

May 9, 1967

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3,319,048

ELECTRICALLY HEATED CONTAINER

Filed Aug. 28, 1964

2 Sheets-Sheet 1

FIG. 1

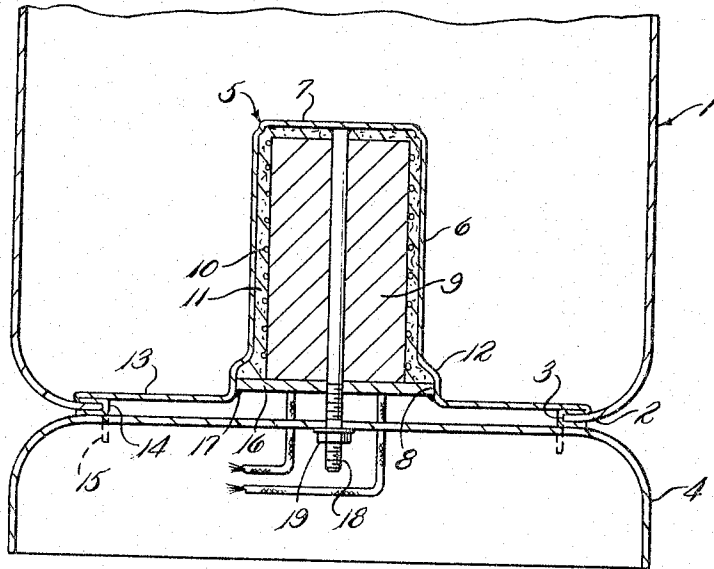
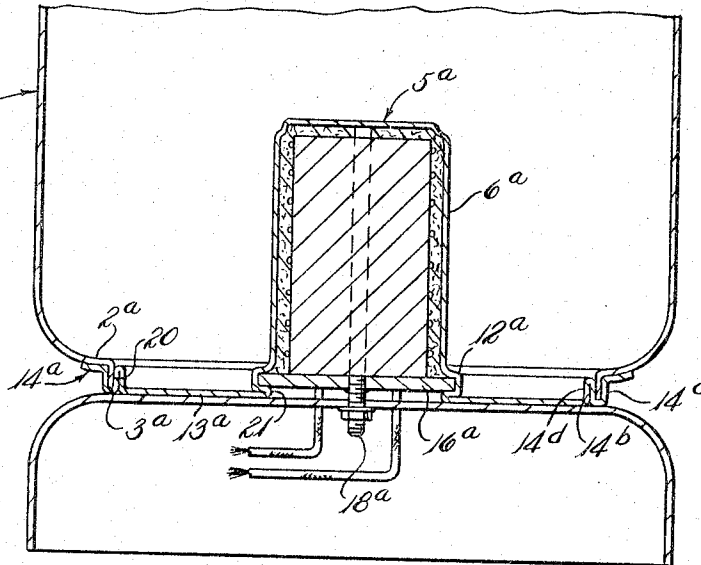


