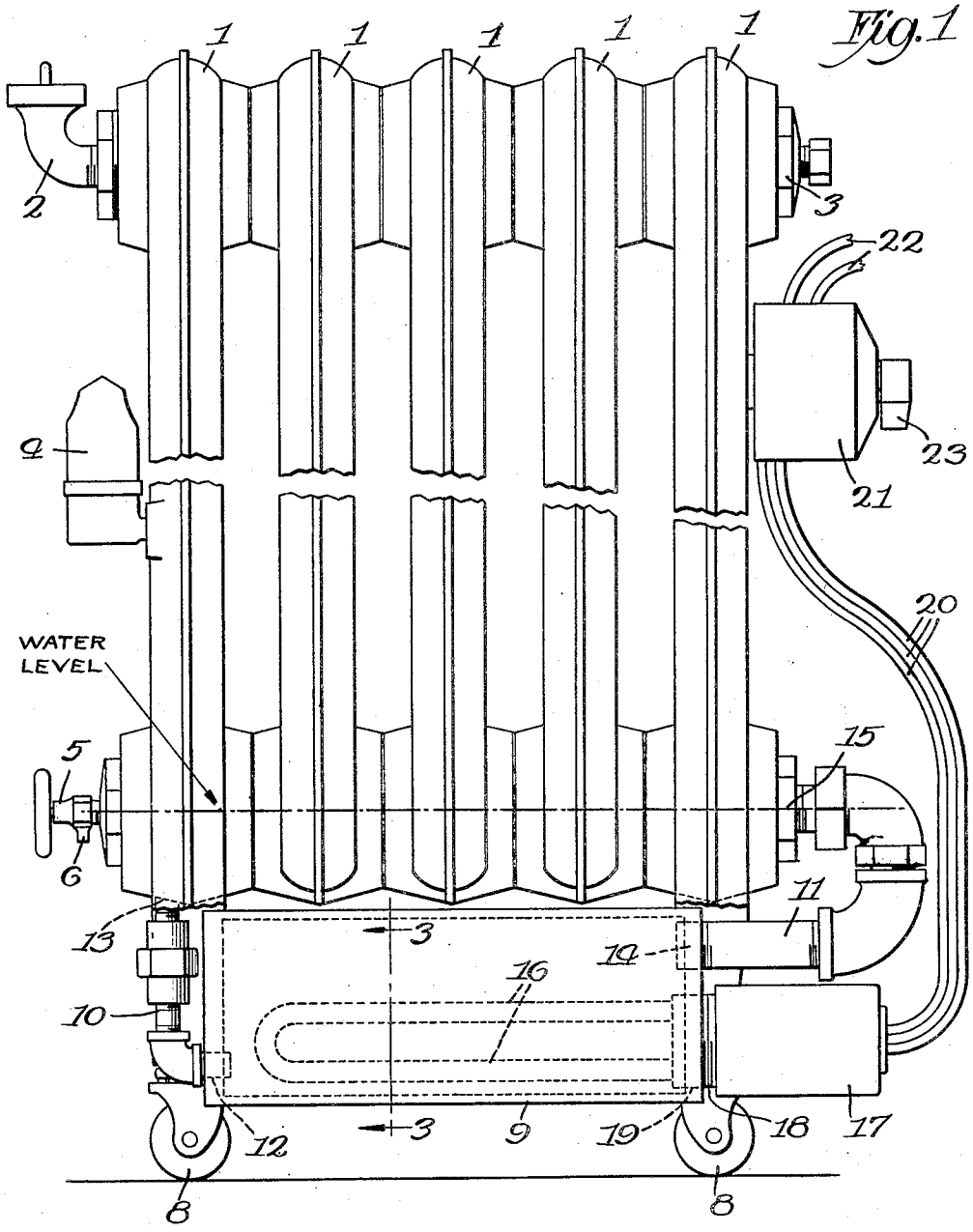
Sept. 17, 1929. L. D. SHREEVE ET AL 1,728,309

