Nov. 4, 1924. 1,514,453

A. C. FREEMAN, JR

STEAM HEATING DEVICE

Filed June 29, 1921

FIG. 1.

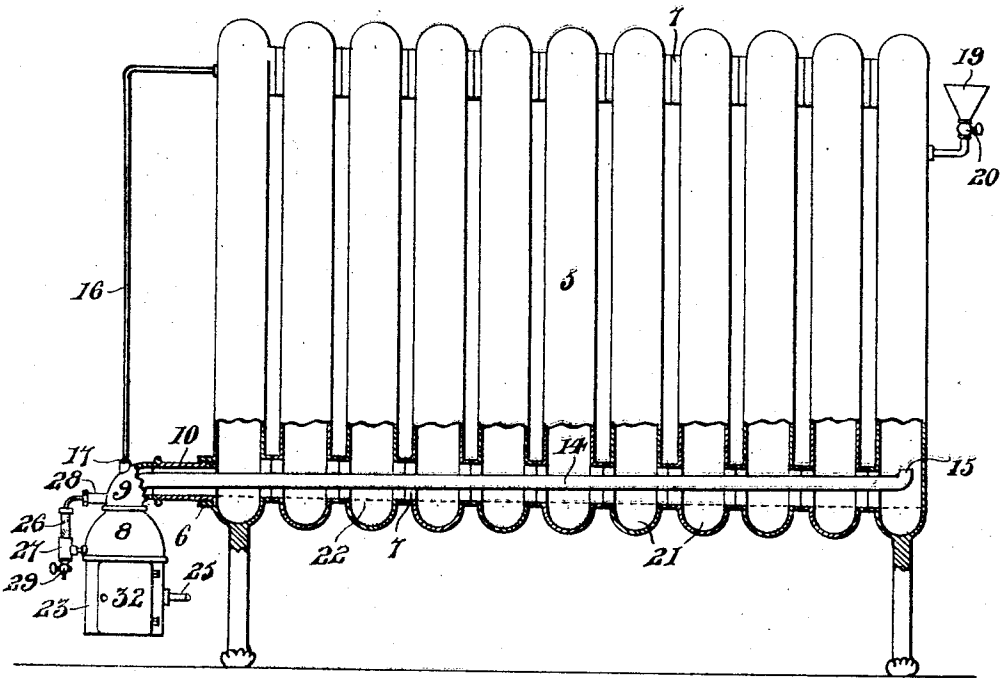


FIG. 2.

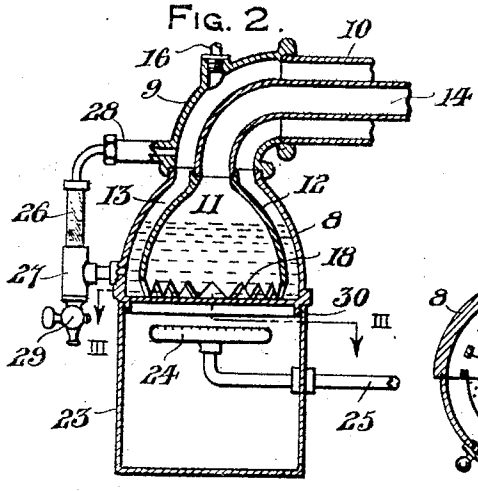


FIG. 3.

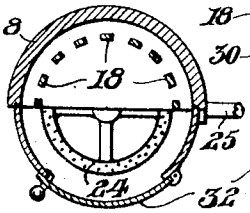
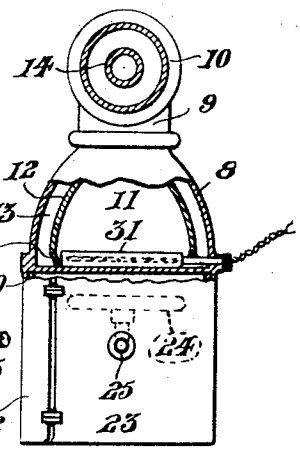


FIG. 4.



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UNITED STATES PATENT OFFICE.

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STEAM-HEATING DEVICE.

Application filed June 29, 1921. Serial No. 481,337.

To all whom it may concern:

Be it known that I, ARTHUR CLARICO FREEMAN, Jr., a citizen of the United States of America, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Heating Devices, of which the following is a specification.

This invention relates to certain new and useful improvements in steam heating devices particularly adaptable for providing a simplified but efficient form of steam generating apparatus for use in connection with heating systems of dwellings or with individual radiators for providing a portable heating unit.

