

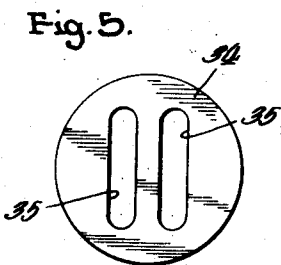
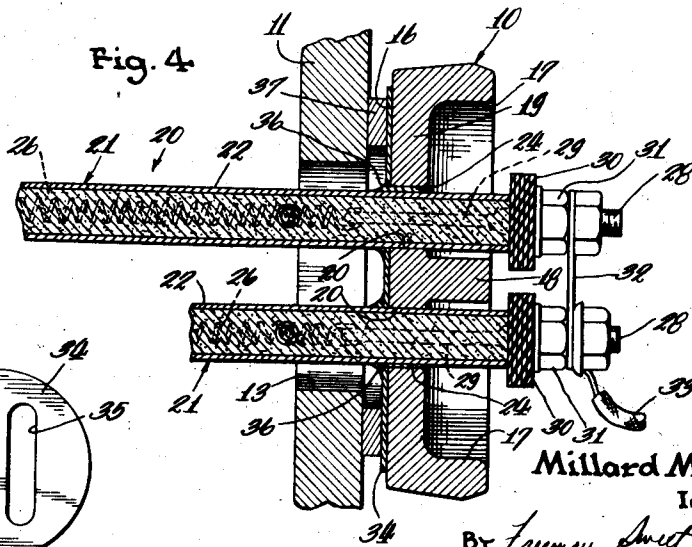
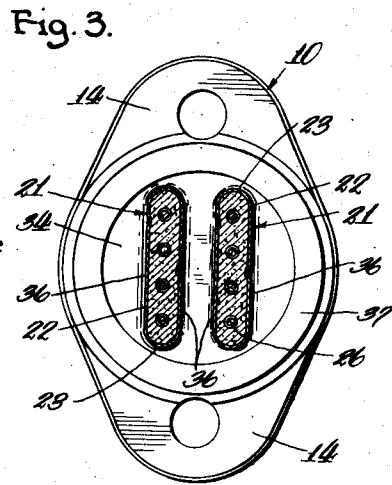
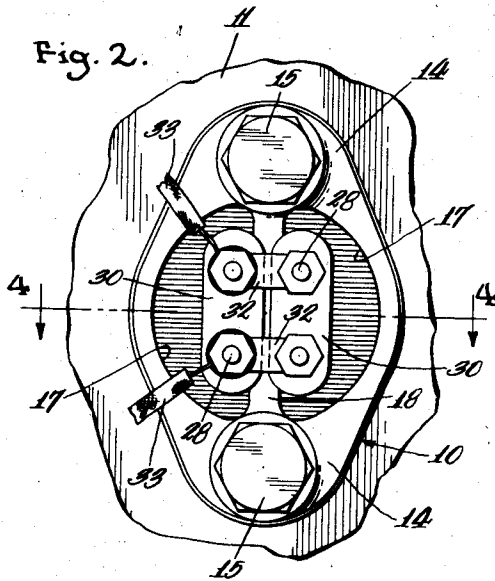
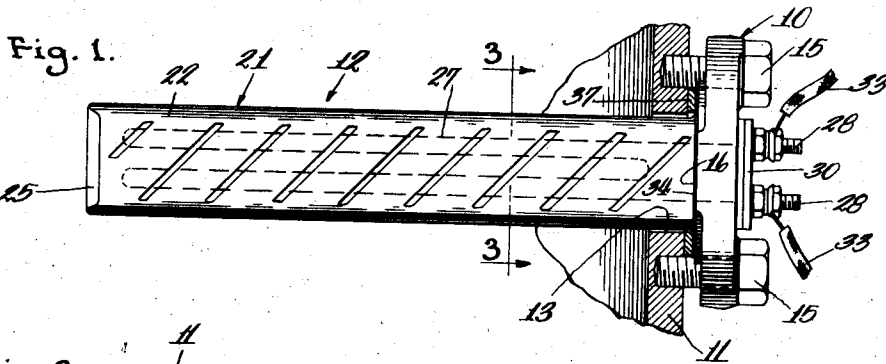
Feb. 24, 1942.

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2,274,445

HEATING MEANS

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2,274,445

HEATING MEANS

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This invention relates to heating means, more particularly to electrical resistance heating means of the immersion type, and the principal object of this invention is to provide new and improved heating means of the character described.

