Dec. 4, 1934. W. C. CARR 1,983,437

HEAT RADIATING UNIT

Filed March 30, 1934 2 Sheets-Sheet 1

Fig. 1.

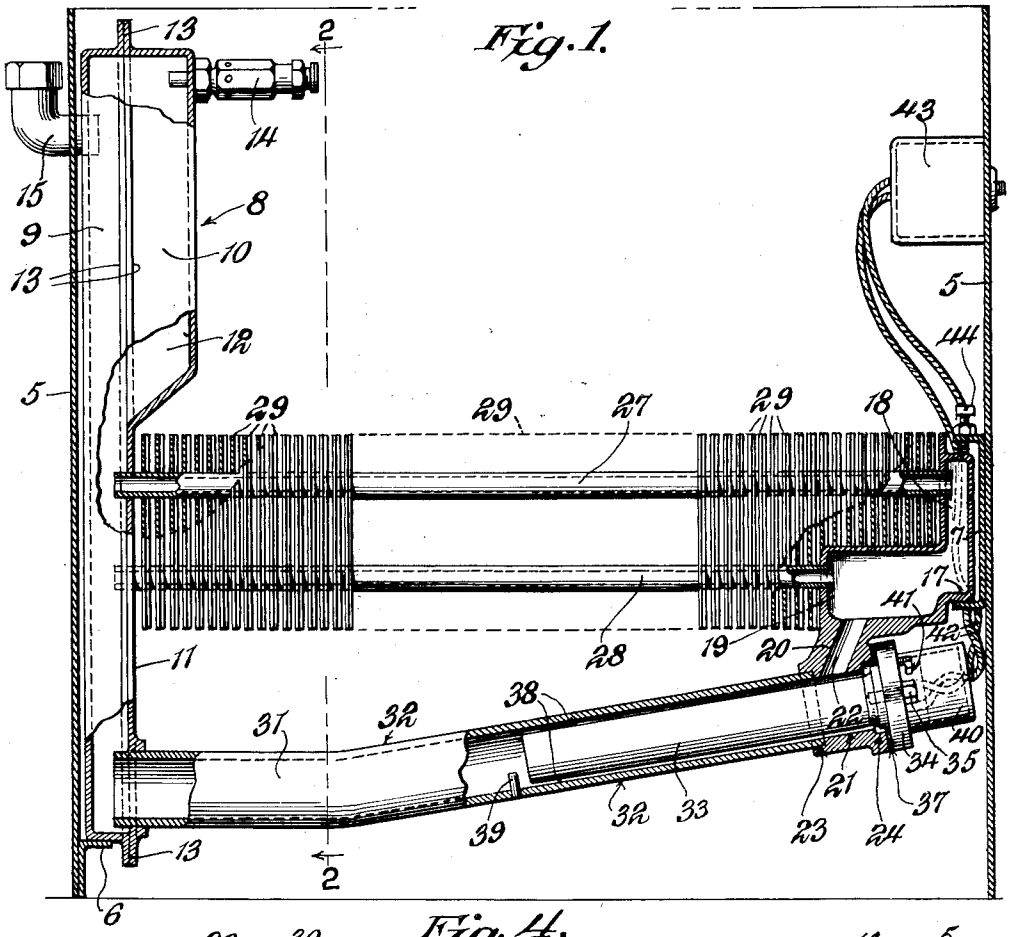
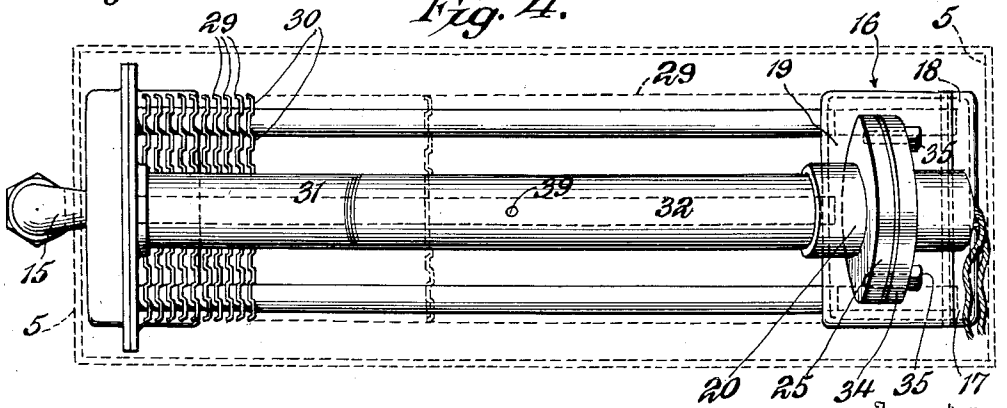


Fig. 4.