The primary object of the invention is to provide a steam generating device of the above kind involving simplicity of construction and durability.

An important object of the invention is to provide a steam generating device for supplying steam to a radiator or radiators and for receiving the return condensation in such manner as to insure free and unimpeded circulation of the steam by lessening contact of the steam with the water either in the radiator or the condensation receiving chamber so that the steam will be dry or superheated and maximum heat will be available and the consumption of fuel or other heating agency will be kept at a minimum.

With the above general objects in view and others 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 accompanying drawings and claimed.

In the drawings, forming a part of this specification and in which like characters of reference indicate corresponding parts throughout the several views,

Figure 1 is a view partly in elevation and partly in section showing the invention embodied in a portable heating unit involving a single radiator,

Figure 2 is a fragmentary view partly in elevation and partly in vertical section, showing the steam generating device employed with the radiator as in Figure 1,

Figure 3 is a horizontal sectional view taken substantially upon line III—III of Figure 2, and

Figure 4 is a view partly in vertical section and partly in elevation of a modified form of the steam generating device.

The invention is illustrated in connection with a conventional form of radiator 5 provided with the usual coupling nipple 6 at the lower end portion of one of the end sections thereof and said sections being coupled together in the usual manner so as to communicate with each other in series at their upper and lower portions as at 7 through the provision of mating alined hollow bosses.

The present invention is shown adapted for use with a single radiator of this kind but it is obvious that by simply multiplying or providing additional steam outlet and condensation return pipes, the invention may be employed with several radiators located in different rooms of a dwelling. In the embodiment shown, the device as illustrated in Figures 1 to 3 inclusive, comprises a casing 8 of any suitable form having an open upper end adapted to be coupled with the nipple 6 by means of an elbow 9 and a short pipe section 10. A steam generating chamber 11 is formed within the casing 8 by providing a steam dome 12 in said casing and as the casing 8 and dome 12 are preferably concentrically arranged in spaced relation, a water chamber 13 is formed therebetween communicating with the elbow 9. The open upper end of the dome 12 is coupled to one end of a section of pipe 14 that extends centrally through the elbow 9 and pipe section 10 in spaced relation to the latter and the pipe 14 is of sufficient length to extend entirely through the hollow bosses 7 of all of the radiator sections so as to convey the steam to the opposite end of the radiator from that adjacent which the steam generating device per se is located. In order to insure proper circulation of the steam through the radiator at all times with a minimum loss of heating efficiency, the free end of the pipe 14 is directed upwardly in the adjacent end section of the radiator as at 15, and the other end section of the radiator has one end of a pipe 16 attached to the upper end portion of the same with the other end of said pipe 16 coupled as at 17 to the elbow 9 so as to interiorly communicate with the radiator and said elbow 9, causing circulation of air and steam in pipe 10.

The steam dome 12 rests upon the bottom of the casing 8, being suitably fixed in proper position, and has its lower edge provided with numerous openings 18 so as to permit

the water to automatically maintain a uniform level in the steam dome and water chamber or jacket with the water fed from the water chamber to the steam dome or chamber automatically as the water is converted into steam and passes out of the pipe 14. An advantage of the present construction is that the water is slightly heated in the water jacket prior to its entrance into the steam generating dome where it may then be quickly converted into steam by the application of a comparatively low degree of heat. Another advantage resides in the return of the water of condensation entirely out of contact with the steam about the pipe 14 and steam dome 12 with the water warmed and admitted to the bottom of the steam generating dome out of the path of the steam being generated, thus providing for free passage of the steam with no water directly contacting therewith to lower its temperature or impede its movement.

The radiator 5 is preferably provided with a filling spout as at 19, having a control cock 20, so as to permit filling the casing 8 to the desired level, and in the form of radiators now in common use, pockets are formed as at 21 at the lower ends of the radiator sections which will have to be filled before the water will run into the casing 8 through the short pipe section 10 and elbow 9. In order to obviate these water pockets, the same may be covered as indicated by dotted lines as at 22 or a special radiator may be constructed to eliminate said pockets. The casing 8 preferably has a receptacle 23 fixed thereto beneath the bottom of the same for enclosing a liquid or gaseous fuel burner 24 having a supply pipe 25 leading to any suitable source of fuel supply, and the burner is of such size as to direct its flame substantially entirely upon the central portion of the bottom of the casing 8 within the boundary of the dome 12 so that the generation of steam will entirely occur within said dome and comparatively little heating from the burner itself will be applied to the water in the water chamber 13. In order to provide for efficiently indicating the level of the water within the casing 8, the same may be provided with a liquid level gage embodying a transparent graduated tube 26 connected as at 27 with the interior of the casing 8 near its bottom and as at 28 with the elbow 9. The fitting 27 may be provided with a cock 29 for draining the casing 8 for removing sediment or the like when desired.