In the drawing accompanying this specification and forming a part of this application, there is shown, for purposes of illustration, an embodiment which the invention may assume, and in this drawing:

Figure 1 is an elevational view of the embodiment illustrating the invention, as applied to a container, the latter being in section and fragmentarily shown,

Figure 2 is an enlarged plan view of the embodiment, as viewed from the right hand side of Figure 1,

Figure 3 is an enlarged sectional view corresponding substantially to the line 3—3 of Figure 1, the container and fastening means being omitted,

Figure 4 is an enlarged fragmentary sectional view corresponding generally to the line 4—4 of Figure 2, and

Figure 5 is a plan view of a detail.

The embodiment of the invention herein disclosed comprises a body 10, adapted to be secured to the wall of a container 11, such, for instance, as a hot water tank. Heater means 12 is carried by the body 10 and extends interiorly of the container 11 through an opening 13 formed in the container wall.

The body 10, in the embodiment herein shown, is in the form of an oval-shaped disk, the extreme portions along the major axis of the oval forming ears 14 which are apertured to receive fastening means, such as the bolts 15. As shown in the drawing, the heads of the bolts 15 bear against the outward positioned surface of the body 10, and the threaded bolt shanks pass through the apertures of the ears 14 and are received within screw-threaded apertures formed in the wall of the container 11. It will be appreciated that in cases where the wall of the container is relatively thin in cross-section, and it is not feasible to hold the body 10 to the container 11 in the manner herein disclosed, other methods may be used. For example, the wall may be formed with screw-threaded bosses, or nuts may be threaded on the interior ends of the bolts 15. Also, in some instances, instead of the ears or other fastening means mentioned, the body 10 is formed with a screw-threaded plug which fits in a screw-threaded recess in the container to hold the body 10 and heater means 12 in position, and it is within the scope of this invention to employ such means, or any other means, for holding the body 10 positioned adjacent the opening in the container.

As shown in the drawing, one surface 16 of the body 10 is relatively flat and shaped round in plan view, and off-set slightly with respect to the ears 14. The opposite surface of the body 10 is formed with a pair of substantially semi-circular shaped recesses 17 separated by a web 18 extending diametrically along the major axis of the oval-shaped body 10. The bottom 19 of each recess 17 is formed with an opening 20, the openings in this particular case being slot-like in shape, for a purpose hereinafter to appear.

The heater means 12, in this particular embodiment, comprises a pair of heating blades 21 of the electrical resistance type, each including a tubular metallic sheath 22, flat and thin in cross-section, the narrow edges being rounded as shown at 23 to correspond to the contour of the openings 20 in the body 10, although the latter openings are preferably slightly larger in size than the cross-sectional outline of the sheath 22. However, the narrow edges of the blades 21 may be, for example, square, and the openings 20 of corresponding contour, if desired.

As best shown in Figure 4, one end of each sheath 22 extends sufficiently through a respective opening 20 so that this end is accessible from the recessed surface of the body 10, while the other end of each sheath 22 extends from the flat surface 16 and inwardly of the container, the amount of extent in this direction depending upon the particular requirements of the heater means.

It is to be understood that the particular construction herein described is only for the purpose of illustrating the invention, and that the number of blades, and the size and shape of each blade may be varied. For instance, only one blade or any other number of blades may be used, and each or any blade may be round or of any other shape in cross-section, the body 10, the openings therein, and the other parts of the heating means in such instances being preferably formed to produce a corresponding construction.

Each of the sheaths 22 is fixed securely within the respective opening 20, and as herein shown is preferably welded in position to secure a connection having considerable mechanical strength. As a matter of practical construction, one flat surface of a sheath 22 is held against a corresponding surface of a respective opening 20, and the opposite flat surface is welded to its corresponding opening surface, as shown at 24, thus making the blades 21 structurally integral with the body 10. As shown in this particular embodiment, each sheath 22 has a continuous cross-section, and the end of the sheath 22 adjacent the body 10 is open, whereas the opposite end is sealed closed, as shown at 25, preferably by pressing the metal of one flat surface down-

wardly onto the metal of the other flat surface.

Each of the heating blades 21 also comprises an electrical resistor disposed within but insulated from the respective sheath 22. For purposes of illustration, the resistor herein shown is in the form of a helical coil 26, insulated from the sheath by suitable insulating material, and extending lengthwise of the respective sheath 22, in the manner suggested by the dotted line 27 in Figure 1, so that the ends of the resistor 26 terminate adjacent the open end of the sheath 22, and these ends of the resistor are secured to terminals for electrical connection purposes. The terminals, in this particular case, are formed from a cylindrical rod, having a round threaded end 28 extending from the open end of the sheath 22, and a flattened portion 29 extending into the open end of the sheath 22. A pair of terminals is provided for each blade 21, each being connected to a respective end of the resistor 26.

