

March 8, 1932.

E. L. WIEGAND
FUSED IMMERSION HEATER

1,848,449

Filed May 26, 1930

2 Sheets-Sheet 1

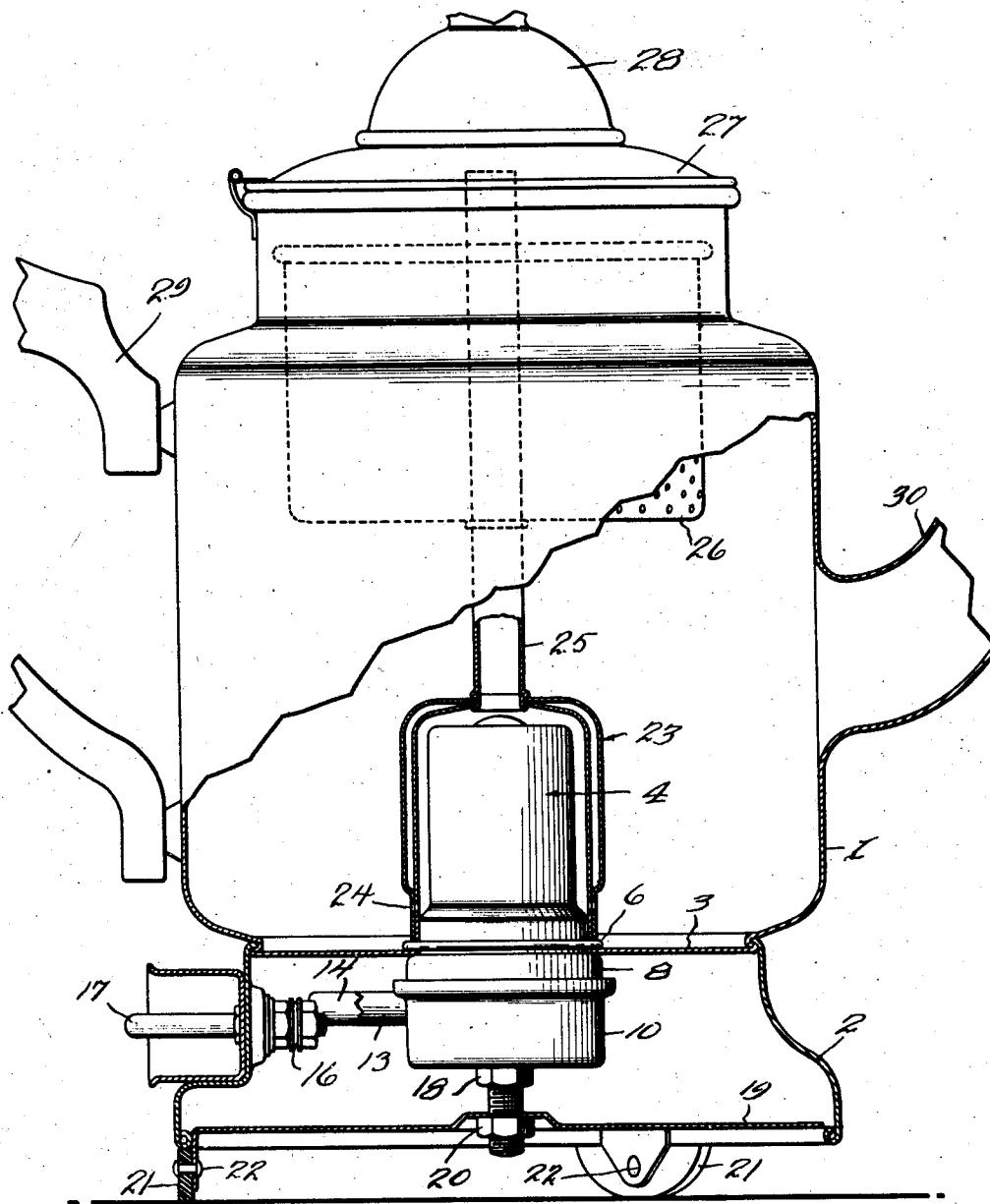


Fig. 1

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2 Sheets-Sheet 2

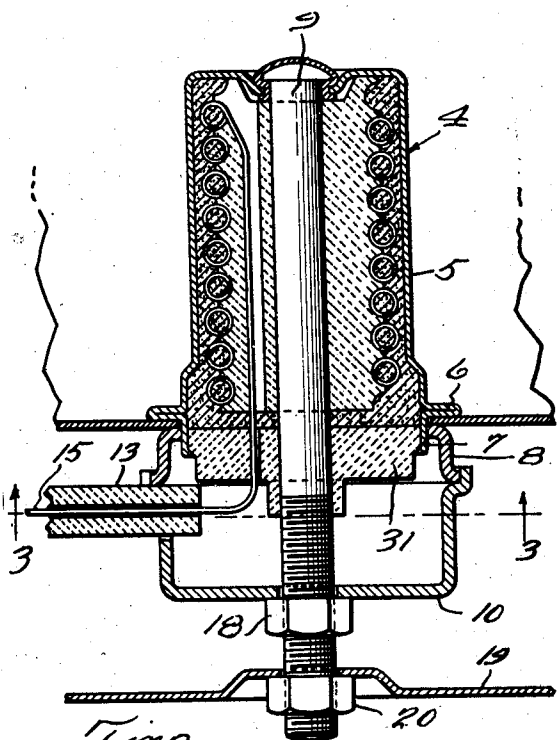


Fig. 2

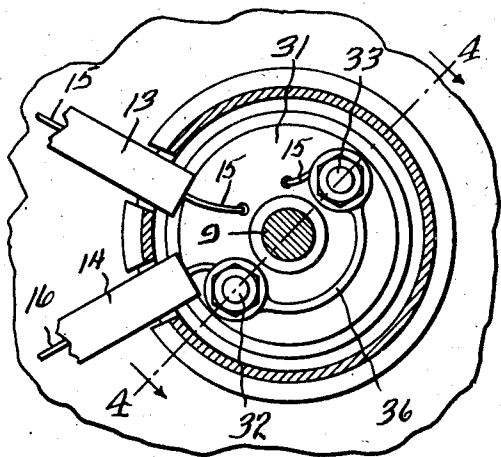


