Dec. 24, 1957 L. D. DRUGMAND 2,817,742

ELECTRIC HEATERS

Filed June 13, 1956 6 Sheets-Sheet 1

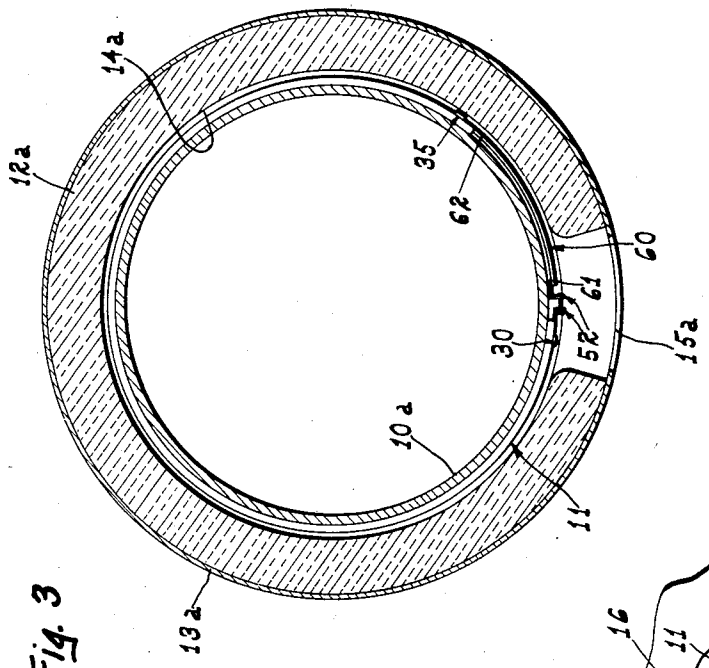


Fig. 3

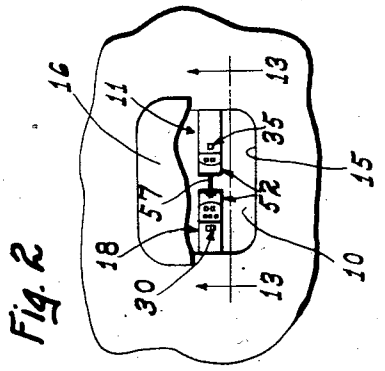


Fig. 2

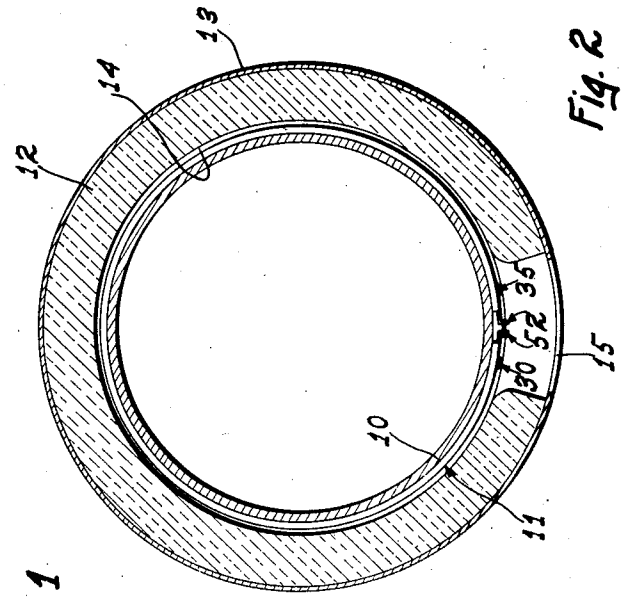


Fig. 1

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ELECTRIC HEATERS

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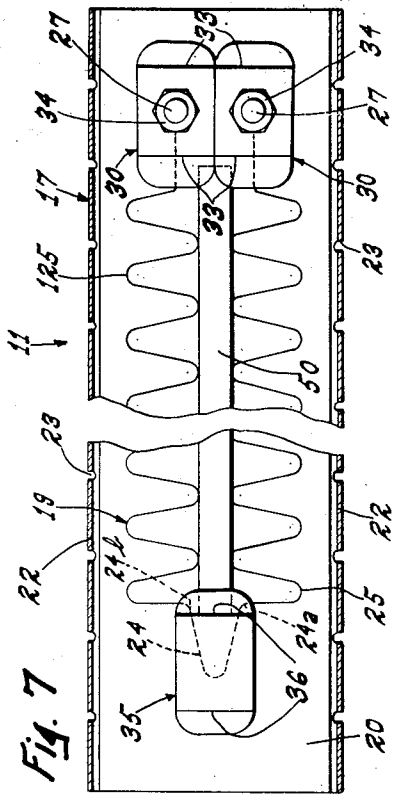