The insulating material is preferably in the form of suitable granular, comminuted, or powdered refractory material, desirably compacted to a dense hard condition, thus suitably holding the resistor 26 in spaced relation with respect to the interior surface of the sheath 22, as well as holding the flattened portion 29 of the terminals against displacement. Elongated mica insulating washers 30 straddle the spaced terminals of respective heating blades 21, and these washers are held in place by clamp nuts 31 received on the threaded ends 28 of the terminals. In this particular embodiment, the terminal of one blade 21 is connected to the terminal of another blade 21 by means of jumper straps 32, so that the resistors of the heating blades may be energized in parallel relationship. For the purpose of energizing the resistors, conductors 33 may lead from certain terminals, either directly to a source of electrical current or to such source through suitable switching mechanism.

It will be appreciated that through proper arrangement and connection of the jumper straps 32 and conductors 33, one of the blades 21 may be energized independently of the other, or the resistors of the blades 21 may be connected in series relationship. Such change, it will be clear, may also be accomplished by omitting the jumper straps 32 and suitably electrically connecting the heating blades to a source of current by means of an electrical switch designed to selectively operate one or the other, or both of the heating blades in the manner just described.

Means is provided for shielding that surface of the body adjacent the container opening from contact with substance in the container, and as herein shown, this means comprises a disk-like plate 34 having a pair of openings 35, each being of a shape substantially corresponding to the cross-sectional outline of a sheath 22, the openings 35 being spaced apart to correspond to the spacing of the heating blades 21. The disk 34 is slipped over the free ends of the blades 21, and is positioned to abut the flat surface 16 of the body 10. Those surfaces margining the openings 35 in the disk 34 are secured in fluid-tight relation to the adjacent surfaces of the respective sheaths 22, and in this particular embodiment, such surfaces are preferably welded together, as shown at 36, the weld extending completely around each of the sheaths 22, as suggested by the shade lines in Figure 3, thus forming a mechanically strong fluid-tight joint between the disk 34 and the respective sheaths

22. A gasket 37 is preferably disposed between the disk 34 and the adjacent surface of the wall of the container 11, the disk 34 providing a perfect gasket face.

With the parts assembled, as best shown in Figures 1 and 4, it will be seen that the interior of the sheaths and the body 10 are entirely shielded from contact with the substance within the container 11. Thus, the body 10 may be made of a low-cost material having a high tensional strength, and it has been found preferable to form the body 10 of a steel forging, since a body thus formed will withstand stresses set up during manufacture and assembly of the article with the container. A body thus formed will not deflect from its shape when the bolts 15 are drawn tightly up during assembly of the article with the container 11, and therefore a perfect fluid-tight connection with the container is always possible, no matter how many times the completed article is assembled or disassembled with respect to the container, and no matter how careless a workman may be in drawing up on the bolts 15.

The heating means, speaking of the completed article, is constructed of such material that those surfaces which are in contact with the substance in the container are substantially chemically inactive, thus preventing chemical reaction between such surfaces and the substance in the container, and consequently preventing deterioration, such as corrosion, and subsequent destruction of such surfaces, as well as preventing contamination of the substance within the container. One of the uses for the article forming this invention is in heating water for domestic and industrial use, and the importance of uncontaminated water for such use will be apparent. In the embodiment herein shown, it has been found practical to form the sheaths 22, as well as the disk 34, of copper, since this material is relatively low in cost, lends itself well to manufacturing operations, and possesses the chemically inactive qualities desired.

From the foregoing it will be apparent to those skilled in the art that I have accomplished at least the principal object of my invention, and it also will be apparent to those skilled in the art that the embodiment herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the herein disclosed embodiment is illustrative only, and that my invention is not limited thereto.

I claim:

1. Heating means, comprising: a forged steel body, constructed for connection to a support; heating element means, comprising a copper sheath welded to said body, and electrical resistor means disposed within said sheath; and a copper member, welded transversely about said sheath adjacent meeting surfaces of said sheath and said body, and so constructed and arranged that said member overlies at least part of the surface of said body.