Inventor
William C. Carr,

By S. George Tate

Attorney

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Fig. 2.

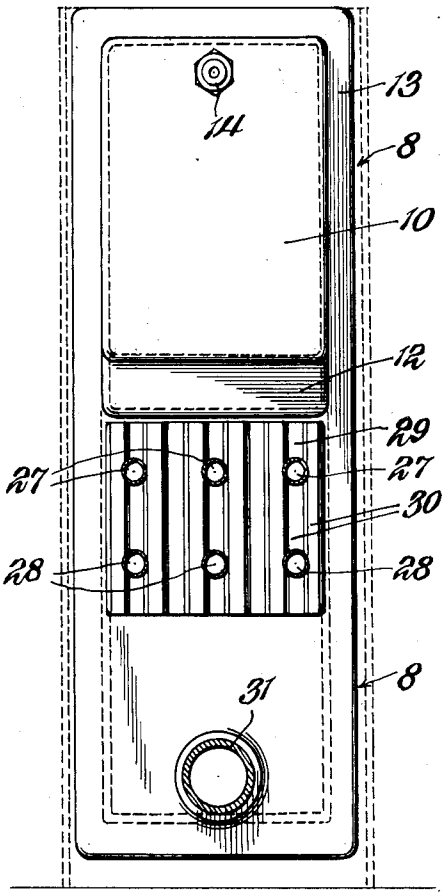


Fig. 3.

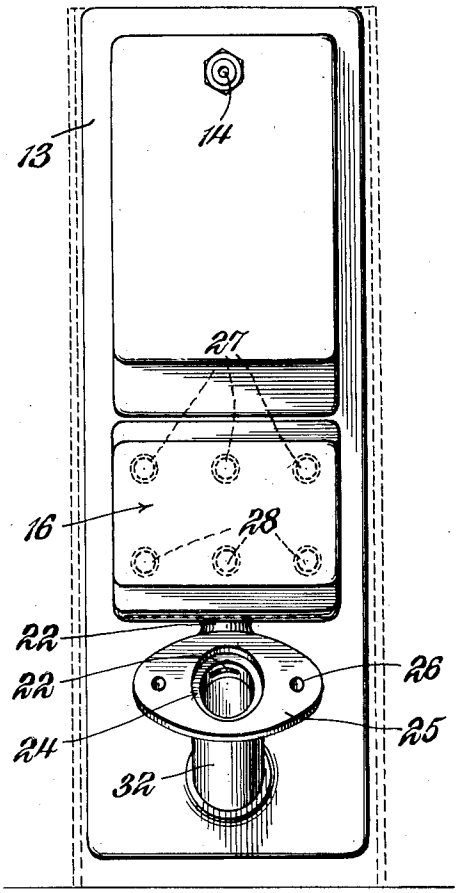
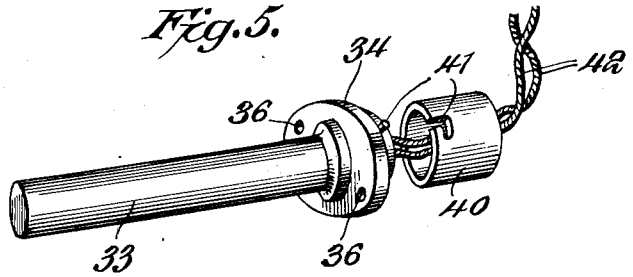


Fig. 5.



Inventor,
William C. Carr,

By S. George Tate

Attorney

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UNITED STATES PATENT OFFICE

1,983,437

HEAT RADIATING UNIT

William C. Carr, Richmond, Va., assignor to The William C. Carr Corporation, Richmond, Va., a corporation of Virginia

Application March 30, 1934, Serial No. 718,298

10 Claims. (Cl. 219—38)

The invention relates generally to heat radiating units and primarily has for an object to provide a novel form of such unit in which water is heated and circulated in a highly efficient manner and the heat of the water effectively transferred by radiation to the surrounding atmosphere.