FIG. 2



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FIG. 3

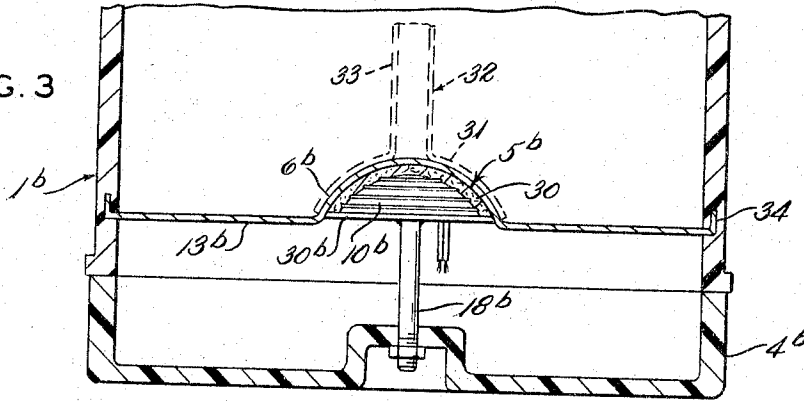


FIG. 4

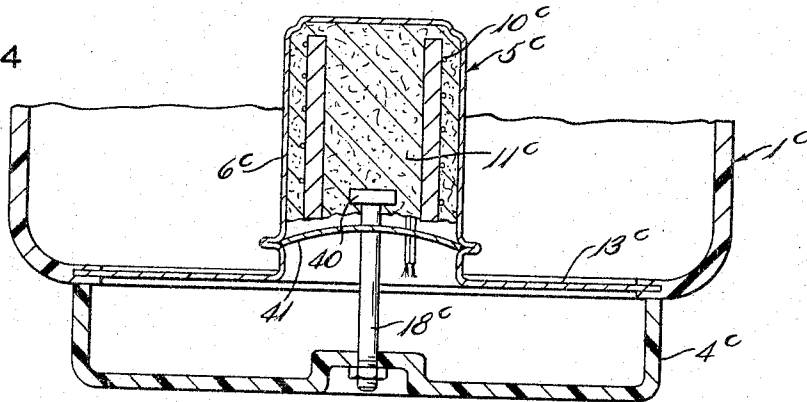
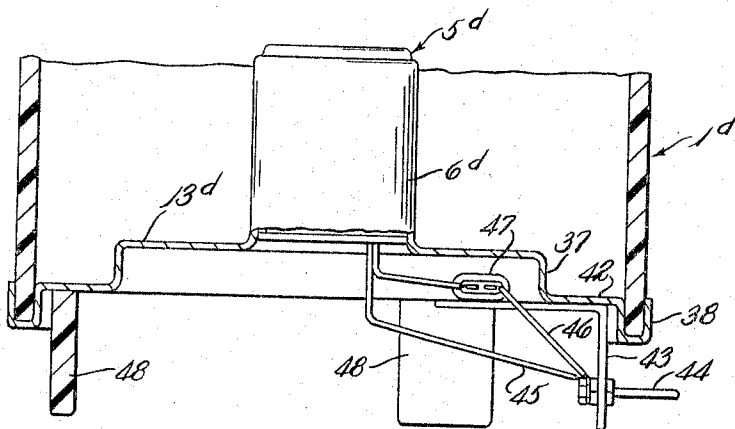


FIG. 5



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1

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ELECTRICALLY HEATED CONTAINER

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2 Claims. (Cl. 219-441)

The present invention relates to electric heaters, and especially to a novel and improved electric heater having a support plate formed as a unit with a metal enclosure in which electrical resistance means for the heater are enclosed.

Heretofore in the production of electrical heaters of the general type to which the present invention relates, normally an electric resistance wire coil is wound upon a suitable core that in turn is positioned within a metal case having one closed end and one open end. Suitable embedment means, which may be produced as described in United States Letters Patent No. 3,050,833 then may be formed around the resistance wire and its core to embed the resistance wire therein and secure the wire and its core in the metal case. The unit then has known types of closure means applied to the open end of the case and affixed thereto, which closure means usually include a positioning stud for the electric heater.

These electric heaters of the type to which the present invention relates have had a number of uses, a principal one being that in electric coffee percolators, water heaters and the like. In these percolators, heretofore, the percolator container has usually been made from a metal shell and the electric heater has been secured to the base portion of the container, being connected to power supply means through terminal means provided in a base affixed to the container. Recently synthetic resin plastics have been used in making the containers for the liquids to be processed in the appliance. Naturally the appliance must be very safe to use. In order to insure safe operation of the heater means in a plastic container, one method has been to insulate such heater means from the plastic container, as by a special support plate. However, the production and assembly of the support plates and heater means so as to position them operatively in containers are relatively costly operations.

It therefore is the general object of the present invention to provide a novel and improved heater means characterized by the provision of an integral support plate or end flange formed integrally with a metal plate forming the heater enclosure means.

Another object of the invention is to provide a relatively inexpensive, sturdy, but improved electrical heater and support plate unit having desirable operating and service life characteristics, which unit has only one seal required in its attachment to a container.

A further object of the invention is to provide a new and improved unit of a heater means and positioning flange, or plate therefor where the unit is made from a minimum number of parts that can be made from a material having low heat conductivity properties to assist in insulating a container from heat generated in the electric heater means operatively positioned therein.