2. Heating means of the immersion type, adapted for heating substance within a container, comprising: a forged steel body, having opposite surfaces, at least one being substantially flat, said body having an opening extending from one surface to the other, and having also spaced ears adapted to receive means for securing said body to the exterior surface of the container; an elec-

tric-resistance heating element, comprising a copper sheath and an electrical resistor disposed within said sheath, one end of said sheath being disposed through said body opening and having resistor terminals accessible from that surface opposite said relatively flat surface, said sheath being welded in position in said opening, and having its opposite end extending from said relatively flat surface and sealed in fluid-tight relation; and a copper disk, having an opening of such size that it may be slid along said opposite end of said sheath to position abutting said relatively flat surface, said disk having its surface margining the opening therein welded to the adjacent surface of said sheath, forming a fluid-tight connection therebetween, and said disk being of such size that it shields that portion of said relatively flat surface adjacent the container opening against chemical reaction with the substance within the container.

3. Heating means, for heating substance within a container, comprising: a body, connectable to the container, and when so connected having a surface adapted to overlie the opening into the container and the exterior surface of the container surrounding the container opening; means, carried by said body, and comprising sheath means extending through the container opening and into the container when said body is connected to the container, and shield means constructed and arranged to overlie said body surface and shield said body surface from contact with substance in the container, said shield means providing a gasket surface between which and the adjacent exterior surface of the container a gasket may be positioned to prevent leakage from the container opening.

4. Heating means, for heating substance within a container, comprising: a body, having a surface adapted to overlie the opening into the container; sheathed electric heating means, carried by said body, and adapted to extend through the container opening and into the container; and shield means, adapted to be interposed between said body surface and the adjacent surface of the container margining the container opening, so constructed and arranged that said body surface is shielded against exposure to substance within the container.

5. Heating means, for heating substance within a container, comprising: a body, formed of material having substantial structural strength but subject to deleterious reaction with substance within the container, said body having a surface adapted to overlie the opening into the container; sheathed electric heating means, carried by said body, and adapted to extend through the container opening and into the container, the surface of said sheathed electric heating means to be exposed to the substance within the container being substantially inactive with respect to such substance; and shield means, overlying said body surface, the surface of which to be exposed to such substance also being substantially inactive with respect to such substance; whereby said shield means shields said body surface from exposure to such substance within the container.

6. Heating means, for heating substance with-

in a container, comprising: a body, formed of material having substantial structural strength but subject to deleterious reaction with substance within the container, said body having a surface adapted to overlie the opening into the container; sheathed electric heating means, having a fused-metal connection with said body, and adapted to extend through the container opening and into the container, the surface of said sheathed electric heating means to be exposed to the substance within the container being substantially inactive with respect to such substance; and shield means, overlying said body surface, the surface of which to be exposed to such substance also being substantially inactive with respect to such substance, said shield means surrounding a transverse section of said sheathed electric heating means, and having a fluid-tight fused-metal connection therewith; whereby said shield means shields said body surface from exposure to such substance within the container.

7. Heating means, for heating substance within a container, comprising: a body, formed of material having substantial structural strength but subject to deleterious reaction with substance within the container, said body having a surface adapted to overlie the opening into the container; sheathed electric heating means, having one end connected to said body, and extending from said body, through the container opening, and into the container when said body is in position with respect to the container, and having the opposite end closed in fluid-tight relation, the terminals of said sheathed electric heating means being accessible from said one end of said sheathed electric heating means, and the surface of said sheathed electric heating means to be exposed to the substance within the container being substantially inactive with respect to such substance; and shield means, overlying said body surface, the surface of which to be exposed to such substance also is substantially inactive with respect to such substance; whereby said shield means shields said body surface from exposure to such substance within the container.

8. Heating means, for heating substance within a container, comprising: a body, formed of material having substantial structural strength but subject to deleterious reaction with substance within the container, said body having a surface adapted to overlie the opening into the container; sheathed electric heating means, carried by said body, and adapted to extend through the container opening and into the container, the surface of said sheathed electric heating means to be exposed to the substance within the container being substantially inactive with respect to such substance; and shield means, overlying said body surface, and having opening means receiving a transverse portion of said sheathed electric heating means, that surface of said shield means which is to be exposed to such substance also being substantially inactive with respect to such substance; and a fluid-tight joint between the surface defining said opening means and the adjacent transverse surface of said sheathed electric heating means; whereby said shield means shields said body surface from exposure to such substance within the container.

MILLARD M. GREER,

DISCLAIMER

2,274,445.—*Millard M. Greer*, Carnegie, Pa. HEATING MEANS. Patent dated Feb. 24, 1942. Disclaimer filed Sept. 16, 1947, by the assignee, *Edwin L. Wiegand Company*.