In its more detailed nature the invention resides in the provision of a novel heat radiating unit including a water tank, a heating element supporting water distributing body, water tubes for carrying heated water from the distributer body to the water tank and cooperating radiating fins for effectively radiating the heat of the water, a duct of novel shape for delivering water from a low point in the tank to the distributer body, and an electrical heating element mounted in a novel manner in said duct, all being cooperatively arranged whereby a very high degree of heat radiating efficiency is assured

The invention further resides in the provision of means for assuring against use of an electrical heating element having a heating capacity in excess of that desired for cooperation with the radiating surface area presented by a particular design of heat radiating unit.

With these and other objects in view which will more fully appear, the nature of the invention will be more clearly understood by following the description, the appended claims, and the several views illustrated in the accompanying drawings.

In the drawings:—

Figure 1 is a front elevation of my improved heat radiating unit, parts being shown in longitudinal section.

Figure 2 is a vertical cross section taken on the line 2—2 on Figure 1.

Figure 3 is a right hand end view of the unit, the electrical heating element being removed.

Figure 4 is an inverted plan view of the unit.

Figure 5 is a detail perspective view of the electrical heating element.

Like reference numerals designate corresponding parts throughout the several figures of the drawings.

In the practical use of my invention my improved heat radiating unit is supported in and encased by any suitable design of cabinet or housing but since such cabinets are well known in the art detail disclosure of the encasing structure is thought to be unnecessary. The end walls of such a structure which serve to support my improved unit are indicated however and generally designated 5.

One end wall 5 of the cabinet or housing has secured thereto by welding or otherwise a bracket angle 6, and the wall 5 at the opposite end of the cabinet is equipped with a cross channel member 7 similarly secured thereto by welding. My improved unit, removably supported by the elements 6 and 7, includes a water tank generally designated 8 and preferably composed of individual copper bronze casting sections 9 and 10. The section 10 comprises a flat cover plate portion 11 and a dished or shell-like enlargement 12, and the whole of the section 9 is in the nature of an open rectangular shell, both sections being equipped with complementary flanges 13 which are welded together to complete the tank. The lower portion of the tank thus formed is in the nature of a relatively narrow vertically disposed water chamber and, because of the enlarged shell portion 12 of the section 10, the upper portion of the tank forms a relatively spacious water head chamber.

A relief valve of any improved form generally designated 14 may be mounted at a high point in the water tank for the purpose of relieving any excess pressure generated during operation of the unit and any suitable means may be provided for administrating a supply of water into the tank such as the simple form of filler-neck indicated at 15. It will be observed by reference to Figure 1 of the drawings that the water tank is supported upon the bracket flange 6.

At the opposite end of the unit I provide a heating element supporting water distributing unit in the nature of a copper bronze casting generally designated 16 and which includes a supporting or seat portion 17 forming the lower terminus of a relatively narrow, rectangular and vertically disposed heated water distributing chamber 18, and a lower relatively large cross chamber 19 which communicates with the chamber 18. A bearing extension 20 depends from the portion of the body in which is formed the chamber 19 and this extension includes an inclined bore 21 and a passageway or duct 22 which affords communication between the interior of the bore, the chamber 19, and through the latter, with the chamber 18.

The extension 20 also includes a counterbore 23 at its left end and a counterbore 24 at its right end, said right hand end also being provided with flange extensions or ears 25 which are thread-tapped at 26 to receive clamp screws for a purpose soon to be described.

An upper series of copper tubes 27 affords communication between the distributor body cham-

ber 18 and the tank and a lower series of such tubes affords communication between the chamber 19 and the tank, and a plurality of heat radiating fins 29 are associated with and equidistantly spaced along said tubes for radiating the heat of water passing through said tubes. For the purpose of increasing the radiating surface of the fins they are corrugated as indicated at 30.

A water delivery pipe 31 delivers water from the lower portion of the tank 8 to the distributer body 16. The pipe preferably extends horizontally a short distance to the right of its connection with the water tank and thence extends upwardly to the distributer body at an incline of approximately 8° as indicated at 32, the right hand end of the pipe being received in the counterbore 23 at the left hand end of the distributer body extension 20. The parts thus far described preferably are welded in assembly so as to assure steam tight connections.