Other objects of the invention are to provide a novel and improved heater means including a metal case having a radially outwardly extending a support plate or flange formed at an open end of the case; to provide a novel positioning stud for use with an electrical heater to extend from the initially open end thereof for engaging positioning means; to provide a continuous means on a peripheral portion of a base positioning plate for an electric heater case by which the heater unit can be secured to the container to form an enclosure therewith; to provide a novel heater support plate and base means in a liquid heating

2

appliance; to form an electrical heating appliance from fewer parts than prior types of similar appliances; and to eliminate one usual area requiring sealing in a liquid heating appliance.

The above and other objects and advantages of the invention will be made more apparent as the specification proceeds.

Attention now is particularly directed to the accompanying drawings, where:

FIG. 1 is a fragmentary vertical section through an integral electrical heater and support base unit embodying the principles of the invention, showing it in association with a portion of an appliance, such as an electric percolator;

FIG. 2 is a fragmentary vertical section, similar to FIG. 1, of a modified heater unit in operative engagement with a container;

FIG. 3 is a fragmentary vertical section through a heater means and a liquid heating appliance combination forming a modification of the invention and wherein a heat pump unit is indicated diagrammatically as operatively positioned therein;

FIG. 4 is a fragmentary vertical section of a further modification of the invention showing another combination of the heater means and a container and a support portion or base therefor; and

FIG. 5 is a further fragmentary vertical section through a combination of a heater unit embodying the principles of the invention and associated container and support means.

When referring to corresponding members shown in the drawings and referred to in the specification, corresponding numerals are used to facilitate comparison therebetween.

The general object of the present invention, as one embodiment thereof, relates to the provision of an electric heater means that comprises an electric resistance means, a metal case in which the resistance means is operatively positioned, which case has a closed end and an open end, the metal case also having a radially outwardly extending support flange formed as a unit therewith at the open end thereof whereby the electric heater means can be operatively attached to a container by the integral flange of the heater case.

Reference now is particularly directed to the details of the structure shown in the accompanying drawings, and a portion of a container 1 is shown. This container 1 may be made from known materials, such as aluminum, or other metals, but it is also contemplated that the container 1 could be made from attractive plastic materials of the synthetic resin type, such as melamine, or polypropylene. In all events, the container 1 has a bottom wall 2 which has an aperture 3 formed therein. The container 1 normally would be a portion of an appliance, such as an electric coffee percolator, although the appliance 1 could be used for water heating actions, or for making cocoa, tea, instant coffee, or other drinks, as desired.

The container 1 is shown as having a base 4 operatively secured thereto and any conventional power supply terminals or means may be associated with the base 4 to supply electrical energy to the components within the container, as hereinafter described.

It is an important feature of the invention that a novel and improved electric heater 5 is provided for positioning within and completing the container 1. Such electric heater includes a metal case 6 that usually is of generally cylindrical shape and which has an initially closed end 7 and an open end 8.

FIG. 1 of the drawings shows that a suitable insulating core 9 is provided on which a wire coil resistance unit 10 is carried. The core 9 may be solid or of hollow, tubular

3

shape, as desired, and the coil 10 is secured in position on the core 9, as by a conventional embedment 11 that is formed between the periphery of the coil 10 and the inner surface of the metal case 6 to hold the coil 10 in position and secure the core and coil in operative engagement with the metal case. The metal case 6 preferably has a radially outwardly extending shoulder 12 provided therein adjacent its open end 8 to form a larger diameter at the open end than at the closed end of this metal case 6. The lower end of the metal case 6 has a positioning flange, or plate 13 formed as a unit therewith from the same metal plate or blank as the case. This positioning flange, or plate 13, extends generally radially outwardly from the metal case 6 at the open end 8 thereof, and radially overlaps the bottom 2 of the container 1 to be sealed in engagement therewith, as hereinafter described. The positioning flange is of generally flat annular or other continuous shape adjacent the metal case 6 and it normally would extend out substantially radially a distance at least equal to the radius of the metal case 6. The positioning flange 13 is provided with means formed as a unit therewith to attach it to the container, which means, for example, comprise a generally U-shape in section peripheral or edge flange 14. FIG. 1 of the drawings shows that the edge flange 14 is positioned so that the open portion in the U-shaped section thereof faces radially outwardly, and with the longitudinal axis of the edge flange lying in a horizontal plane in the normal positioning of the heater unit 5. Such edge flange 14 is positioned to be doubled back on and lie under the adjacent surface of the positioning flange 13. FIG. 1 of the drawings indicates how this edge flange 14 may include an initially downwardly extending section 15 as indicated in dotted lines so that the electric heater unit 5 could be assembled, for example, from the top of the container to be brought down into engagement with the bottom wall 2 of the container and then have the downwardly extending section 15 of the positioning flange turned over to the position shown by a metal working or forming action where it is in compressive engagement with the margins of the container bottom 2 adjacent the aperture 3 therein. Any suitable sealing means, gaskets, or cement, can be associated with the edge flange 14 on one or both surfaces of the bottom wall 2 to facilitate obtaining a good, sealed engagement therewith.