HEATER

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Fig. 1



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Fig. 2

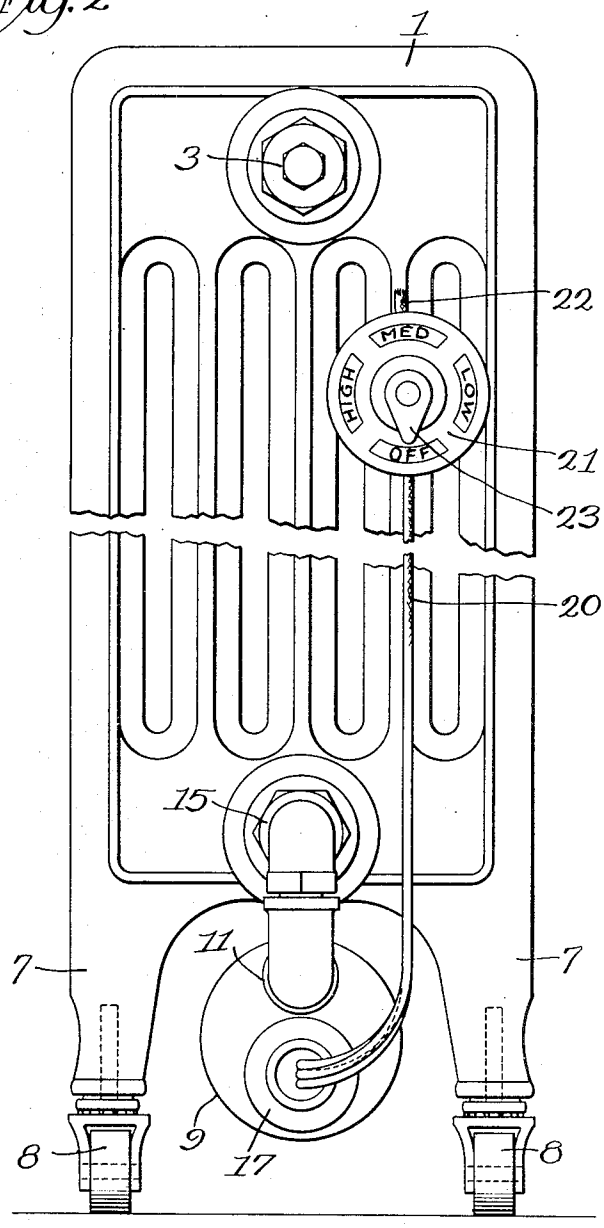


Fig. 4

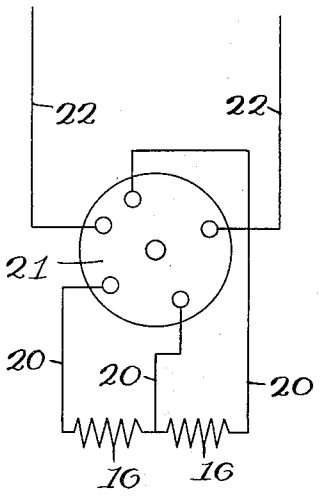
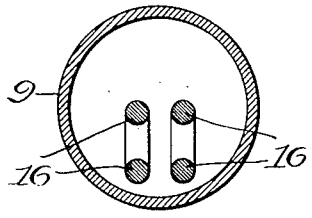


Fig. 3



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UNITED STATES PATENT OFFICE

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HEATER

Application filed December 29, 1927. Serial No. 243,352.

This invention relates to electrically heated fluid radiators, and more particularly to radiators adapted to be heated by steam.

Generally stated, the object of the invention is to provide a novel and improved construction and arrangement whereby a steam radiator of the ordinary or any suitable construction is equipped with an electric steam-generating device, which forms with the radiator an electro-steam heating unit which can be used for heating rooms, and which may be either stationary or portable.

It is also an object to provide certain details and features of construction, and combinations, tending to increase the general efficiency and the desirability of an electric space heater of this particular character.

To these and other useful ends, the invention consists in the matters hereinafter set forth and claimed, and shown in the accompanying drawings, in which,—

Fig. 1 is a side elevation of an electro-steam heating radiator embodying the principles of the invention.

Fig. 2 is a side elevation of said radiator.

Fig. 3 is a detail section on line 3—3 in Fig. 1.

Fig. 4 is a diagram of the circuits of the switch and electric heating element, by which latter the water is heated and converted into steam.