Hereby enters this disclaimer of:

So much of claim 3 of said patent as may cover any heating means in which the body is not provided with one or more openings therethrough within the periphery of the container opening, or in which the means carried by said body is not an embedded-resistor electric heating element, or in which said embedded-resistor electric heating element does not comprise sheath means extending through said one or more openings in said body and the container opening and into the container when said body is connected to the container, a resistor within said sheath means, terminal means for said resistor accessible exteriorly of said body, and refractory heat-conducting electrical-insulating material embedding said resistor, generally filling the space within said sheath means, and serving both to insulate said resistor electrically and to conduct the heat from said resistor to said sheath means, or in which the shield means is not integral with said sheath means;

So much of claim 4 as may cover any heating means in which the body is not provided with one or more openings therethrough within the periphery of the container opening, or in which the sheathed electric heating means does not comprise a tubular sheath extending through said one or more openings in said body and arranged to extend through the container opening and into the container, a resistor within said sheath, terminal means for said resistor accessible exteriorly of said body, and refractory heat-conducting electrical-insulating material embedding said resistor, generally filling the space within said sheath, and serving both to insulate said resistor electrically and to conduct the heat from said resistor to said sheath, or in which the shield means is not integral with said sheath, or does not extend over the body surface;

So much of claim 5 as may cover any heating means in which the body is not provided with one or more openings therethrough within the area of the body surface adapted to overlie the opening into the container, or in which the sheathed electric heating means does not comprise a tubular sheath extending through said one or more openings in said body and arranged to extend through the container opening and into the container, a resistor within said sheath, terminal means for said resistor accessible exteriorly of said body, and refractory heat-conducting electrical-insulating material embedding said resistor, generally filling the space within said sheath, and serving both to insulate said resistor electrically and to conduct the heat from said resistor to said sheath, or in which the shield means is not integral with said sheath; and

So much of claim 8 as may cover any heating means in which the body is not provided with one or more openings therethrough within the area of the body surface adapted to overlie the opening into the container, or in which the sheathed electric heating means does not comprise a tubular sheath extending through said one or more openings in said body and arranged to extend through the container opening and into the container, a resistor within said sheath, terminal means for said resistor accessible exteriorly of said body, and refractory heat-conducting electrical-insulating material embedding said resistor, generally filling the space within said sheath, and serving both to insulate said resistor electrically and to conduct the heat from said resistor to said sheath.

[*Official Gazette October 28, 1947.*]

DISCLAIMER

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So much of claim 3 of said patent as may cover any heating means in which the body is not provided with one or more openings therethrough within the periphery of the container opening, or in which the means carried by said body is not an embedded-resistor electric heating element, or in which said embedded-resistor electric heating element does not comprise sheath means extending through said one or more openings in said body and the container opening and into the container when said body is connected to the container, a resistor within said sheath means, terminal means for said resistor accessible exteriorly of said body, and refractory heat-conducting electrical-insulating material embedding said resistor, generally filling the space within said sheath means, and serving both to insulate said resistor electrically and to conduct the heat from said resistor to said sheath means, or in which the shield means is not integral with said sheath means;

So much of claim 4 as may cover any heating means in which the body is not provided with one or more openings therethrough within the periphery of the container opening, or in which the sheathed electric heating means does not comprise a tubular sheath extending through said one or more openings in said body and arranged to extend through the container opening and into the container, a resistor within said sheath, terminal means for said resistor accessible exteriorly of said body, and refractory heat-conducting electrical-insulating material embedding said resistor, generally filling the space within said sheath, and serving both to insulate said resistor electrically and to conduct the heat from said resistor to said sheath, or in which the shield means is not integral with said sheath, or does not extend over the body surface;

So much of claim 5 as may cover any heating means in which the body is not provided with one or more openings therethrough within the area of the body surface adapted to overlie the opening into the container, or in which the sheathed electric heating means does not comprise a tubular sheath extending through said one or more openings in said body and arranged to extend through the container opening and into the container, a resistor within said sheath, terminal means for said resistor accessible exteriorly of said body, and refractory heat-conducting electrical-insulating material embedding said resistor, generally filling the space within said sheath, and serving both to insulate said resistor electrically and to conduct the heat from said resistor to said sheath, or in which the shield means is not integral with said sheath; and

So much of claim 8 as may cover any heating means in which the body is not provided with one or more openings therethrough within the area of the body surface adapted to overlie the opening into the container, or in which the sheathed electric heating means does not comprise a tubular sheath extending through said one or more openings in said body and arranged to extend through the container opening and into the container, a resistor within said sheath, terminal means for said resistor accessible exteriorly of said body, and refractory heat-conducting electrical-insulating material embedding said resistor, generally filling the space within said sheath, and serving both to insulate said resistor electrically and to conduct the heat from said resistor to said sheath.

[*Official Gazette* October 28, 1947.]