Fig. 3

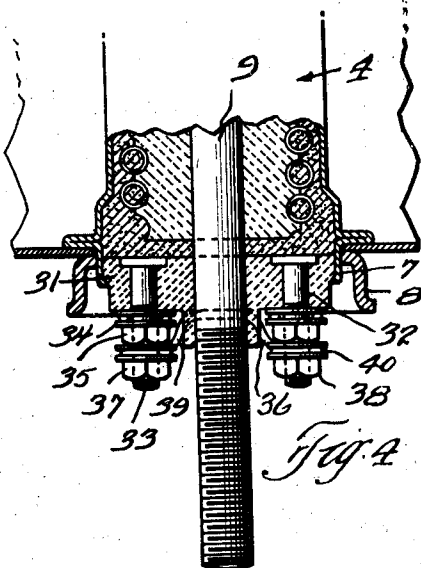


Fig. 4

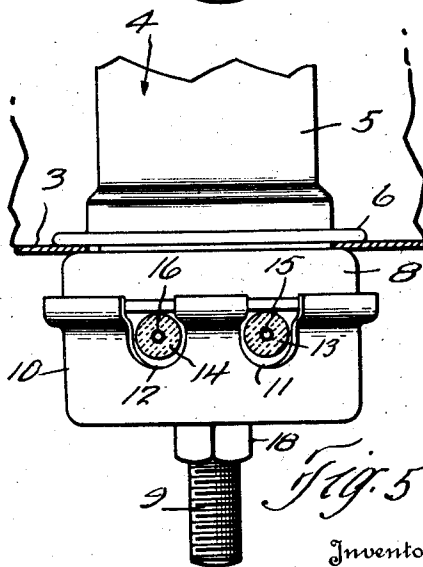


Fig. 5

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UNITED STATES PATENT OFFICE

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FUSED IMMERSION HEATER

Application filed May 28, 1930. Serial No. 455,477.