Fig. 7

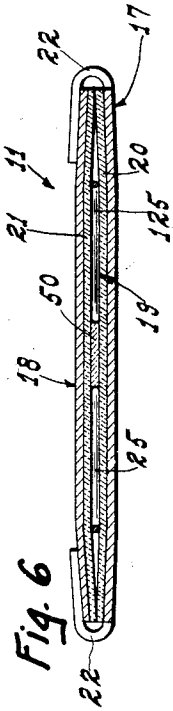


Fig. 6

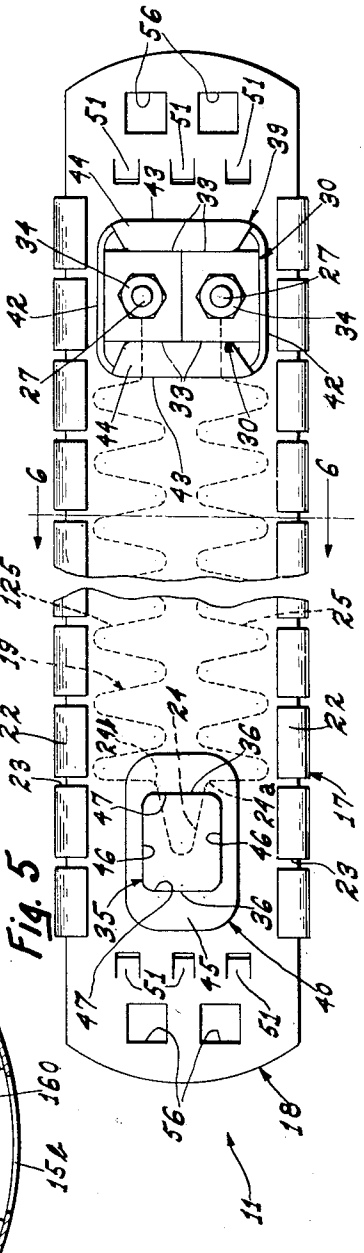


Fig. 5

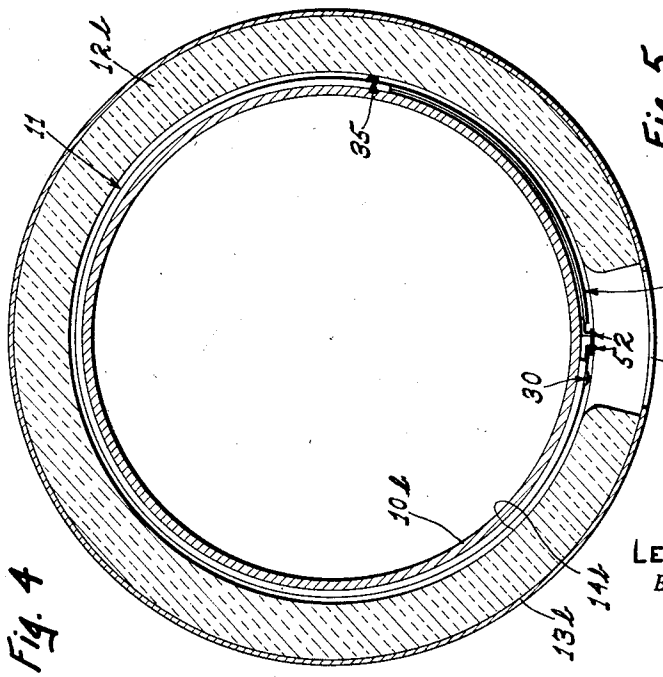


Fig. 4

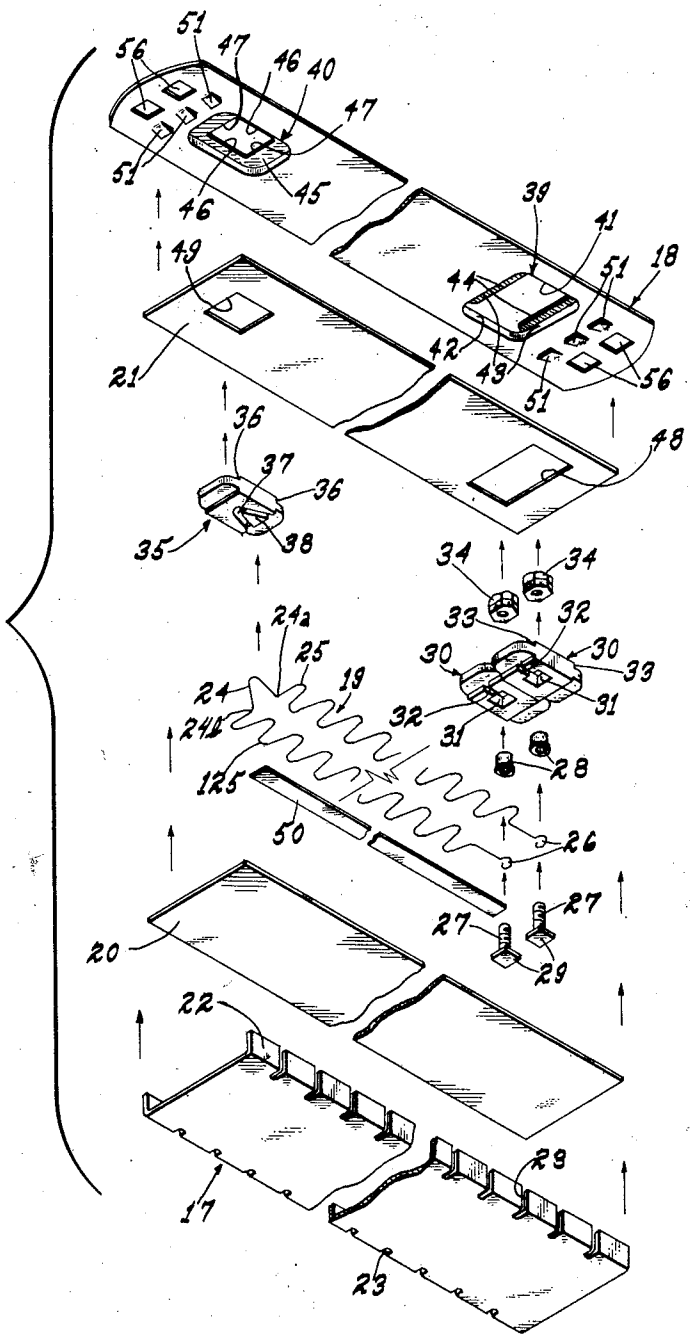
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ELECTRIC HEATERS

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Fig. 8



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ELECTRIC HEATERS

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Fig. 9

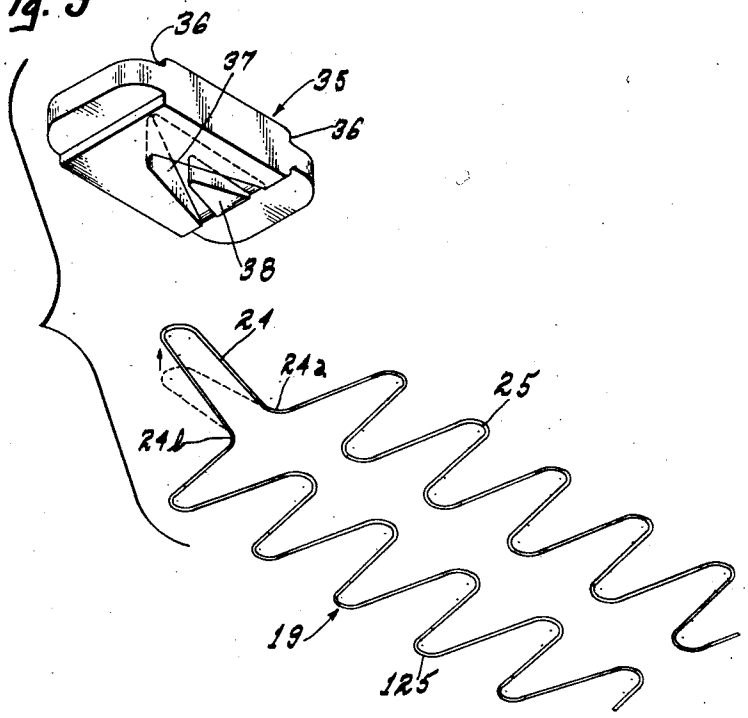


Fig. 10

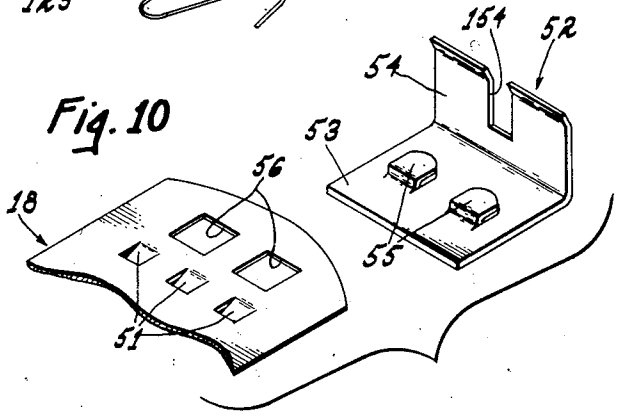
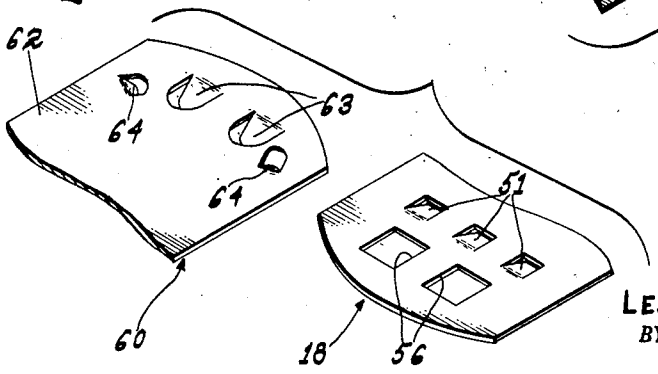