An electrical heating element 33 is removably supported by the distributer body extension 20 and extends into the upwardly inclined portion 32 of the pipe 31 as indicated in Figure 1.

The electrical element may be of any approved form well known in the art and in this particular use includes a clamp flange 34 of the same shape as the flanged portion 25 of the distributer body extension and is secured to said extension by clamp screws 35 which pass through holes 36 in the element flange and into the taps 26 with which the distributer body extension flanges are provided. A ring washer 37 is interposed between clamp flanges and by suitably tightening the screws 35 a steam tight mounting of the heating element is secured.

It will be observed by reference to Figure 1 of the drawings that the external diameter of the heating element is slightly less than the internal diameter of the pipe 31, 32 and thus a restricted angular space 38 is provided between the element and pipe wall for passage of water, and because of this restricted passage it is possible to very rapidly heat the water which is circulated by thermo-siphonic action.

In the practical use of my improved heating unit it is my intention to provide a predetermined amount of heat radiating surface in each unit and to standardize the parts comprising the unit. When a greater heating capacity is demanded the units are constructed in greater lengths and as the radiating surface is increased heating elements of greater heating capacity must be used. In order to assure against the use in a heating unit of given radiating surface of a heating element of greater capacity than is necessary or desirable, I mount a stop lug 39 in the upwardly inclined portion 32 of the pipe 31 which will prevent insertion into said pipe of a heating element longer, and therefore of greater capacity, than the element designed for use with the particular unit. The removable heating element may include a cap 40 removably secured thereto as at 41 so that access may be had to the wires 42 which connect the element with the source of electrical current under control of a suitable switch 43.

In use the delivery pipe 31, 32 takes water from the lower end of the relatively narrow vertically disposed tank portion and delivers it through the duct 22 into the distributer body chambers 19 and 18 from which it flows into the tubes 28 and 27 back to the tank. While passing through the tubes 27 and 28 the water heated by the element 33 while flowing through the restricted space surrounding said element gives up its heat to the radiating fins 29 and therefrom to the surrounding atmosphere. The particular shape and mounting of the delivery pipe 31, 32, the distributer body, the tubes 27 and 28 and fins 29 provide for a very efficient heating and rapid circulation of the water.

If desired a holddown screw 44 may be utilized for securing the distributer body end of the unit in its mounting in the cross channel 7.

It is of course to be understood that the details of structure and arrangement of parts may be variously changed and modified without departing from the spirit and scope of my invention.

I claim:—

1. A heat radiating unit comprising a water tank, a hollow distributer body, a water delivery pipe communicating between a low part of the tank and the distributer body and having a portion thereof upwardly inclined toward said body, hot water tubes communicating between the distributer body and the tank above said pipe, heat radiating fins associated with said tubes, and a removably mounted electrical heating element supported by the distributer body and extending longitudinally in the upwardly inclined portion of the pipe.

2. A heat radiating unit comprising a water tank, a hollow distributer body, a water delivery pipe communicating between a low part of the tank and the distributer body, a hot water tube communicating between the distributer body and the tank above said pipe, heat radiating fins associated with said tube, a removably mounted electrical heating element extending longitudinally in said pipe, and means in said pipe preventing the insertion in said pipe of a heating element longer than a predetermined length.

3. In a heat radiating unit wherein is provided water circulating means including a water pipe, and means providing a predetermined amount of heat radiating surface, the combination of a removably mounted electrical heating element extending longitudinally in said pipe, and means in said pipe preventing the insertion in said pipe of a heating element having a heating capacity greater than that demanded for said predetermined amount of heat radiating surface.

4. A heat radiating unit comprising a water tank; a hollow distributer body; a water delivery pipe communicating between a low part of the tank and the distributer body and having a portion thereof upwardly inclined toward said body, hot water tubes communicating between the distributer body and the tank above said pipe, heat radiating fins associated with said tubes, a removably mounted electrical heating element supported by the distributer body and extending longitudinally in the upwardly inclined portion of the pipe, and means in said pipe preventing the insertion in said pipe of a heating element longer than a predetermined length.