This invention relates generally to fused immersion heating elements and is of general application; and while the specific embodiment of the invention herein disclosed is particularly adapted for percolators, the invention is applicable to any type of heating vessel or device in which an immersion heating element may be useful.

Percolators heretofore generally known usually embody a heating vessel in the bottom of which is secured an electrical heating unit. It is also standard practice to provide a fusible element which is usually located outside of the vessel and attached adjacent the heating element. This fusible element is generally connected in electrical circuit in series with the heating element and is designed to melt and break the circuit to the heating element when excessive temperature is obtained. It has been found quite difficult to obtain a simple type of fuse which is effective and dependable in operation due to the fact that the fuse, being usually located adjacent the bottom of the percolator, is affected by the cool air in the base of the percolator which causes the fuse to radiate the energy received from the heating element quite rapidly which therefore retards the action of the fuse. Moreover, in the operation of the percolator it is undesirable to have the base of the percolator or the air contained in the base portion of the percolator maintained at a high temperature. It is therefore quite difficult to rapidly heat the fuse to a melting temperature if the air in the base is kept at a low temperature which is desirable. Heretofore fuses have been enclosed in a cartridge or casing which isolates the fuse from the outside air as well as from the heating element. One of the disadvantages of this construction and arrangement is that it reduces the degree of fuse exposure to the heat and therefore impedes the response of the fuse.

One of the main objects of the invention is to avoid the difficulties hereinbefore mentioned and to provide an immersion heating element in combination with a fuse which is adapted to be located outside of the heating vessel and isolated from the outside air and

at the same time exposed to the heat of the element so as to secure quick response to temperature changes of the heating element.

Another object of the invention is to provide an immersion heating unit of the character described in which the fusible element is enclosed within a housing or casing, which housing or casing may also serve to detachably secure the heating element and its associated parts in place.

Another object of the invention is to provide a heating unit of the character described which is adapted to be detachably secured to the vessel containing the material to be heated and which is also provided with a fusible element which is carried by the heating element and disposed adjacent the lower end thereof so as to be readily replaceable.

A further object of the invention is to provide a heating element adapted to be detachably secured to a vessel in combination with a fuse carried by the heating element and disposed adjacent the element together with a means for rapidly conducting the heat downwardly toward the fuse when the internal temperature rises above a predetermined limit, all of the parts being readily detachable for replacement or repair.

A still further object of the invention is to provide a heating unit consisting essentially of a metal cup or casing having the heating element arranged therein, the casing having a heat conducting means extending from the interior of the heating element to a point adjacent a fuse carried by the heating element together with a cover for the fuse which functions to isolate the fuse from the outside air without isolating it from the heat source.

By positioning the fuse adjacent the lower end of the heating element and surrounding this fuse with a housing or cover which forms a separate chamber, the air inside of the chamber will heat up more rapidly to a high temperature than the air in the larger space within the base of the percolator, with the result that the fuse will function more positively and the temperature of the air within the fuse chamber will rise much more rapidly than when a cover or heat confining member is not used. In other words, the function

of the fuse cover is to develop a high ambient temperature immediately adjacent the fuse so that the fuse and its terminals will not radiate heat so rapidly into the cooler space within the base of the percolator, thus providing about the fuse a small isolated compartment in which the temperature is relatively high, but still without obstructing the transfer of heat to the fuse, the heat transfer being in fact accelerated by the heat conducting member and fuse terminals.

