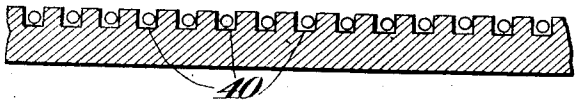


Fig. 9

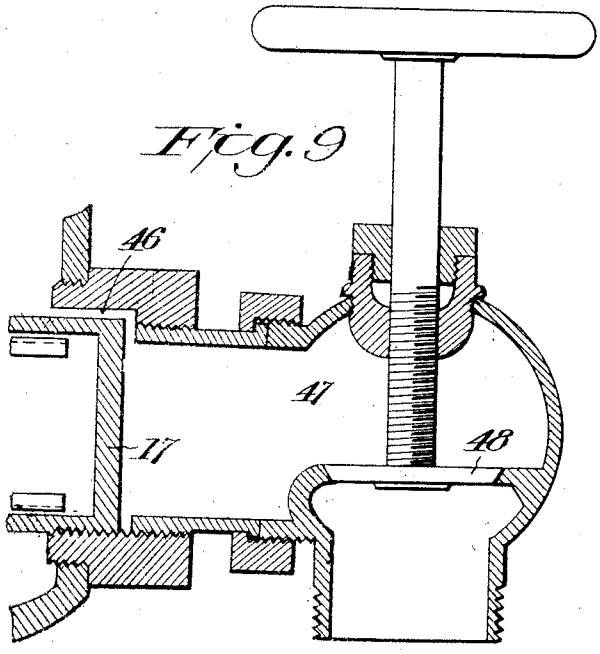
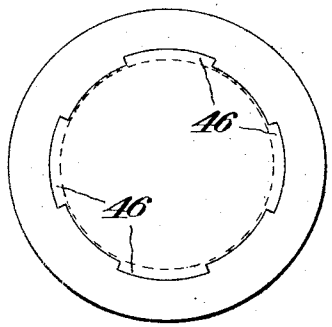


Fig. 10.



Witnesses

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UNITED STATES PATENT OFFICE.

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RADIATOR.

1,267,700. Specification of Letters Patent. Patented May 28, 1918.

Application filed August 23, 1913. Serial No. 786,870.

To all whom it may concern:

Be it known that I, WILL R. SAVAGE, a citizen of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Radiators, of which the following is a specification.

This invention relates to radiators and has special reference to an electrically heated radiator.

One object of the invention is to provide a radiator of this type wherein the heating chamber will be connected to all of the vertical radiating tubes in such manner that no possible obstruction to the circulation of water in heating is obtained.

A second object of the invention is to provide a unitary heating coil which may be readily removed from the radiator for purpose of repair or the like.

A third object of the invention is to provide an air chamber at the top of the radiator which will prevent bursting of the same by expansion of the water.

A fourth object of the invention is to provide transparent gages in the radiator of the class described so that the person operating the radiator can observe the height of water in it.

A fifth object of the invention is to provide an improved control for the filling of the radiator so that the height of water may be kept below a fixed level for the purpose desired.

A sixth object of the invention is to provide a radiator of this class with an adjustable thermostatic control whereby the temperature of the room wherein the heater is installed may be kept at the desired degree by automatic control in closing and breaking the electric circuit to maintain a certain temperature within the room.

A still further object of the invention is to provide an improved form of radiator built up of sections wherein the heating element serves to bind the sections together at the lower end.

With the above and other objects in view as will be hereinafter apparent the invention consists in general of certain novel details of construction and combination of parts hereinafter fully described, illustrated in the accompanying drawings, and specifically claimed.

In the accompanying drawings, like characters of reference indicate like parts in the several views, and:—

Figure 1 is a vertical longitudinal section through one of the radiators constructed in accordance with this arrangement.

Fig. 2 is a transverse section on the line 2—2 of Fig. 1.

Fig. 3 is a partial detail section on the line 3—3 of Fig. 1.

Fig. 4 is a longitudinal vertical section of a modified form of radiator.

Fig. 5 is a section on the line 5—5 of Fig. 4, showing only part of the radiator.

Fig. 6 is a longitudinal sectional view through one of the gages.

Fig. 7 is an enlarged detail view of a portion of the heating elements showing the heating coil in position thereon.

Fig. 8 is a view similar to Fig. 7 but of a modified form of heating element.

Figs. 9 and 10 are detailed sections showing a modification of the plug or cap 18.