The electric heater unit 5 may be completed by means of an end disc 16 that is secured across and covers the initially open end 8 of the metal case 6, as by being cemented or welded in position at 17. A stud 18 extends axially of the metal case 6 and it is secured, as by welding, to the closed end thereof to extend the length of the metal case 6 and protrude therebelow for support action for the electric heater unit. The drawings also show that a lock nut 19 may engage the lower end of the stud 18 to secure the base 4 thereto whereby the electric heater unit 5 and container means are operatively associated and the container 1 is secured to its base 4.

It should be realized that the base 4 for the container can be made from any suitable means, and that the metal case 6 can be made from any known metal. However, it is particularly desirable to form the metal case 6 from a material having low heat conductivity so that the positioning flange 13 thus acts as an insulator means to insulate the container 1 from the relatively large amounts of heat generated in the electric heater 5. Stainless steel is one very satisfactory material from which the metal case 6 can be formed, and it will give a good service life for an electric heater having any conventional range of power capacities therein, such as from 400 to 1000 or more watts. In use, normally the positioning flange 13 would be covered by the liquid contents of the container, but it also must protect the container from excessive temperatures under "dry run" abuse conditions. Further insulation between the container 1 and metal case 6 can

4

be provided, as by gaskets inserted between the edge flange 14 and the bottom wall 2 of the container.

It should be realized that the end disc 16 for the heater unit can be made from ceramic material, or other suitable materials, including metals, as desired.

In the unit shown in FIG. 2, a container 1a is shown that has a bottom wall 2a provided therein with a downwardly extending flange 20 formed thereon outlining an aperture 3a in the bottom portion of the container 1a.

The drawing also shows an electric heater unit 5a of generally the same construction as that described hereinbefore. However, in this instance, the metal case 6a may have a relatively sharply defined shoulder 12a formed thereon adjacent its lower end to provide a seat for an end disc 16a at the initially open or lower end of the metal case 6a. The end disc 16a is then held in place by means of a turned in rib 21 formed on a positioning flange 13a that is a unit with (formed from) the metal sheet forming the metal case 6a. In this embodiment of the invention, a stud 18a may be secured to the closed end of the metal case 6a, as indicated by dotted lines in the drawing, or it can be formed on or secured to the end disc 16a, as shown.

The container 1a is secured to the electric heater 5a in a slightly different manner, as in this instance by a continuous generally vertically extending upwardly open annular channel or edge or peripheral flange 14a of U-shape in vertical section formed on the positioning plate or flange 13a provided on the electrical heater unit. Here again, any suitable compressive, or metal working forces can be applied to the different walls 14b and 14c defining the vertically extending channel or edge flange 14a used to engage opposite surfaces of the annular flange 20 of the container. In this instance, the edge flange 14a is shown as extending vertically upwardly of a flat plane in which the major portion of the positioning flange 13a occupies so that a vertically upstanding wall 14d is provided on the positioning flange 13a to connect the edge flange and positioning flange. However, if desired, such edge flange 14a could be moved down to extend downwardly from the plane of the primary portion of the positioning flange 13a and in such instance, the upstanding wall 14d or one equivalent thereto, would not be required in the structure. In all events, a new and improved electric heater unit 5a has been provided and it is attached to the container by novel, improved unitary means of the electric heater unit.

It should be realized that any type of terminal or connector means may be provided in the containers 1 and 1a for supply of electrical energy thereto, and that the power supply leads connecting to the electric heater means, or units 5 and 5a can be sealed in engagement therewith, if desired, in any conventional manner. Likewise, the thermostats or other thermal controls used in association with the heater means and containers of the invention can be of any desired construction and can be associated with and connected to the electric resistance heating means by known circuits for conventional control actions in their power circuits.