A still further object of the invention is to provide a percolator of the character described which will have a maximum efficiency and which consists of comparatively few parts which are readily assembled and disassembled for the purpose of replacement or repair and which at the same time is well adapted for production at comparatively low cost. Further and more limited objects of the invention will appear as the description proceeds and by reference to the accompanying drawings in which Fig. 1 is a fragmentary view partly in front elevation and partly in section disclosing the essential features of the preferred embodiment of my invention applied to a percolator; Fig. 2 is a fragmentary vertical sectional view disclosing the heating element and the manner of securing the same in place; Fig. 3 is a fragmentary horizontal sectional view on the line 3—3 of Fig. 2; Fig. 4 is a fragmentary vertical sectional view on the line 4—4 of Fig. 3; and Fig. 5 is a fragmentary view partly in elevation and partly in section disclosing the combination of the retaining ring and fuse cover and the manner of securing the same in place.

Referring now to the drawings, the percolator shown consists essentially of a heating vessel 1 having a base or skirt portion 2 secured thereto. A plate 3 constitutes the bottom of the vessel and is provided with a central opening in which is arranged the heating unit 4. The heating unit 4 is of the chromalox cartridge type and preferably consists of a metal cup or casing 5 having an electrical resistance wire arranged therein, as shown most clearly in Fig. 2, and preferably embedded in suitable refractory material. The metal cup or casing 5 is provided with a flanged shoulder 6 and a downwardly extending skirt portion 7 which projects below the bottom of the vessel. Secured over the skirt portion 7 is an annular retaining ring 8 which fits thereover in frictional engagement therewith. Disposed within the inverted cup 5 is a heat conducting member which is preferably in the form of a rod or tube 9 the upper end of which may be secured to the top of the cup and arranged centrally thereof. The rod or tube 9 extends axially of the cup and has its lower end threaded and disposed considerably below the bottom of the vessel. Fitting over the lower end of the rod or tube 9 is a clamping cover or cap 10 having a peripheral shoulder

thereon which fits over and bears upon the retaining ring 7. The clamping cap or cover 10 is provided at one side adjacent the upper edge thereof with a pair of slots 11 and 12 adapted to receive therein refractory tubes 13 and 14 through which lead the wires 15 and 16 which connect with terminal pins 17, only one of which is illustrated. Threadedly secured over the lower end of the bolt 9 is a nut 18 which secures the cover 10 and serves to draw the flange 6 tightly against the vessel wall 3 keeping the element 5 in place when cover 10 is removed to replace fuse 36. Also fitting over the lower end of the bolt 9 is a bottom plate 19 which closes the lower end of the skirt portion of the percolator. This bottom plate is secured in place by means of a nut 20 threadedly secured over the lower end of the bolt 9. The bottom plate 19 also carries a plurality of legs 21 which are preferably formed of fiber or some suitable material of low heat conducting value and which are secured to the bottom plate by means of rivets 22.

The heating element 4 projects upwardly into the percolator as shown most clearly in Fig. 1 and fitting thereover is a double wall pump 23 having openings 24 in the lower portion thereof. Extending upwardly from the pump 23 is a tube 25 over the upper end of which is secured the basket 26. The percolator is provided with the usual cover 27 and glass top 28. Secured to one side of the percolator is a handle 29 of usual construction. Extending from the opposite side of the percolator is the usual spout 30.

Surrounding the bolt 9 and fitting into the lower end of the cup 5 and closing the same is a cap 31 which is formed of some suitable refractory material and serves as a fuse block. Carried by the cap 31 are a pair of terminals 32 and 33. The wire leading from the heating element is connected to the terminal 33 and is secured thereto by means of a washer 34 and a nut 35. A fuse 36 has one end connected to the terminal 32 and its opposite end connected with the terminal 33. The fuse is connected in series with the heating element and is secured to the terminals by means of nuts 37 and 38 and washers 39 and 40. The wire 16 which leads through the refractory tube 14 is also connected with the terminal 32 and has its opposite end connected with one of the terminal pins 17 through the medium of which the heating element may be connected to a source of current. The retaining ring 8 and the cover 10 substantially enclose the fuse 36 and are secured in place by means of the nut 18 and bolt 9.