5. A heat radiating unit comprising a water tank, a hollow distributer body, a water delivery pipe communicating between a low part of the tank and the distributer body; a lower and an upper series of hot water tubes communicating between the distributer body and the tank above said pipe, heat radiating fins associated with both series of tubes; said distributer body including a vertically disposed relatively narrow chamber portion entered by said upper series of tubes and an enlarged extension chamber entered by said lower series of tubes and communicating with

the narrow chamber portion and the delivery pipe, and an electrical heating element supported by the distributer body and extending into the delivery pipe.

6. A heat radiating unit comprising a water tank, a hollow distributer body, a water delivery pipe communicating between a low part of the tank and the distributer body, a lower and an upper series of hot water tubes communicating between the distributer body and the tank above said pipe; heat radiating fins associated with both series of tubes; said distributer body including a vertically disposed relatively narrow chamber portion entered by said upper series of tubes, an enlarged extension chamber entered by said lower series of tubes and communicating with the narrow chamber portion and the delivery pipe, and a depending hollow supporting extension for receiving the distributer-body-connected-end of said pipe and having a water passage communicating between said pipe and the distributer body chambers; and an electrical heating element removably supported by said extension and extending into the delivery pipe.

7. A heat radiating unit comprising a water tank; a hollow distributer body; a water delivery pipe communicating between a low part of the tank and the distributer body; a lower and an upper series of hot water tubes communicating between the distributer body and the tank above said pipe; heat radiating fins associated with both series of tubes; said distributer body including a vertically disposed relatively narrow chamber portion entered by said upper series of tubes, an enlarged extension chamber entered by said lower series of tubes and communicating with the narrow chamber portion and the delivery pipe, and a depending hollow supporting extension for receiving the distributer-body-connected-end of said pipe and having a water passage communicating between said pipe and the distributer body chambers; and an electrical heating element removably supported by said extension and extending into the delivery pipe; said extension and said heating element having complementary flanges; and means to clamp the flanges to form a steam tight joint.

8. A heat radiating unit comprising a water tank; a hollow distributer body; a water delivery pipe communicating between a low part of the tank and the distributer body; a lower and an upper series of hot water tubes communicating between the distributer body and the tank above said pipe; heat radiating fins associated with both series of tubes; said distributer body including a vertically disposed relatively narrow chamber portion entered by said upper series of tubes, an enlarged extension chamber entered by said lower series of tubes and communicating with the narrow chamber portion and the delivery pipe, and a depending hollow supporting extension for receiving the distributer-body-connected-end of said pipe and having a water passage communicating between said pipe and the distributer body chambers; and an electrical heating element removably supported by said extension and extending into the delivery pipe; the portion of said delivery pipe into which the heating element projects being inclined upwardly toward the distributer body and of a diameter very slightly greater than that of said heating element.

9. A heat radiating unit comprising a water tank; a hollow distributer body; a water delivery pipe communicating between a low part of the tank and the distributer body; a lower and an upper series of hot water tubes communicating between the distributer body and the tank above said pipe; heat radiating fins associated with both series of tubes; said distributer body including a vertically disposed relatively narrow chamber portion entered by said upper series of tubes; an enlarged extension chamber entered by said lower series of tubes and communicating with the narrow chamber portion and the delivery pipe, and a depending hollow supporting extension for receiving the distributer body connected end of said pipe and having a water passage communicating between said pipe and the distributer body chambers; and an electrical heating element removably supported by said extension and extending into the delivery pipe; a portion of said delivery pipe into which the heating element projects being inclined upwardly toward the distributer body and of a diameter very slightly greater than that of said heating element, and means in said pipe portion limiting the length of heating element receivable therein.

10. A heat radiating unit comprising a water tank, a hollow distributer body, a water delivery pipe communicating between a low part of the tank and the distributer body and having a portion thereof upwardly inclined toward said body, hot water tubes communicating between the distributer body and the tank above said pipe, heat radiating fins associated with said tubes, and a removably mounted electrical heating element supported by the distributer body and extending longitudinally in the upwardly inclined portion of the pipe, said tank comprising a relatively narrow vertical chamber portion communicating with said pipe and tubes and an enlarged vertically extended water head chamber portion.

WILLIAM C. CARR.