The plastic means used for forming the containers in the appliances of the invention can be of either the thermoplastic or thermosetting types, as long as the plastic is sufficiently heat resistant for the contemplated liquid heating actions.

It is important that a continuous insulating section, usually flat, be provided in the positioning flanges for the electric heaters in the portions thereof immediately adjacent the metal cases of the electric heater units. It should be realized that the positioning flanges provided for the electric heater units of the invention normally will extend generally outwardly therefrom a distance at least equal to the radius of the metal heater case 6 to aid in the insulating action of the positioning flange, but in some instances, it may be desirable to have a radially shorter positioning flange provided, such as for a con-

5

tainer having a small liquid capacity, or a small base area and using a small wattage heater. However, in all events, the positioning or support plate or flange for the electric heater unit would have the continuous engaging means provided from the same metal sheet as the heater case for attaching the electrical heater unit to the container. These positioning flanges are secured to the walls of the containers 1 and 1a by turning over, rolling or compressing edge flange portions of these peripheral sections so that a good compressive engagement is obtained between the container and the positioning flange or plate for the heater unit. The flange radial length depends on the composition of the metal, the heater wattage, and the composition of the containers.

The containers 1 and 1a, or the like, can be reinforced adjacent the aperture formed therein with which the electric heater positioning flange is engaged.

It particularly should be realized that the thermostat means normally used in association with the electrical heater can have any conventional construction and circuit control action and be of the pulsating or non-pulsating type, as desired, and that they can be positioned in any conventional manner in association with the electrical heater means, or its positioning flange.

Suitable insulation means may be positioned within the metal cases 6 and 6a, on the axially inner faces of the end discs 16 and 16a, when desired. The initially open end of the metal cases 6 and 6a can be sealed or closed in any known manner and the studs 18 and 18a may be omitted if not needed to attach a support base to the container, or an end disc to the metal case.

In FIG. 3, a modified container 1b is shown that has a suitable electric heater unit 5b provided therein. In this instance, the metal enclosure or case, comprises a substantially semi-spherical upwardly extending portion or case 6b formed in a metal plate that has a flange or plate section 13b formed therein. In this instance, the case 6b receives a conventional electric heater 10b therein that may be a coil formed from any suitable electric resistance material which coil can preferably be embedded in a mass or block of insulating material 30 and which may be carried on a suitable insulating form, if desired. The insulating material 30 may be suitably operatively secured to the lower or inner surface of the case 6b to be operatively associated therewith, as by an end plate 30b secured to the case 6b. In this instance, a conventional heat pump means, or percolating device, is shown associated with the heater 5b and in this instance, a substantially semispherical base 31 is formed on a heat pump 32 and it has a vertically extending tubular section 33 extending upwardly therefrom whereby water can flow in under the base 31 and be heated by direct heat flow from the case 6b and cause water to move up through the vertically extending tube 33 for coffee percolating action at the upper end of the tube 33, or for other action as desired. It should be realized that the base portion 31 of the heat pump will be spaced slightly from the associated surface of the metal heater case 6b, as by forming ribs or small protuberances on the inner surface of the base 31 to facilitate water flow between these associated members. By forming a substantially convex semi-spherical outer surface on the metal case 6b, no close tolerances need be set up between the shape of this case and the base 31 of the heat pump associated therewith as it is desired that some freedom of movement, and no close tolerances of size with relation to these two parts be provided in the apparatus of the invention. Usually the lower edges of this base 31 for the heat pump will extend substantially down to the substantially horizontally directed flange or plate portion 13b of the case 6b to facilitate operatively positioning this heat pump unit in the appliance of the invention.

FIG. 3 of the drawings also shows that the flange of plate 13b can have an upwardly extending end flange 34 formed thereon, if desired, and this end flange can be

6

embedded in the wall of the container 1 adjacent the bottom aperture formed therein, as such unit is molded. In all events, the peripheral portion of the flange or plate 13b is in suitable sealed engagement with the container 1b, and then any desired base means 4b can be provided for the container and be suitably secured thereto. In this instance, a stud 18b is shown operatively secured to and extending downwardly from the end plate 30b and such stud in turn then has the base 4b secured thereto.