In the present embodiment of the invention there are provided the end sections 10 and the intermediate sections 11. Each of these sections has flanges 12 extending from it at top and bottom and when the sections are assembled these flanges butt against each other so as to provide passages 13 between adjacent sections. In the embodiment of the invention shown in Fig. 1 the sections are secured together at the top by means of bolts 14 passing through lugs or eyes 15 cast on the outermost or end sections 10. Each of the end sections 10 is provided with a threaded opening 16 adjacent its lower end and in alinement with the lower openings or passages 13 and into one of these threaded openings is screwed the open end of an inclosing tube 17 wherein is removably mounted a porcelain or a non-conducting cylinder or core 17′ which forms the support for the heating element or wire. It will be obvious that in place of porcelain any other suitable insulating material may be used for this purpose. Between the porcelain cylinder and the iron tube 17 there may be provided a covering of mica 17^a or other suitable insulating material to prevent electrical

connection between the heating wires and iron tube 17. The porcelain cylinder and iron tube are so proportioned that the cylinder may be readily drawn out of the tube and by reason of this construction it is not necessary to drain the radiator before withdrawing the porcelain cylinder. The other opening 16 is provided with an externally threaded plug 18 having a hollow inner end 19 which receives the closed outer end of the tube 17. The threaded open end of the tube 17 which is screwed into one of the openings 16 projects through that opening and on the outer end of the tube is screwed a closing cap 20. Extending centrally through the cap 20 is the bushing 21 through which enter the wires 22 which are wound around the cylinder 17'. These wires lead up to an adjustable thermostat 23 secured to the upper part of the radiator so that the heating of the element in the bottom of the radiator may be automatically controlled by alternately breaking and closing the electric circuit by means of the variation of temperature within the room. One of the radiator sections is provided at its bottom end with a suitable drain plug 24 and one of the end sections 10 is provided with a lower drain-cock 25 and an upper drain-cock 26, these being located respectively at the height of the water when steam is to be made in the radiator and at the height of the water when the heat from hot water is to be used. One of the radiator sections is also provided with a pair of spaced openings 27 and in each of these openings 27 is screwed a bushing 28 provided on its outer end with a cap or closure 29. Depending from each of the bushings 28 is a filling tube 30 and one of these tubes terminates at its lower end slightly below the cock 26, while the other terminates slightly below the cock 25. By this means there is always left in the upper part of the radiator an air space which constitutes an expansion chamber since the radiator cannot be filled through either tube to a height much greater than the bottom of the tube.

There is also provided at the upper part of the radiator a plug or bushing 31 having a cap 32. This arrangement provides an air vent which being loosened slightly allows for the escape of air and later, if so desired, a very slight adjustment can be maintained for allowing the steam to escape, thus preserving the proper humidity of the atmosphere in the room.

At 33 is shown a suitable form of safety valve so that in case the pressure becomes too great in the upper part of the radiator the valve will lift and permit the escape of the compressed air or steam from the compression chamber.

At suitable points on the radiator are arranged transparent sight openings 34 which are provided with flanges 35 surrounding them so that a glass plate 36 may be held therein by a suitable ring 37 secured by the screws 38.

The insulating support for the resistance wire may either have the flat grooves 39 as shown in Fig. 7 or the square grooves 40 as shown in Fig. 8, these grooves being to accommodate either flat or round wire as clearly indicated in those figures.

In the form of the device shown in Figs. 4 and 5 the invention varies somewhat inasmuch as the supporting member for the heating element constitutes the tie or bond between the outer sections of the radiator. In this form, and to this end the outer sections of the radiator are provided with openings 41 and 42 respectively. The opening 41 is smooth and in this smooth opening is fitted a hollow cap 43 threaded interiorly to receive the threaded and closed end of the iron tube 44. The other end of the tube 44 is threaded but is open and is screwed into the hollow bushing 43' which is in turn screwed into the opening 42. A cap 20' is secured to the bushing 43' to cover the opening 42 by means of screws or other suitable fastenings 45, only one of which fastenings is shown. It will thus be seen that by screwing up the cap 43 which swivels in opening 41 the parts may be drawn tightly together as the tube 44 will be placed under tension by compressing the sections.

In Figs. 9 and 10 is illustrated a slight modification wherein at the closed end of the tube 17 are provided gates or ports 46 within the cap or bushing which swivels on tube 17 to support the same and so that water flowing into the hollow cap or bushing 47 through the valve 48 may pass into the interior of the radiator. By means of this arrangement the device may be connected directly to the water pipe or mains of the building or other place where the radiator may be installed for convenient and speedy filling or draining of the same.

In either of these forms as herein described it is to be noted that the electric heating element is a unitary structure which can readily be removed from the radiator, without the radiator being drained, by simply removing the cap 20' at the end of the tube. It is also to be noted that the sight opening provides a register for determining whether the water in the radiator is at the proper height with respect to the gage-cock and feed pipe, since the height of the water can be readily observed through the glasses.

There has thus been provided a simple and efficient device of the kind described and of the character specified.