Fig. 11



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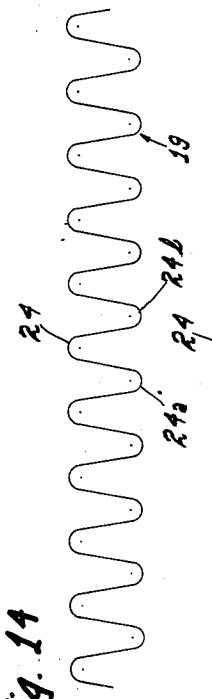


Fig. 14

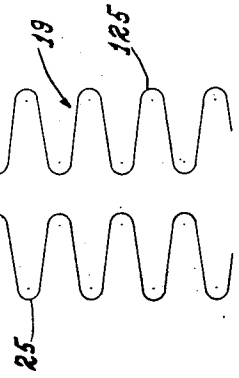


Fig. 15

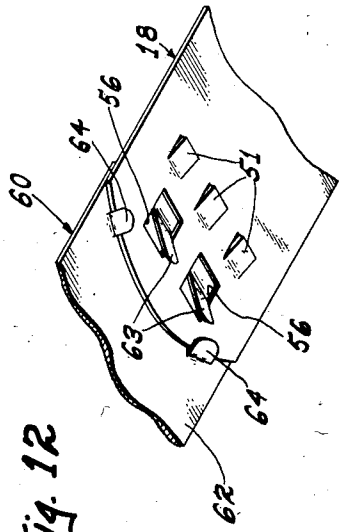


Fig. 12

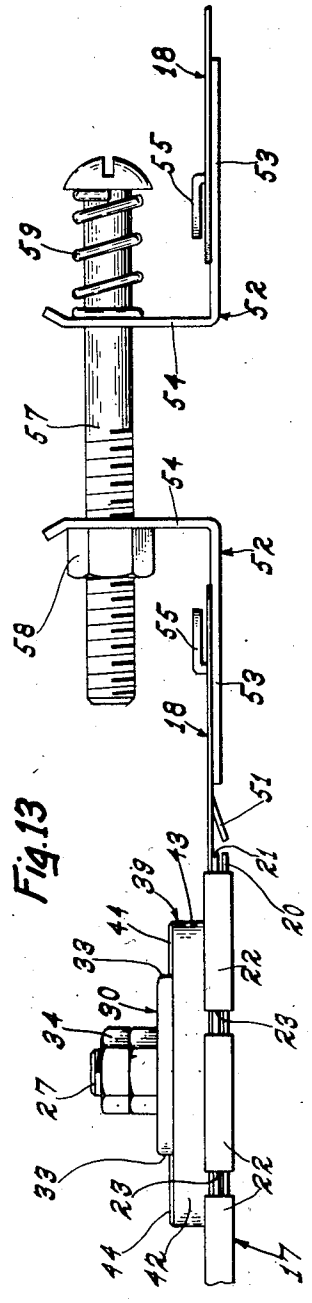


Fig. 13

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ELECTRIC HEATERS

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Fig. 16

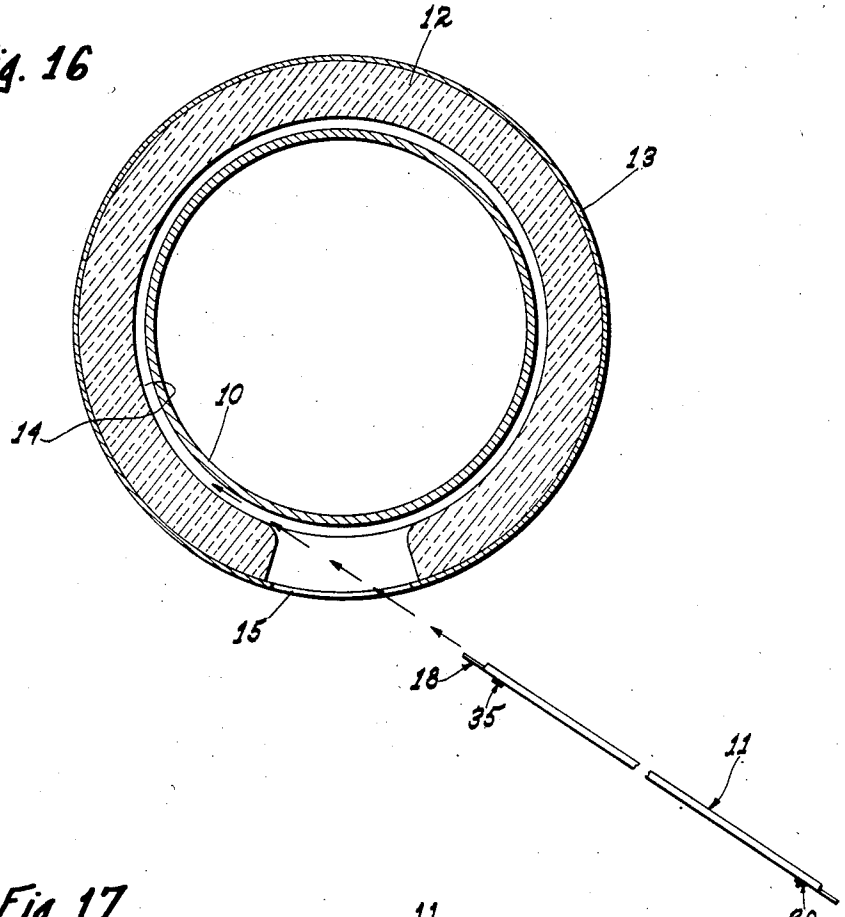
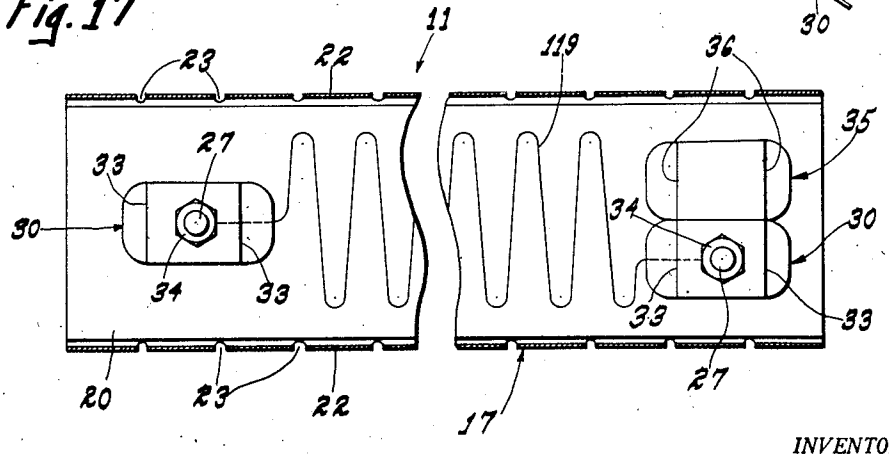


Fig. 17



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Patented Dec. 24, 1957

2,817,742

ELECTRIC HEATERS

Lester D. Drugmand, Pittsburgh, Pa., assignor to Edwin L. Wiegand Company

Application June 13, 1956, Serial No. 591,124

24 Claims. (Cl. 219—38)

The present invention relates to electric heaters and to methods of making the same, more particularly to electric resistance heating elements of the type adapted to be wrapped about a container or the like for heating its contents, and the principal object of the invention is to provide new and improved heaters of such character.