It will thus be seen that the fuse is enclosed within a separate housing or chamber formed by the retaining ring 7 and cover 10. The slots 11 and 12 permit the removal of the cover 10 without disconnecting any of the wires. When the liquid in the percolator falls below

the top of the heating unit, the heating element temperature rises and heat is conducted downwardly rapidly through the medium of the rod or tube 9 to the fuse. This results in the fuse being melted so as to break the circuit to the heating element. The fuse and its terminals being isolated in a separate chamber is rapidly affected by the heat as there is very little heat lost by radiation from the fuse or its terminals. In the embodiment shown the bolt 9 conducts the heat downwardly and provides a means for securing the combination retaining ring and fuse cover in place. The bolt 9 also serves as a means for attaching the bottom plate 19 which carries the legs 21. When it is desired to replace the fuse, it is only necessary to remove the nut 20 and then remove the bottom plate 19 whereupon access may be had to the nut 18 to remove the cover plate 10. The retaining ring 7 being in frictional engagement with the skirt portion 7 of the cup 5 maintains the heating element in place while the fuse is being replaced.

It will now be clear that I have provided a fused heating unit which will accomplish the objects of the invention as hereinbefore stated. Various changes may be made in the details of construction as well as in the shape, size and arrangement of parts without departing from the spirit of my invention. It is therefore to be understood that the embodiment of the invention herein disclosed is merely illustrative and is not to be considered in a limiting sense and my invention is limited only in accordance with the scope of the appended claims. Throughout the specification and claims, the term "fuse" is used in its broadest sense and refers to any kind of circuit breaker whether a fuse or a thermostatic device.

Having thus described my invention, what I claim is:

1. A fused immersion heater adapted to be mounted in a vessel, a fuse block mounted adjacent one end of said heater, fuse terminals carried by said fuse block, a fuse connected with said fuse terminals and a cover substantially enclosing the fuse and the fuse block, and means extending through the heater, fuse block and cover for securing the heater in place, said means serving to conduct the heat downwardly toward said fuse and to heat the same by radiation.

2. A fused immersion heater adapted to be mounted in a vessel, a fuse block mounted adjacent one end of said heater, fuse terminals carried by said fuse block, a fuse connected with said fuse terminals, and means for conducting the heat downwardly from the heater toward the fuse, said means serving also to detachably secure the heater in place.

3. A fused immersion heater adapted to be mounted in a vessel, a fuse block mounted adjacent one end of said heater, fuse terminals carried by said fuse block, a fuse connected

with said fuse terminals, and means for conducting the heat from the heater toward the fuse and a housing over said fuse, said means serving also to detachably secure the heater in place.

4. A fused immersion heater adapted to be mounted in a vessel, a fuse block mounted adjacent one end of said heater, fuse terminals carried by said fuse block, a fuse connected with said fuse terminals, and means for conducting the heat from the heater toward the fuse, and a retaining device and fuse cover securing the parts in place.

5. A fused immersion heater adapted to be mounted in a vessel, a fuse block mounted adjacent one end of said heater, fuse terminals carried by said fuse block, a fuse connected with said fuse terminals, and means for conducting the heat from the heater toward the fuse and a housing over said fuse and serving to secure the heater and fuse block in place.

6. In a heating vessel adapted to contain a heating unit, a heat conducting member extending from said heating unit and having one end disposed outside of said vessel, a fusible element disposed adjacent one end of said member and in electrical circuit with said heating unit, a retaining device and a fuse cover substantially enclosing said fusible element, the said heat conducting member being out of contact with said fusible element.

7. In a heating vessel adapted to contain a liquid, a heating unit for said vessel comprising an electrical resistance heating element secured in one wall of said vessel, a heat conducting member extending from said heating unit and having one end disposed outside of said vessel, a fusible element disposed adjacent the lower end of said member, a retaining device and a fuse cover enclosing one end of said heating unit and fuse, and means connected with the lower portion of said heat conducting member for securing the heater, fuse block and fuse cover in place.

8. In a heating vessel of the character described, a heating unit for said vessel extending through one wall thereof, a heat conducting member extending from said heating unit and having one end disposed outside of said vessel, a fusible element disposed adjacent one end of said member and in electrical circuit with said heating unit, a combination retaining device and fuse cover surrounding the lower end of said unit, said device serving also to retain said heating unit in place.