As thus illustrated, the invention comprises any suitable or desired number of hollow radiator sections 1, coupled together in the usual or any suitable or desired manner to form a multiple-section steam radiator. The upper portion of the radiator has a filling device 2, of any suitable character, for introducing water into the radiator. At the other side of the radiator there is provided a suitable relief valve 3 for automatically relieving the pressure, in case the steam pressure rises above a certain point, being in the nature of an ordinary safety valve. The radiator is provided also at one side with an automatic valve 4 to permit the escape of air, and which will close automatically when the air has all escaped, this being of the kind ordinarily found on steam radiators, or of any suitable character. Near the bottom of the radiator, at one side thereof, is provided a hand valve 5 with a water outlet 6, whereby the radiator can be filled until it runs over through the outlet 6, thereby to maintain the normal water level at the point indicated in Fig. 1 of the drawings. Or, of course, a sight level, of any suitable character, can be used in place of this arrangement, as anything that will enable the user to fill the radiator and maintain the desired water level therein will serve the purpose.

Preferably, the radiator is provided with legs 7 having casters 8 of any suitable character, whereby the radiator is portable and may be moved around from one room to another, or from one place to another.

The electro-steam heating device comprises a cylinder 9 disposed under the radiator, as shown, having one end connected with the interior of the radiator by a pipe connection 10, while the other end of this cylinder is connected with the interior of the radiator by a pipe connection 11, as shown. It will be seen that the pipe connection 10 extends from a point 12 near the bottom of the cylinder 9 to a point 13 on the bottom of the radiator. The pipe connection 11, however, extends from a point 14 near the top of the cylinder 9 to a point 15 on the side of the radiator, whereby the point 12 is lower than the point 14, while the point 13 is lower than the point 15, with the consequence that water will enter the cylinder 9 through the connection 10, will be converted into steam by the covered coils 16 of the immersed, electric heating element, and the steam will then escape through the connection 11 to the interior of the radiator at a point above the said water level. Said heating element may be of any suitable character, the coils having an outer mount-

ing or covering 17 provided with a screw-threaded boss portion 18 which is screwed into the threaded opening 19 formed in one end of the cylinder 9 previously mentioned. Three wires 20 lead from the hand switch 21 to the terminals of the coils 16, within the covering 17, while two wires 22 lead from the source of current to the said switch, which latter may be of any suitable character.

With the foregoing construction, which is illustrative of one form of the invention, the switch 21 can be employed for turning on and off the electric current, thereby to control the generation of steam in the cylinder 9, which latter is in effect a small steam boiler. When the current is turned on, steam will be generated in the boiler or generator 9, and this steam will escape through the pipe connection 11 into the radiator, as previously explained, and water will descend through the connection 10, to be in turn converted into steam, and this operation will continue until the radiator is full of steam at the required pressure.

While the form of the switch and the character of the electric heating element are immaterial, so far as the real object of the invention is concerned, it will be seen that, as illustrated in Fig. 2, the switch has four positions, the normal position being designated as "Off", which means no current, and the other three positions being designated, respectively, as "Low", "Medium" and "High", whereby three degrees of heat may be maintained in the radiator. For this purpose, therefore, the circuits of the switch and the two immersed heating coils may, for example, be as indicated in Fig. 4 of the drawings, with contacts in the switch arranged substantially as shown, whereby, with the well known switch of this character, the coils 16 and 16 can be employed in different ways. For example, when the pointer 23 of the switch is in the position indicated, the circuits of both coils are open and no current is passing therethrough. However, when the pointer is turned to "Low", then one coil only is connected in circuit to receive current; but when the pointer is turned to "Medium", then the two coils are connected in series to provide moderate heat; and when the pointer is turned to "High", the two coils are then connected in parallel or multiple, thereby to supply maximum heat. These so-called three-heat, snap switches, and double-coil, immersion heating elements, are common and need no further description, as they are found, for example, in the catalogues of the General Electric Company, in various forms and sizes.

From the foregoing, it will be seen that a steam radiator is provided having a self-contained, steam-generating device, which device is electrical and provided with means for converting the heat generated by the current into steam, as by immersing the electric heating element in the water itself, or by using any suitable means for generating steam by the use of an electric heating device. The radiator may be of the ordinary or any suitable character, such as any of the steam radiators on the market, and the radiator may be of any suitable or desired design or shape, either high or low, long or narrow, depending upon requirements, just as other radiators are made in different sizes and shapes.