Electric resistance heating elements of the type having a resistor conductor interposed between and insulated from two metallic strips in face to face relation which are secured together for relative longitudinal movement have achieved wide usage in domestic water heaters. Heating elements of this type are frequently called mica heaters since a strip of mica or the like is disposed on each side of the resistor conductor to insulate it from the metallic strips. Such water heaters comprise a suitable tank for containing the water to be heated and about which one or more heating elements are wrapped in close thermal transfer engagement with the exterior tank wall.

Heating elements of the foregoing mica type have several advantages over the type of element having a resistor conductor embedded in compacted refractory material and encased in a metallic sheath. The former element is usually manufactured at a lower cost; it is more easily fastened to the tank; its width spreads the heat generated by the resistor conductor over a wide area of the tank wall thus eliminating localized hot spots which tend to damage the tank; and it is extremely flexible along only one axis so that it may be easily wrapped about the tank.

The present invention possesses several highly advantageous features not possessed by prior art mica-type, wrap-around heating elements. For example, the present invention provides heating elements which may be used with equal facility on tanks of various girths. This is made possible by employing an extension member which may be easily secured to the element without the use of tools to, in effect, increase its length so that it may be used on tanks whose girth is materially greater than the length of the heating element alone. The use of the element on tanks of various girths is made practical by a novel construction of the heating element which disposes its terminals, to which the usual current carrying lead wires are adapted to be secured, in side by side relation at one end of the heating element. These and other advantages will readily become apparent from a study of the following description and from the drawings appended hereto.

In the drawings accompanying this specification and forming a part of this application there are shown, for purpose of illustration, embodiments which the invention may assume, and in these drawings:

Figure 1 is a transverse sectional view through a domestic water heater embodying an electric heater assembly of the present invention,

Figure 2 is a fragmentary side elevational view of the water heater shown in Figure 1,

Figures 3 and 4 are views similar to Figure 1 but of water heaters having storage tanks of successively larger diameters,

Figure 5 is an enlarged, broken plan view of an electric heater assembly constructed in accordance with the present invention,

Figure 6 is a transverse sectional view of the heater assembly generally corresponding to the line 6—6 of Figure 5,

Figure 7 is a view similar to Figure 5 but with certain parts removed to illustrate the underlying construction,

Figure 8 is a reduced size, exploded perspective view of the electric heater assembly,

Figure 9 is an enlarged, fragmentary exploded perspective view of certain parts,

Figure 10 is a fragmentary exploded perspective view of other parts,

Figure 11 is a fragmentary exploded perspective view of still other parts,

Figure 12 is a bottom-side perspective view of the parts shown in Figure 11 but illustrating them in assembled relation,

Figure 13 is an enlarged view generally corresponding to the line 13—13 of Figure 2,

Figures 14 and 15 are respective plan views of a detail before and after a stage of manufacture,

Figure 16 is a view similar to Figure 1 but illustrating the manner in which the electric heater is assembled with the tank, and

Figure 17 is a view similar to Figure 7 but of a modified construction.

As most clearly shown in Figure 1, the usual domestic water heater comprises a suitable storage tank **10** for containing the water to be heated, one or more electric resistance heaters **11** wrapped about and in close thermal transfer engagement with the exterior tank wall, suitable insulating material **12**, such as a spun glass jacket or the like, surrounding the tank to prevent heat loss, and a sheet metal housing **13** surrounding the tank for protecting the insulation and for decorative purposes.

The insulating material **12** provides an annular shallow channel **14** adjacent heater **11** and, although not shown, the channel is usually lined with sheet metal to keep the insulation away from the heater and to provide a smooth surface, for a purpose to become clear.

In order to provide for replacement of the heating element, in a manner later to be disclosed, without removing casing **13** and insulation **12** from about the tank, the casing is usually provided with an opening **15** (see also Figure 2) which is normally closed by a suitable cover plate **16**. As will be evident, insulation is omitted adjacent opening **15** to provide free access to the heater so that the necessary electrical connections can be made and so that the heater can be secured to or removed from the tank.

As best seen in Figures 5, 6 and 8, the present heater is similar to those in common use in that it comprises an elongated sheet metal base member **17**, an overlying elongated sheet metal pressure member **18**, a resistor conductor **19** interposed between the members, and strips of mica (or other thin, heat resistant dielectric material) **20** and **21** respectively interposed between the resistor **19** and the base member **17** and between the resistor and the pressure member **18**. Base member **17** is wider than pressure member **18** and the opposite edges **22** of the former are adapted to be folded over the latter to securely clamp the assembly together (see especially Figure 6). The opposite, folded over edges of member **17** are formed with closely spaced cuts, or notches, **23** to provide flexibility.

The heater **11**, as thus far described, comprises a plurality of thin laminations stacked one upon the other and clamped together by means of the folded over edges **22**. Since the liminations are not interlocked with each other but are merely clamped together, each may slide lon-

gitudinally relative to the others. This, it will be evident, provides a heater of great flexibility which may easily be bent about a tank or the like.

In most prior art heaters of the general type herein disclosed, the terminal conductors which are connected to the resistor conductor in the interior of the heater and to which the power leads are to be connected, are positioned one at each end of the heater. Since the space provided by opening 15 in the casing which surrounds the tank is quite limited, difficulty arises in making the electrical connections to the heater since the terminal conductors are spaced apart at least several inches when the heater is wrapped about the tank. Further, in the event the heater is employed (in a manner later to be disclosed) with tanks whose girth is materially greater than the length of the heater, respective terminal conductors will be spaced even further apart. This will render making the electrical connections to the heater through opening 15 even more difficult if not virtually impossible.

It has been proposed to construct heaters of the general type herein disclosed with both terminal conductors at one end of the heater. However, these proposed constructions disposed a return lead within the heater which connected one of the terminal conductors with the end of the resistor conductor at the opposite end of the heater. This return lead was positioned in over-lying relation with the resistor conductor and, in order to insure against short circuiting between the latter and the lead and between the lead and the metal parts which form the sheath of the heater, it was necessary to either employ an insulated lead or to position an additional sheet of mica within the heater. In any event, the thickness of the heater was materially increased by this construction and thus the flexibility of the heater was decreased. A further disadavantage resulted from the fact that since the resistor conductor and the return lead were tightly clamped within the heater, continual expansion and contraction between the various parts of the heater frequently wore through the insulation and eventually permitted the return lead to short out against the resistor conductor or to ground out against a metal part of the heater.