9. In a heating vessel of the character described having a bottom provided with an opening, a heating unit secured in said opening, said heating unit comprising a metallic casing in which is arranged an electrical resistance heating element, a heat conducting element extending from said heat-

ing element and adapted to be heated thereby, one end of said member projecting into said heating element and the other end of said member projecting outwardly of said heating element, and a retaining device connected with the lower end of said member and securing the parts in place.

10. In a heating vessel of the character described having a bottom wall provided with an opening, an electrical heating unit secured in said opening and comprising a metallic casing in which is arranged an electrical resistance heating element, a bolt extending axially of said heating element and adapted to be heated therefrom, the upper end of said bolt being secured to said casing and the lower end of said bolt being disposed below said heating element and a fusible element in circuit with said heating element and disposed adjacent the lower end of said bolt so as to be heated therefrom.

11. In a heating vessel of the character described having a bottom provided with an opening, a heating unit secured in said opening comprising a metallic casing in which is arranged an electrical resistance heating element, a bolt extending axially of said heating element and adapted to be heated therefrom, one end of said bolt being secured to said casing and the other end of said bolt projecting outwardly from said heating element, a fusible element in circuit with said heating element and disposed adjacent the lower end of said bolt so as to be heated therefrom and a housing substantially enclosing the fusible element, said housing being connected with said bolt and securing said heating element in place.

12. The combination with a vessel for containing a liquid to be heated, an electrical heating element projecting into the vessel, a body of metal extending out of the heating element in heat conducting relation therewith, a fusible element disposed in heat responsive relation to said body of metal for opening and closing the circuit of the heating element under predetermined conditions, a housing substantially enclosing said fusible element and serving to maintain the heating element in place.

13. In an electrically heated utensil comprising a vessel having a bottom opening, a metal cup secured in said opening, an electrical heating element disposed within said cup, a heat conducting member extending out of said heating element and having its upper end disposed adjacent the upper end of said cup and its lower end disposed outside of said vessel, a fusible element disposed adjacent the lower end of said member and in circuit with said heating element, and a combination retaining device and fuse cover surrounding the lower portion of said member and holding the parts in place.

14. In an electrical heating utensil com-

prising a vessel having a bottom opening, a metal cup secured in said opening, an electrical heating element disposed within said cup, a heat conducting member extending axially of said heating element and having its upper end disposed adjacent the upper end of said cup and its lower end disposed below the bottom of said utensil, a fusible element disposed adjacent the lower end of said member and in circuit with said heating element, and a combination retaining device and fuse cover surrounding the lower portion of said member and serving to hold the parts in place, said fuse covering being readily detachable independent of said retaining device to permit replacement of said fusible element.

15. In a heating vessel adapted to contain a liquid to be heated, a metal cup projected through one wall of said vessel, an electrical resistance heating element disposed within said cup, a fusible element in circuit with said heating element and disposed adjacent the lower end of said element, terminals for said fusible element, a fuse cover substantially surrounding said fusible element and covering the lower end of said heating element whereby to maintain a high ambient temperature immediately adjacent the fuse and to reduce radiation of heat from the fuse terminals, a heat conducting member extending axially of said heating element and having its lower end disposed adjacent but out of contact with said fusible element.

16. In a heating vessel adapted to contain a liquid to be heated, a metal cup projected through one wall of said vessel, an electrical resistance heating element disposed within said cup, a fusible element in circuit with said heating element and disposed adjacent the lower end of said member, a fuse cover substantially surrounding said fusible element and covering the lower end of said heating element whereby to maintain a high ambient temperature immediately adjacent the fuse and to reduce radiation of heat from the fuse terminals, and means for rapidly conducting the heat downwardly toward the fusible element when the liquid in the vessel falls below a predetermined level, said means comprising a heat conducting member extending axially of said heating element and having its lower end disposed adjacent but out of contact with said fusible element.