A miniature steam boiler is provided with a water connection from the bottom of the radiator, and is provided with a steam outlet connection which connects with the lower axis of the radiator, which axis is the horizontal line extending centrally and axially of the round or boss-like lower portions of the radiator sections, by which the sections of the radiator are connected to communicate with each other, in the usual manner. In this way steam enters the radiator exactly where it would if the radiator were simply hooked up to an ordinary steam heating plant, except that in this case the steam heating plant is carried on the bottom of the radiator and forms therewith an electro-steam heating unit.

Thus standard equipment is used practically everywhere in the construction of the invention, as the radiator itself may be of any standard form or construction, and the electric switch and electric heating element are also of standard or well known form and construction.

The boiler 9 may be formed by welding a disk in each end of a section of pipe or boiler tube, one disk being drilled and tapped at two places to receive the pipe connection 11 and the boss 18 of the heating element, while the other disk is drilled and tapped to receive the connection 10 previously mentioned. However, the cylinder thus forming the miniature boiler, and its pipe connections, may all be made of standard or ordinary materials, and hence the manufacturing cost of production of the steam generator and radiator unit as a whole is reduced practically to a minimum, as practically no special parts are necessary.

It will be understood, however, that the invention is not limited to the exact construction shown and described.

Thus it will be seen that the vertical sections 1 of the radiator are provided with coupling means at their upper end portions, in the usual or any suitable form, forming a horizontal upper axis of formation, and that the devices 2 and 3 are coupled to the radiator at opposite ends of this axis. Similarly, the lower portions of the sections of the radiator are provided with the usual round coupling bosses, as shown, forming a lower horizontal axis, practically coincident with the

water level, and the devices 5 and 15 are coupled to the opposite ends of this axis. Thus the radiator sections are in communication with each other at their upper ends, and also at their lower ends, and the radiator may comprise any suitable or desired number of sections, one or more, or any number, but in any event the devices 2, 3, 5 and 15 are desirably coupled axially to the upper and lower portions of the radiator, thus utilizing the ordinary coupling means for these purposes.

It will be seen that the container 9 is structurally separate and distinct from the radiator, and is readily removable therefrom by breaking or opening the connections 10 and 11 between the container and the radiator. Moreover, it is also true that the heating element 16 forms with the head 17 and the rotary screw connection 18 a heating unit which is readily removable without disconnecting or disturbing the container 9, by simply rotating the head 17 to unscrew the heating element from the end wall or head of the container. The entire structure, with the exception of the heating element, can be built complete, and the heating element, of any suitable character, can then be easily inserted in place, and may be as easily removed afterward, if necessary or desirable.

Without disclaiming anything, and without prejudice to any novelty disclosed, what we claim as our invention is:

1. An electric heater comprising a radiator having one or more hollow sections, a cylindrical boiler disposed under the radiator, with the longitudinal axis of said boiler parallel with the lower coupling axis of the radiator, said boiler having its opposite ends provided with heads, a pipe connection from the bottom of the radiator to one of said heads, tapped into the head adjacent to the lower edge thereof, a second pipe connection from one end of said coupling axis of the radiator to the other head of the boiler, this second pipe connection being tapped into the head near the upper edge thereof, a cylindrical boss screwed into the last mentioned head below said second pipe connection, an electric heating element projecting into the boiler from the inner end of said boss, and electric current connections extending through the boss to said element, together with means for supporting the radiator and its said boiler in an upright position on the floor.

2. A structure as specified in claim 1, in combination with a filter at one end of the upper coupling axis of the radiator, and a hand valve forming a drain by which to maintain the water level substantially coincident with the said lower coupling axis of the radiator.

3. A structure as specified in claim 1, said supporting means comprising four legs for the radiator, and said boiler having one head thereof disposed between one pair of said legs, and having its other head disposed between the other pair of said legs.

4. A structure as specified in claim 1, said pipe connections and said boss being disposed in a vertical plane, coincident with the axis of the boiler and the two coupling axes of said radiator, and said boiler having entirely imperforate sides.

Specification signed this twenty-second day of December, 1927.

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GEORGE H. HILLIS.