The present invention provides for positioning both of the terminal conductors in side by side relation at one end of the heater without using a return wire as employed by certain prior art heaters. This is accomplished by doubling an elongated resistor conductor back on itself to provide two reaches in side by side relation, securing opposite ends of the resistor conductor to respective terminal conductors, and anchoring the bight portion of the resistor conductor in position to prevent undue shifting of the latter.

In the embodiment shown in Figure 8, the resistor conductor 19 is preferably a single resistance wire formed to the pattern shown in the following manner;

The wire is first formed to provide a single reach of the proper length having the flat sinuous shape shown in Figure 14. Opposite ends of the reach disposed on respective sides of an intermediate loop portion 24 are then permanently displaced about loop portions 24*a*, 24*b* to position such reach portions as shown in Figure 15 to provide two reaches 25, 125 in spaced, side by side relation. As will later appear, loop portion 24 provides an anchor portion while the free ends of reaches 25, 125 are formed to provide eyes 26 (see Figure 8) through which terminal conductor screws 27 are adapted to pass.

Each terminal screw 27 slidably carries a sleeve 28, the eyes 26 of the resistor conductor 19 being adapted to be clamped between the square heads 29 of the screws and the adjoining ends of the sleeves. The shank portion of each screw 27 is adapted to pass through an aperture formed in respective dielectric terminal blocks 30, which apertures are of sufficient diameter to slidably receive the sleeves 28. Each sleeve 28 is preferably of sufficient length to protrude slightly above the upper surface of its terminal block when the terminal screws are seated therein for a purpose to be seen. Each terminal block 30 has a square recess 31 for receiving the head of a respective screw 27 and is slotted at 32 to clear that portion of the resistor wire which is adjacent the eye 26. For reasons to become clear, the center portion of each terminal block is thicker than its end portion to provide oppositely facing, spaced shoulders 33. Nuts 34 are adapted to be threaded on each screw 27 to exert pressure upon the protruding sleeve 28 to thereupon tightly clamp the eye 26 of the resistor conductor between the sleeve and the head of the screw. The nuts also hold the screws assembled with their respective terminal blocks and further provide for fastening the power leads to the terminal screws.

The end of the resistor conductor 19 opposite eye portions 26 is adapted to be anchored in place by being engaged with a dielectric block 35 preferably similar to terminal blocks 30 in size and external configuration and providing shoulders 36 which are similar to shoulders 33 of the terminal blocks. The block 35, however, instead of being apertured as are the terminal blocks 30—30, is provided with a U-shaped recess 37 in its underside for receiving loop 24 of the resistor conductor. It will be noted that the block portion 38 defining the inner margin of recess 37 provides an abutment for engagement within loop 24. As best illustrated in Figure 9, loop 24 is bent upwardly from the plane of the element to insure its seating in the recess 37 of block 35.

As most clearly seen in Figure 8, terminal blocks 30 and block 35 are adapted to be seated in respective pockets 39 and 40 formed adjacent respective ends of pressure member 18. Pocket 39 comprises an aperture 41 sufficiently large to receive both terminal blocks 30 in side by side relation and circumscribed by upstanding side walls 42 and end walls 43. End walls 43 provide tabs 44 bent to overlie the terminal blocks and provide abutments against which they seat. A marginal edge of each tab 44 abuts a respective shoulder 33 of each terminal block to prevent movement of such blocks longitudinally of the pressure member 18 while side walls 42 prevent movement of the terminal blocks in a direction edgewise of the pressure member.

Pocket 40 is formed by an embossed portion 45 which is apertured to provide side edges 46 and end edges 47. When block 35 is positioned in pocket 40, end edges 47 abut shoulders 36 of the block to prevent movement thereof longitudinally of pressure member 18 and side edges 46 engage the sides of the block to prevent its movement in a direction edgewise of the pressure member.

To assemble the heater, mica strip 21 is positioned against pressure member 18 so that apertures 48, 49 thereof are in register with respective pockets 39, 40 of the pressure member. Terminal blocks 30 and block 35, together with the attached resistor conductor 19, will then be positioned so that the blocks seat in their respective pockets in the pressure member 18. A mica separator 50 (see Figures 6, 7 and 8) will preferably then be positioned between the reaches 25, 125 of the resistor conductor 19 to maintain them in spaced-apart relation. It will be understood that in the event a separator of some type is not employed, there is a possibility that respective reaches of the resistor might shift into engagement with each other and thereby short out a portion of the resistor.

After positioning spacer 50, mica strip 20 will be positioned against the resistor conductor, followed by base member 17. Edges 22 of the base member will then be folded over pressure member 18, as before described, to secure the assembly together.

As best shown in Figure 5, pressure member 18 is longer than base member 17 so that respective ends of the former project beyond the ends of the latter for a

purpose to become clear. Mica strips **20** and **21** are slightly longer than base member **17** so as to project slightly beyond the ends thereof and, to obviate the possibility of either of the mica strips sliding a material amount longitudinally of the heater, tabs **51** are struck from opposite ends of the pressure member. These tabs (see Figure 13) form abutments adjacent the ends of the mica strips for the purpose aforesaid.

In order to clamp the heater about the tank **10** shown in Figure 1, clips **52** are presently adapted to be attached to opposite ends of the pressure member **18**. Each clip (see Figures 10 and 13) preferably comprises an L-shaped member having legs **53** and **54**. Leg **53** has a pair of tabs **55** which are adapted to pass through apertures **56** formed in respective ends of the pressure member for hook-like engagement with the latter.

Each leg **54** has a slot **154** for passing a bolt **57**, a nut **58** being threaded thereon so that members **52** may be drawn together by the bolt to tension the heater about the tank. A coil spring **59** is interposed between the head of the bolt and one of the members **52** so as to spring tension the heater about the tank. In this way, the longitudinal expansion and contraction of the heater as it heats up and cools off will be absorbed by the spring **59** and therefore this expansion and contraction will not result in eventual loosening of the heater from about the tank.

As illustrated in Figure 16, heater **11** will be assembled about tank **10** by inserting one end of the heater through opening **15** in housing **13** and into annular channel **14**. The heater will then be fed longitudinally into the channel until the one end of the heater is accessible through opening **15**. Clips **52** will then be assembled with the ends of the pressure member **18** of the heater, and bolt **57** and its associated parts installed and tightened to firmly clamp the heater about the tank. The necessary electrical connections may then be made to the terminal conductor screws **27** and the cover plate **16** installed over the opening **15**.

It is an important feature of the present invention that while the heater **11** thus far described is of a length to fit around tank **10** illustrated in Figure 1, it may also be employed with tanks which are larger in girth (see Figures 3 and 4) than is tank **10**. The advantages which flow from this will readily be apparent. For example, at the present time, a water heater manufacturer must purchase heaters of different lengths to fit the various girths of the various tank sizes despite the fact that each heater may be of the same voltage and wattage rating. With the present invention, the manufacturer can purchase large quantities of but one length heater (which results in a cost saving because of the volume purchase of identical heaters) with the knowledge that these heaters may be used on any of the various sizes of tanks. This reduces the water heater manufacturer's inventory of heaters since he may freely change production schedules from one size tank to another at a moment's notice without regard as to whether he has a sufficient quantity of the proper length heaters in stock. Obviously, the foregoing advantages also accrue to distributors, dealers, service men and the like since their inventory requirements are also accordingly reduced.