In operation, the cock or valve 20 is opened and water is then poured into the filling spout 19 until the same fills the casing 8 to the desired level, whereupon the valve 20 is closed. The burner 24 is then lighted and as the steam is generated within the steam dome chamber 11, the same will pass through the tube or pipe 14 to the far end of the radiator and will be directed upwardly from the upturned end 15 of said pipe 14. Free circulation of the steam will be permitted by passage of air which may be in the radiator through the pipe 16 and some of the steam will be condensed before the same reaches said pipe 16 so as to fall to the bottom of the radiator and flow through the pipe section 10 and elbow 9 back to the water chamber 13. The remaining steam that is condensed in the pipe 16 is led to the water chamber from the elbow 9 and it will thus be seen that the same body of water will last for a considerable length of time as it is used over and over. The slight amount of evaporation which will take place can be taken care of by simply supplying a small amount of water from time to time through the filling spout 19. The water is allowed to flow from the water chamber to the bottom of the steam dome through the openings 18 and as a water seal is provided at this point, the outlet of the steam must be by way of the pipe 14 where it is prevented from coming in contact with the water.

As shown in Figure 2, the burner-enclosing receptacle 23 may be detachably connected to the casing 8 as at 30 and an electrical heating unit 31 as shown in Fig. 4 may be provided upon the bottom of the casing 8 within the steam dome 12 so that said electric heating unit 31 may be employed in place of the burner 24 and the articles sold without the casing or receptacle 23 and its burner 24. On the other hand, the device may be sold complete as shown in Figure 4 for permitting use as desired of either the burner 24 or the electrical heating element 31. The receptacle 23 is preferably provided with a door 32 so as to permit access to the burner for cleaning or the like when desired.

The radiator is necessarily full of air when the heat is first applied and I find in practice that it is well after the heat has been applied for a few minutes to open cock 20 and let the air blow out and remain open until steam appears and then close said cock 20 and the radiator will be full of vapor and will operate much more efficiently as there will be no air to be heated up, or rather there will be less air as all the air could not probably be expelled.

It is believed that the construction and operation as well as the advantages of the present invention will be readily understood and appreciated by those skilled in the art from the foregoing description.

Minor changes may be made without departing from the spirit and scope of the invention.

What is claimed as new is:

1. The combination with a radiator formed of a pluralitv of vertical sections connected together at their upper and lower portions, of a steam generating apparatus, means for

connecting said generating apparatus to the lower portion of one end section for forming a condensate return, and a pipe leading from said generating apparatus through said condensate return and through the lower connections for said sections for delivering steam to a section remote from the steam generating apparatus, whereby steam delivered to the last mentioned section will circulate through the remaining sections to be returned to the steam generating apparatus in the form of water of condensation.

2. The combination with a radiator formed of a plurality of vertical sections connected together at their upper and lower portions, said sections having pockets formed therein in open communication with each other through the lower connections for said sections, of a steam generating apparatus, means for connecting said generating apparatus to the lower portion of one end section in a position substantially below said pockets and for forming a return for condensate collected in said pockets, and a pipe leading from said generating apparatus through said condensate return and through the lower connections for said sections for delivering steam to the section farthest removed from said apparatus, whereby steam delivered to the last mentioned section will circulate through the remaining sections to be returned to the steam generating apparatus by way of the aforementioned pockets and lower connections for said sections.

3. The combination with a radiator formed of a plurality of vertical sections connected together at their upper and lower portions, of a steam generating apparatus comprising a casing, a steam dome positioned within said casing and spaced therefrom to provide a water chamber therebetween, the lower edge of said dome being formed with a plurality of openings; means below said dome for heating water therein; means connecting the upper portion of said casing to the lower portion of one end section to provide a condenstate return, and a pipe leading from the upper portion of said steam dome through said condensate return and through the lower connections for said sections for delivering steam to the section farthest removed from the steam generating apparatus whereby steam delivered to the last mentioned section will circulate through the remaining sections to be returned to the casing in the form of water of condensation.

In testimony whereof I affix my signature.

ARTHUR CLARICO FREEMAN, Jr.