17. A fused immersion heating element comprising a metal casing and means for securing said casing to one wall of a heating vessel with a liquid tight joint, electrical heating means arranged within said casing, a heat conducting member extending axially of said casing and disposed so as to be heated thereby, a circuit breaker disposed adjacent the lower end of said member and adapted to open the electrical circuit to the heating means, a support for said vessel and means

connecting said support and said heat conducting member.

18. An immersion heating element of the character described, a metal casing and means for securing said casing to one wall of a heating vessel with a liquid tight joint, heating means arranged within said casing, a heat conducting member extending axially of said casing and disposed so as to be heated thereby, a circuit breaker disposed adjacent the lower end of said member and adapted to open the circuit to the heating means under predetermined conditions, a cover enclosing said circuit breaker whereby to maintain a high ambient temperature adjacent thereto, and means connecting said cover with said heat conducting member, said heat conducting member being out of contact with said circuit breaker.

19. An immersion heating element of the character described, a metal casing and means for securing said casing to one wall of a heating vessel with a liquid tight joint, heating means arranged within said casing, a heat conducting member extending axially of said casing and disposed so as to be heated thereby, a circuit breaker disposed adjacent the lower end of said member and adapted to open the circuit to the heating means under predetermined conditions, a combination retaining device and cover surrounding said heat conducting member and detachably secured thereto, said cover serving also to retain the heating element in place.

20. In a heating vessel, the combination of an electrical immersion heating element disposed within said vessel and having a portion projecting through one wall thereof, a heat conducting member extending axially of said heating element and having its lower end disposed outside of said vessel and adjacent the lower end of said member, a circuit breaker disposed outside of said vessel and adjacent the lower end of said heat conducting member, a cover enclosing said circuit breaker and detachably secured to said heat conducting member.

21. In a heating vessel, the combination of an electrical resistance heating element disposed within said vessel and having a portion projecting through one wall thereof, a heat conducting member extending axially of said heating element and having its outer end disposed outside of said vessel, a circuit breaker disposed outside of said vessel and adjacent but out of contact with the outer end of said heat conducting member, means disposed between said heating element and circuit breaker to protect the circuit breaker from the direct heat of the heating element and a cover enclosing said circuit breaker and protecting the same from the outside air.

22. In a heating vessel, the combination of an electrical resistance heating element disposed within said vessel and having a portion

projecting through one wall thereof, a heat conducting member extending axially of said heating element and having its outer end disposed outside of said vessel, a circuit breaker disposed outside of said vessel and adjacent the outer end of said heat conducting member, means forming a housing substantially enclosing said circuit breaker and isolating the same from said heating element as well as from the outside air, said heat conducting member extending into said housing.

23. In a heating vessel adapted to contain a liquid to be heated, a metal cup projecting through one wall of said vessel, an electrical resistance heating element disposed within said cup, a fuse block disposed outside of said vessel and adjacent one end of said cup, fuse terminals carried by said fuse block and extending into said cup, a fuse connected with said fuse terminals, said fuse terminals serving to conduct the heat from said element outwardly toward said fuse.

24. In a heating vessel adapted to contain a liquid to be heated, a metal cup projecting through one wall of said vessel, an electrical resistance heating element disposed within said cup, a fuse block disposed outside of said vessel and adjacent one end of said cup, fuse terminals carried by said fuse block and extending into said cup, a fuse connected with said fuse terminals, said fuse terminals serving to conduct the heat from said element outwardly toward said fuse, and a cover substantially enclosing said fuse and serving to maintain a relatively high ambient temperature adjacent said fuse.

25. A fused immersion heater adapted to be mounted in a vessel and containing an electrical resistance heating element, a fuse block disposed adjacent the lower end of said heater, a fuse carried by said fuse block and disposed outside of said heater, a pair of fuse terminals extending into said heater and having their lower ends disposed outside of said heater and to which said fuse is connected, said fuse terminals serving to conduct the heat downwardly toward said fuse.

In testimony whereof, I hereunto affix my signature.

EDWIN L. WIEGAND.