The water heater illustrated in Figure 3 is similar to that shown in Figure 1; accordingly, corresponding parts are identified with the same reference characters but with the suffix "*a*" added. This water heater, however, differs from that shown in Figure 1 in that tank **10***a* is larger in girth. Obviously, the insulating jacket **12***a* and the housing **13***a* are also larger to accommodate the larger tank.

In order to employ heater **11** with this larger tank, a suitable extension **60** (see Figures 3 and 11) is provided to permit the heater to be tensioned about the tank. Extension **60** preferably comprises a metal strip of the same width and made of the same stock as pressure member **18**. One end **61** of extension **60** is formed with apertures which are identical with apertures **56** formed in the ends of the pressure member **18** while the other end **62** of the extension is formed for engagement with the end of the pressure member.

As shown in Figures 11 and 12, tabs **63**, **64** are struck from end **62** of extension **60**. Tabs **63** are adapted to pass through respective apertures **56** of pressure member **18** for engagement with the member portions defining such apertures while tabs **64** are adapted to engage the terminal end portion of the pressure member. It is to be understood that respective parts are so formed that the extension may be snapped into engagement with the pressure member, the tabs deflecting slightly for this purpose and then springing back to restrict disengagement between the extension and the pressure member. If desired, after the extension member is engaged with the pressure member, slight hand pressure will clinch the tabs **63**, **64** so they lie flat against the pressure member. However, hand clinching is not really essential when the tabs are disposed on the side adjacent the tank since when the assembly is tightened about the tank, the tabs will be automatically clinched by engagement with the exterior tank wall.

It will be noted that tabs **63** are positioned to resist longitudinal forces tending to pull the pressure member and the extension apart while tabs **64** are positioned to resist longitudinal forces tending to push the pressure member and the extension together. The advantage of providing means for resisting the last mentioned longitudinal forces will readily be apparent upon considering the manner in which heater **11** is assembled with tank **10***a*.

The latter assembly operation will be effected in the same manner as described and shown in Figure 16. However, in this case, extension **60** will first be attached to the heater before it is fed into channel **14***a*. Normally, extension **60** will be attached to the end of the heater opposite the terminal conductor screws and this end of the heater fed into the channel first so that the portion of the heater carrying the terminal conductors need not be fed through the channel. It will be evident that as the heater is fed into the channel, it must push extension **60** ahead of it and were it not for tabs **64**, the extension would become disconnected from the heater.

When end **61** of extension **60** becomes accessible through opening **15**, clips **52** may be attached to such extension end and to the opposite adjoining end of the heater and the clips secured together in the manner theretofore described to tension the heater about the tank. As previously mentioned, it is preferable that extension **60** be so secured to the heater that tabs **63**, **64** are disposed on the side thereof adjacent the tank **10***a* in order to automatically clinch the tabs as the assembly is tensioned about the tank. A further advantage of so positioning the tabs is that even if the heater is tensioned about the tank with sufficient force to bend tabs **63**, interengagement between the tabs and the tank will restrict bending of the tabs. This insures that the application of excessive tensioning force will not pull the heater and the extension apart unless the force is sufficient to actually shear the tabs from the extension.

The embodiment of the invention shown in Figure 4 is similar to that shown in Figure 3 with the exception that tank **10***b* is even larger in girth than is tank **10***a* necessitating, of course, a larger casing **13***b* and insulating blanket **12***b*. Accordingly, the extension **160** therein employed has a greater length than does extension **60**. Assembly of the heater with this larger tank will be effected in the same manner as was disclosed with respect to the water heater illustrated in Figure 3.

As shown in Figure 17, in the event it is desired that the heater be formed with its terminal conductors at opposite ends instead of in side by side relation at one end as heretofore disclosed, none of the foregoing heater parts need be changed, or modified with the exception of the resistor conductor **110**. In this case, the resistor wire

is formed to provide the flat sinuous configuration shown so that opposite ends of the wire are disposed adjacent respective opposite ends of the heater. One of the terminal blocks **30**, instead of being positioned for seating in pocket **39** of the pressure member **18**, will be positioned for seating in pocket **40** thereof. Block **35** will be positioned next to the other terminal block **30** in pocket **39** to function as a dummy and fill the space in this pocket normally occupied by the one terminal block. Obviously, separator **50** will be omitted in this construction since there are no spaced-apart resistor conductor reaches to be insulated from each other.

In view of 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 will also be apparent to those skilled in the art that the embodiments herein disclosed 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 embodiments are illustrative only, and that my invention is not limited thereto.

I claim:

1. A flexible elongated electric heater assembly, comprising a pair of elongated sheet metal members disposed in face to face relation and secured together to provide for relative longitudinal movement therebetween as said heater assembly is flexed, resistor conductor means positioned between and electrically insulated from said members and providing a pair of resistor conductor portions in side by side relation extending longitudinally of said members, adjoining ends of said resistor conductor portions at one end of said resistor conductor means having electrical continuity to provide a series circuit and opposite adjoining ends of said portions terminating in terminal conductors disposed in side by side relation adjacent one end of said members and adapted to be connected to a source of electricity, and means carried by one of said members adjacent said one end of said resistor conductor means for holding such end in position between said members.

2. A flexible electric heater assembly, comprising a pair of elongated sheet metal members secured together in face to face relation, resistor conductor means positioned between and electrically insulated from said members and providing two portions in side by side relation extending longitudinally of said members, a pair of terminal conductors providing for electrical connections to said heater assembly and disposed in side by side relation adjacent one end of said members and each electrically connected to a respective adjoining resistor conductor portion, and means adjacent the other end of said members and engaged with adjacent resistor conductor portions for holding such portions in position between said members.

3. A flexible electric heater assembly, comprising a pair of elongated sheet metal members secured together in face to face relation, resistor conductor means positioned between and electrically insulated from said members and comprising a pair of resistor conductor portions in side by side relation and extending longitudinally of said members, adjoining ends of said resistor conductor portions at one end of said resistor conductor means having electrical continuity, a pair of terminal conductors providing for electrical connections to said heater assembly and disposed in side by side relation adjacent the other end of said resistor conductor means and each electrically connected to a respective adjoining resistor conductor portion, and means adjacent said one end of said resistor conductor means and engaged therewith for holding said resistor conductor means in position between said members.

4. A flexible electric heater assembly adapted to be wrapped about a tank and the like, comprising a first elongated sheet metal member adapted to be positioned against the exterior tank wall surface, a second elongated sheet metal member secured to said first member in face to face relation therewith, resistor conductor means positioned between and electrically insulated from said members and providing two portions in side by side relation extending longitudinally of said members, a pair of terminal conductors held against movement relative to said second member and providing for electrical connections to said heater assembly, said terminal conductors being disposed in side by side relation adjacent one end of said members and each electrically connected to a respective adjoining resistor conductor portion, and means adjacent the other end of said members and also held against movement relative to said second member, said means being engaged with adjacent resistor conductor portions for holding such portions in position between said members.