It will be obvious that many minor changes may be made in the form and construction of this invention without depart-

ing from the material principles thereof. It is not therefore desired to confine the invention to the exact form herein shown and described, but it is wished to include all such as come properly within the scope claimed.

Having thus described the invention, what is claimed as new, is:—

1. In combination with a plurality of radiator sections; a heating element support connected to the outer sections and holding the sections closely together.

2. A radiator of the class described comprising a plurality of sections formed to provide a radiator; with an upper expansion chamber and a lower heating chamber, and a series of tubes connecting said chambers; in combination with a heating element extending lengthwise of the heating chamber and adapted to hold the sections together and to heat the water at the lower ends of all of said tubes uniformly.

3. In a radiator of the class described, a series of sections provided at their upper ends with communicating passages arranged to form an expansion chamber, said sections being further provided at their lower ends with similar passages arranged to form a heating chamber, a filling tube extending downward from the upper end of one of said sections and terminating below the expansion chamber, and a heating element supported in the heating chamber and holding the sections together.

4. In a radiator of the class described, a series of sections provided at their upper ends with communicating passages arranged to form an expansion chamber, said sections being further provided at their lower ends with similar passages arranged to form a heating chamber, a filling tube extending downward from the upper end of one of said sections and terminating below the expansion chamber, a heating element supported in the heating chamber and holding the sections together, and a gage-cock communicating with one of said sections at a point slightly above the lower end of the filling tube.

5. A radiator of the class described provided at its lower end with a heating chamber having alined openings, a hollow cap fitted in one of said openings, a heating element support having one end engaged in said hollow cap and the other end projecting through the remaining opening, and a hollow cap screwed onto the projecting end of the heating element support.

6. A radiator of the class described provided at its lower end with a heating chamber having alined openings, one of said openings having a smooth surface and the other opening being threaded, a hollow cap mounted in one of the openings and provided with a threaded interior, a bushing screwed into the remaining opening and provided with a threaded interior, and a tube screwed into said bushing and connecting it with the hollow cap and outer sections of the radiator.

7. In a device of the character described, a plurality of radiator sections provided with a conduit at the bottom, a chambered bonding rod located in said conduit and adapted to hold the sections together at the bottom, and an electric heater mounted in said chambered rod.

8. In a device of the charcter described, a plurality of radiator sections provided with a conduit at the bottom, a chambered bonding rod located in said conduit and adapted to hold the sections together at the bottom, and an electric heater removably mounted in said chambered rod.

9. In a device of the character described, a plurality of radiator sections provided with alining openings to form a conduit extending directly through the radiator at the bottom thereof, a chambered member located in said conduit which is constructed and arranged to hold the sections together and to exclude the fluid of the radiator from the interior thereof, and an electric heater removably mounted in said chambered member.

10. In a radiator of the class described, a plurality of radiator sections, a hollow imperforate heating element support extending through the bottom of the sections and projecting beyond the end sections, said heating element support being surrounded by the water of the radiator, and caps secured to the ends of the support, one of said caps being removable so that the heating element may be inserted in or removed from the support irrespective of the water in the radiator.

11. In a device of the character described, a plurality of radiator sections provided with alining openings to form a conduit extending directly through the radiator at the bottom thereof, a chambered member located in said conduit, and holding the sections together and an electric heater mounted in said chambered member.

12. In a radiator of the class described, a plurality of sections arranged side by side and having alined openings, a heating element support projecting through said alined openings and supported at its ends only in the end sections of the radiator, the ends of the support extending entirely through the end sections, and caps secured to the projecting ends of said support.

13. In a radiator of the class described, a plurality of sections arranged side by side and having alined openings, a heating element support projecting through said alined openings and supported at its ends only in the end sections of the radiator, the

ends of the support extending entirely through the end sections, caps secured to the projecting ends of said support, an electric circuit, an electric heating element carried by said support and connected to said circuit, and a thermostat connected in said circuit to intermittently make and break the circuit and thereby maintain a constant heat within the room without a constant current.

14. A radiator provided at its lower portion with a heating chamber having alined openings, a hollow cap fitted in one of said openings, a heating element support having one end engaged in said hollow cap and the other end projecting through the remaining opening, and a hollow cap attached to the projecting end of the heating element support.

15. In a device of the character described, a radiator body having alining openings at the opposite ends thereof, one of said openings being threaded, a bushing externally threaded for a portion of its length and engaged in the threaded openings at the end of said radiator body, said bushing being open at both ends and internally threaded, a tubular casing removably engaged at one end with the internally threaded portion of said bushing and extending within the opening at the opposite end of the radiator body, a heating element carried within said casing, and a cap secured to said open ended bushing.

In testimony whereof I affix my signature in presence of two witnesses.

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