A heater 5c is shown in FIG. 4 of the drawings, which heater can be completely filled with an embedment material 11c to position the heater coil 10c and its support case properly in position. It is also a feature of the invention that the embedment 11c may have a head 40 of a stud 18c embedded therein and extending downwardly therefrom. Such stud can be used to attach a desired base 4c to the remainder of the appliance of the invention. In this instance, again it will be noted that a container 1c may have the peripheral portion of a flange or plate section 13c of a unitary metal sheet from which the case 6c for the heater 5c is formed suitably sealed into engagement with the container, as by molding the two into engagement when the container is initially produced. In this embodiment of the invention, a resilient metal plate 41 is shown in spring or resilient engagement with a groove formed on the inner wall surface of the heater case 6c, in accordance with an invention disclosed in more detail in Mr. Rudolph Himelsbaugh's co-pending patent application Ser. No. 358,821 filed April 10, 1964. Any suitable power supply leads and control means can be connected in the power supply circuit for the electric heater 5c through one or more holes, or openings, in the plate. The stud 18c also extends through a suitable opening in the plate 41.

FIG. 5 of the drawings shows a novel combination of the invention utilizing a novel and improved heater unit 5d of the invention. In this instance, the heater unit engages a container 1d that is made from a suitable plastic material and the heater unit has a generally radially extending support plate or flange 13d that again is formed from the same metal blank or sheet of metallic material as is the case 6d of the heater unit or means.

In this embodiment of the invention, the flange 13d is shown as having a shoulder 37 formed therein that is axially outwardly facing with relation to the heater case 6d, or that extends downwardly of the case in the normal positioning of the heater unit in a container. A suitable groove or peripheral channel 38 is provided at the periphery of the plate 13d so that the lower end of the container 1d can be received therein and be sealed in engagement therewith by a suitable heat sealing, or metal working or deforming action, or by a cementing action, as desired.

The axially outwardly positioned section in the flange 13d forms a continuous peripheral portion 42 that is substantially horizontally extending and that has a suitable conventional terminal member 43 secured thereto, as by welding. This terminal member 43 has conventional prongs 44 thereon by which a power supply unit can be engaged therewith when desired. The terminal unit 43 has leads 45 and 46 that connect a thermostat 47 in series with the heater coil of the heater unit for controlled heating action thereof as conventional in appliances of this general type. The thermostat 47 is suitably secured to a horizontally extending part of the terminal or connector member 43.

As another feature of the invention, the container 1 is supported on a plurality of short support legs or blocks 48 that can be made from plastic or other suitable insulating material, which insulating blocks then can be secured, as by cementing them to the lower surface of the portion 42 of the metal plate to provide a relatively inexpensive but sturdy support for the container and to form a novel and improved unit therefrom.

7

From the foregoing, it is submitted that a new and improved heater unit has been created by the present invention and this heater unit particularly is adapted for use with new and improved containers having lower resistance to elevated temperatures than prior types of metal containers. It is important that the heater unit has a support and insulating plate made from the means forming the metal case so that the electric heater means can be readily secured to an electric appliance, or the like, by a minimum number of parts and sealed connections to form a long service life connection therebetween. Hence, it is believed that the objects of the invention have been achieved.

While several complete embodiments of the invention have been disclosed herein, it will be appreciated that modification of these particular embodiments of the invention may be resorted to without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. In combination, a container having an opening in a lower portion thereof, and an electric heater means comprising
 - a wire coil electrical resistance means,
 - a metal case in which said resistance means is received, said case having a closed upper end, means securing said resistance means within said metal case,
 - said metal case having a generally horizontal, radially outwardly extending flange operatively secured thereto,
 - said flange having upwardly open continuous means formed at a peripheral portion thereof engaging said container to close said opening and to position said heater means within said container, and

8

a plate-like mounting bracket secured to the lower surface of said flange and protruding axially beyond said flange,
 a thermostat carried by said bracket in good heat exchange relation to said flange,
 terminal means carried by said bracket,
 wire means connecting said terminal means in series with said heater means and said thermostat, and
 support means for said container operatively secured to the lower portion thereof and protruding axially beyond said bracket.

2. A combination as in claim 1 where said thermostat has a metal case which is abutted against a portion of said bracket, which bracket is made of metal.

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