5. A flexible electric heater assembly adapted to be wrapped about a tank and the like, comprising a first elongated sheet metal member adapted to be positioned against the exterior tank wall surface, a second elongated sheet metal member secured to said first member in face to face relation therewith, resistor conductor means positioned between and electrically insulated from said members and providing a pair of portions in side by side relation extending longitudinally of said members, first dielectric body means engaged with one of the end portions of said second member, a pair of terminal conductors carried by said first body means and providing for electrical connections to said heater assembly, said terminal conductors being disposed in side by side relation and each electrically connected to a respective adjoining resistor conductor portion, and second dielectric body means engaged with said second member and spaced longitudinally thereof from said first body means, said second body means being engaged with adjacent resistor conductor portions for holding such portions in position between said members.

6. A flexible electric heater assembly adapted to be wrapped about a tank and the like, comprising a first elongated sheet metal member adapted to be positioned against the exterior tank wall surface, a second elongated sheet metal member secured to said first member in face to face relation therewith and having longitudinally spaced portions providing respective pockets, dielectric body means seated in respective pockets, a pair of terminal conductors carried in side by side relation by the body means seated in one of said pockets to provide for electrical connections to said heater assembly, and resistor conductor means positioned between and electrically insulated from said members and providing a pair of portions in side by side relation extending longitudinally between said pockets, the resistor conductor portions adjacent said one pocket being secured to respective terminal conductors to establish electrical connections therebetween and to anchor such portions in position between said members, and other resistor conductor portions adjacent said other pocket being engaged with said body means seated therein to anchor such other resistor conductor portions in position between said members.

7. A flexible electric heater assembly adapted to be wrapped about a tank and the like, comprising a first elongated sheet metal member adapted to be positioned against the exterior tank wall surface, a second elongated sheet metal member disposed in face to face relation with said first member and having longitudinally spaced portions providing respective pockets, longitudinally extending marginal edges of said first member being bent over said second member to clamp said members together, dielectric body means seated in respective pockets and the body means seated in one pocket providing an abutment and the body means seated in the other pocket carrying a pair of terminal conductors in side by side

relation to provide for electrical connections to said heater assembly, and resistor conductor means formed of a length of resistor wire doubled back on itself to provide a pair of reaches in side by side relation connected together at one end by a bight portion, said reaches having a wave-like configuration and said resistor conductor means being positioned between and electrically insulated from said members and extending longitudinally between said pockets with its bight portion end adjacent said one pocket and its opposite end adjacent said other pocket, the bight portion end of said resistor conductor means being engaged with the abutment provided by that body means which is seated in said one pocket to anchor such end in position between said members, and the reach portions adjacent the opposite end of said resistor conductor means being secured to respective terminal conductors to establish connections therebetween and to anchor such opposite end in position between said members.

8. A flexible electric heater assembly adapted to be wrapped about a tank and the like, comprising a first elongated sheet metal member adapted to be positioned against the exterior tank wall surface, a second elongated sheet metal member disposed in face to face relation with said first member and having longitudinally spaced portions providing respective pockets, longitudinally extending marginal edges of said first member being bent over said second member to clamp said members together, dielectric body means seated in respective pockets and the body means seated in one pocket providing an abutment and the body means seated in the other pocket carrying a pair of terminal conductors in side by side relation to provide for electrical connections to said heater assembly, and resistor conductor means formed of a length of resistor wire doubled back on itself to provide a pair of reaches in side by side relation connected together at one end by a bight portion, said reaches having a wave-like configuration and said resistor conductor means being positioned between and electrically insulated from said members and extending longitudinally between said pockets with its bight portion end adjacent said one pocket and its opposite end adjacent said other pocket, the bight portion end of said resistor conductor means being looped about the abutment provided by that body means which is seated in said one pocket to anchor such end in position between said members, and the reach portions adjacent the opposite end of said resistor conductor means being secured to respective terminal conductors to establish connections therebetween and to anchor such opposite end in position between said members.

9. A flexible electric heater assembly adapted to be wrapped about a tank and the like, comprising a first elongated sheet metal member adapted to be positioned against the exterior tank wall surface, a second elongated sheet metal member disposed in face to face relation with said first member and having longitudinally spaced portions providing respective pockets, longitudinal marginal edges of said first member being bent over said second member to clamp said members together, dielectric body means seated in respective pockets, resistor conductor means positioned between and electrically insulated from said members and extending longitudinally between said pockets, said resistor conductor means being engaged with respective body means to anchor said resistor conductor means in position between said members, and a pair of terminal conductors carried by said body means and electrically connected to respective ends of said resistor conductor means, one of said terminal conductors being adapted to be positioned in one pocket and said other terminal conductor being adapted to be selectively positioned either in said one pocket adjacent said one terminal conductor or in said other pocket spaced from said one terminal conductor.

10. A flexible electric heater assembly adapted to be wrapped about a tank and the like, comprising a first elongated sheet metal member adapted to be positioned against the exterior tank wall surface, a second elongated sheet metal member disposed in face to face relation with said first member and having longitudinally spaced portions providing respective pockets, longitudinally extending marginal edges of said first member being bent over said second member to clamp said members together, resistor conductor means positioned between and electrically insulated from said members and extending longitudinally between said pockets, three dielectric bodies adapted to be seated in said pockets for engagement with said resistor conductor means to anchor the latter in position between said members, one of said pockets being of a size to receive any one of said bodies while the other of said pockets being of a size to receive the remaining bodies, two of said bodies carrying respective terminal conductors which are electrically connected to respective ends of said resistor conductor means, said bodies being interchangeable between said pockets to in one position provide for locating one of said terminal conductor carrying bodies in said one pocket and the remaining bodies in said other pocket to thereby position said terminal conductors in spaced relation, and in another position to provide for locating both of said terminal conductor carrying bodies in said other pocket and the remaining body in said one pocket to thereby position said terminal conductors in side by side relation.

11. A flexible elongated electric heater assembly adapted to be wrapped about a tank and the like, comprising a pair of elongated sheet metal members disposed in face to face relation and secured together to provide for relative longitudinal movement therebetween as said heater assembly is wrapped about the tank, resistor conductor means positioned between and electrically insulated from said members and providing two resistor conductor portions in spaced side by side relation extending longitudinally of said members, one end of one resistor conductor portion having electrical continuity with the adjoining end of the other resistor conductor portion to provide a series circuit and opposite adjoining ends of said portions terminating in terminal conductors disposed in side by side relation adjacent one end of said members and adapted to be connected to a source of electricity, and dielectric means interposed between said side by side resistor conductor portions for maintaining the latter in spaced relation.

12. A flexible elongated electric heater assembly adapted to be wrapped about a tank and the like, comprising a pair of elongated sheet metal members disposed in face to face relation and secured together to provide for relative longitudinal movement therebetween as said heater assembly is wrapped about the tank, resistor conductor means positioned between said members and providing two resistor conductor portions in spaced side by side relation extending longitudinally of said members, one end of one resistor conductor portion having electrical continuity with the adjoining end of the other resistor conductor portion to provide a series circuit and opposite adjoining ends of said portions terminating in terminal conductors disposed in side by side relation adjacent one end of said members and adapted to be connected to a source of electricity, first dielectric means interposed between the facing surfaces of said members and said resistor conductor to insure electrical isolation between the latter and said members, and second dielectric means interposed between said side by side resistor conductor portions and between respective said first dielectric means for maintaining said resistor conductor portions in spaced relation.

13. An assembly for heating the contents of containers of varying sizes, comprising an elongated flexible sheathed electric heater for conforming insertion into and withdrawal from a peripheral exterior channel on a said container, extension means for selectively accommodating

said heater for containers having girths materially greater than the length of said heater, and cooperating interlocking portions on adjoining ends of said heater and said extension means for connecting the same to prevent substantial relative longitudinal movement therebetween due to insertion and withdrawal forces exerted longitudinally thereagainst.

14. An assembly for heating the contents of containers of varying sizes, comprising an elongated flexible sheathed electric heater for conforming insertion into and withdrawal from a peripheral exterior channel on a said container, means between the ends of said heater for tensioning the latter about said container within said channel, said tensioning means being at all times removably connected to one end of said heater, extension means for selectively accommodating said heater for containers having girths materially greater than the length of said heater, and cooperating interlocking portions on the other end of said heater and on one end of said extension means for connecting the same to prevent substantial relative longitudinal movement therebetween due to insertion and withdrawal forces exerted longitudinally thereagainst, the other end of said extension means being connectable to said tensioning means.

15. A heater assembly for use in heating containers of various girths, comprising an elongated sheathed electric heater of a predetermined length which is flexible whereby it may be wrapped about the container and which has an apertured end portion, extension means having an apertured end portion and also having tongue means spaced from such end portion engageable with the aperture defining portion of said heater to connect said extension means thereto for accommodating said heater for use with containers whose girth is materially greater than the length of said heater, and means connectable to said heater for exerting a force thereon in a direction to tension it about the container, said means having lug means selectively engageable with either the aperture defining portion of said extension means when the latter is employed or with the aperture defining portion of said heater when said extension means is omitted.

16. A heater assembly for use in heating containers of various girths, comprising an elongated sheathed electric heater of a predetermined length which is flexible whereby it may be wrapped about the container and which has an apertured end portion, extension means having an apertured end portion and also having a pair of tongues spaced from such end portion for connecting said extension means to said heater for accommodating the latter for use with containers whose grith is materially greater than the length of said heater, one of said tongues being engageable with the aperture defining portion of said heater to resist longitudinal forces applied in a direction to pull said extension means and said heater apart and the other of said tongues being engageable with said heater to resist longitudinal forces applied in a direction to push said extension means and said heater together, and means connectable to said heater for exerting a force thereon in a direction to tension it about the container, said means having lug means selectively engageable with either the aperature defining portion of said extension means when the latter is employed or with the aperture defining portion of said heater when said extension means is omitted.

17. A heater assembly for use in heating containers of various girths, comprising an elongated sheathed electric heater of a predetermined length which is flexible whereby it may be wrapped about the container and which has an apertured end portion, extension means having an apertured end portion and also having a pair of oppositely facing, spaced-apart tongues spaced from such end portion for connecting said extension means to said heater for accommodating the latter for use with containers whose girth is materially greater than the length of said heater, one of said tongues being engageable with the aperture defining portion of said heater to resist longitudinal forces applied in a direction to pull said extension means and said heater apart and the other of said tongues being engageable with the terminal end portions of said heater to resist longitudinal forces applied in a direction to push said extension means and said heater together, and means connectable to said heater for exerting a force thereon in a direction to tension it about the container, said means having lug means selectively engageable with either the aperture defining portion of said extension means when the latter is employed or with the aperture defining portion of said heater when said extension means is omitted.

18. The method of forming a patterned electric resistance conductor from a single reach of a conductor member which has been wound to sinuous shape to provide successive interconnected loop portions at opposite sides of said shape, which method comprises permanently displacing longitudinally spaced portions of said single reach about an intermediate loop portion to provide a fixed pattern of side-by-side reaches each of said sinuous shape and connected by said intermediate loop portion.

19. The method of forming a patterned electric resistance conductor from a single reach of a conductor member which has been wound to a sinuous shape to provide successive interconnected loop portions at opposite sides of said shape, which method comprises permanently displacing longitudinally spaced portions of said single reach about respective loop portions disposed at one side of said shape and which are positioned on respective sides of an intermediate loop portion disposed on the other side of said shape to provide a fixed pattern of side by side reaches each of sinuous shape and connected by said intermediate loop portion.

20. The method of forming a patterned electric resistance conductor to provide an anchor portion at one end and terminal portions at the other end from a single reach of a conductor member which has been wound to a sinuous shape to provide successive interconnected loop portions at opposite sides of said shape, which method comprises permanently displacing longitudinally spaced portions of said single reach about respective loop portions disposed at one side of said shape and which are positioned on respective sides of an intermediate loop portion disposed on the other side of said shape to provide a fixed pattern of side by side reaches each of sinuous shape and connected by said intermediate loop portion with said intermediate loop portion providing said anchor portion and with the respective free ends of said reaches providing said terminal portions.

21. The method of accommodating wrap-around electric heaters of a predetermined length for tensioning about containers of various girths, which method comprises supplying electric heaters in a length suitable to fit about containers having a predetermined girth, and providing extension members of various predetermined lengths selectively attachable to such heaters to accommodate them to fit about containers having larger girths.

22. A heater assembly for use in heating containers of various girths, comprising an elongated flexible sheathed electric heater adapted to be wrapped about a container and including means for tensioning said heater about the exterior wall of said container, extension means selectively usable with said heater to accommodate it for use with containers whose girth is materially greater than the length of said heater, and means in part provided by said heater and in part provided by said extension means and interengaging to removably connect said extension means to an end portion of said heater to resist forces applied in either direction longitudinally of the assembly.

23. In a device for use in heating containers of various girths, the assembly comprising an elongated, flexible sheathed electric heater member adapted to be tensioned about a container and an extension member usable with said heater member to accommodate it for use with con-

tainers whose girth is materially greater than the length of said heater member, said members having end portions overlapped with each other and one member providing a transversely extending tab which engages with an abutment provided by the other member for maintaining said members in predetermined assembled relation against a force applied longitudinally of said assembly, said tab engaging the exterior of said container when said assembly is tensioned thereabout and being crimped against said other member by such engagement to prevent disengagement of said tab from said abutment.

24. The method of wrapping an elongated flexible sheathed electric heater of predetermined length around and in closely fitting engagement with a container having a girth materially greater than said predetermined heater length and having a shallow peripheral channel on the exterior surface thereof, said method comprising superposing in assembled interlocked relation an end of

said heater and an end of a separate thin flexible extension member of sufficient length to compensate for the difference between the length of said heater and the length of said channel, pushing said interlocked assembly lengthwise through said channel, and interconnecting the free ends of said heater and extension member to draw said heater into closely fitting engagement with said container.

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