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L. D. DRUGMAND ET AL
ELECTRIC HEATERS

2,846,536

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3 Sheets-Sheet 1

Fig. 1

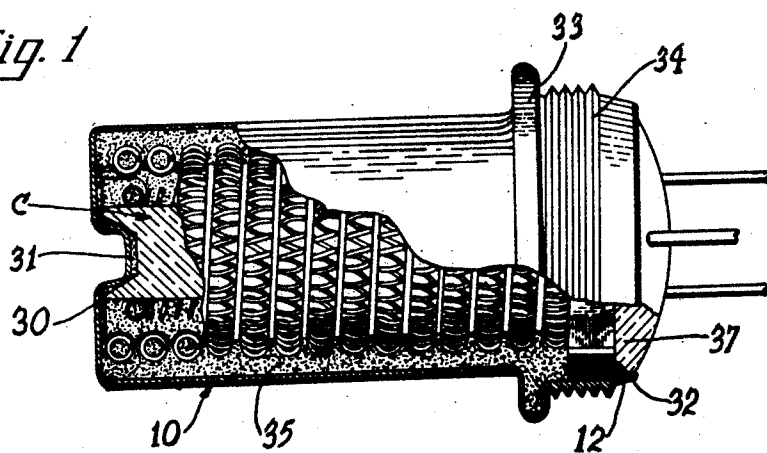
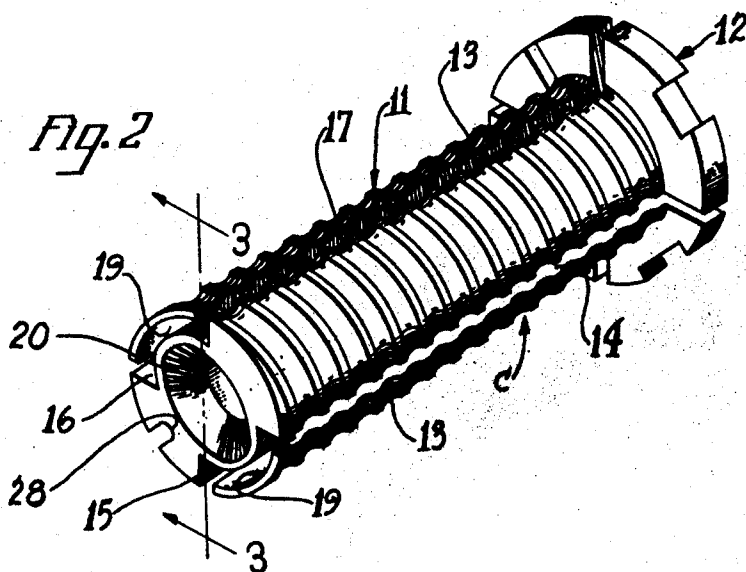


Fig. 2



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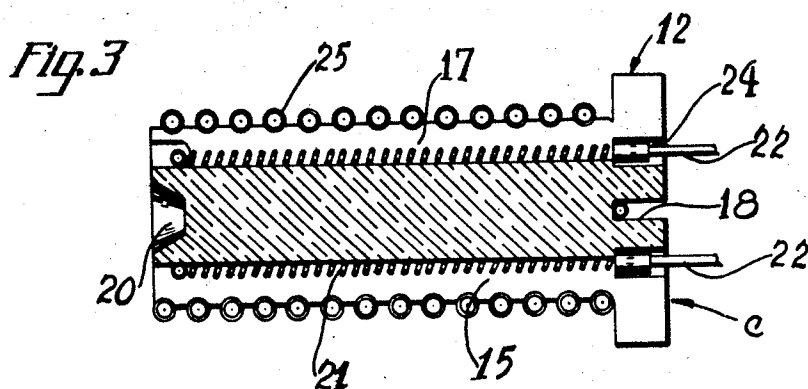
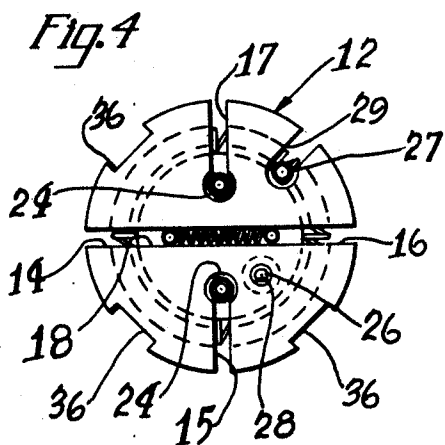
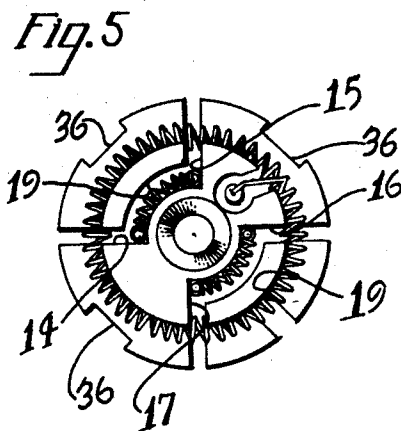
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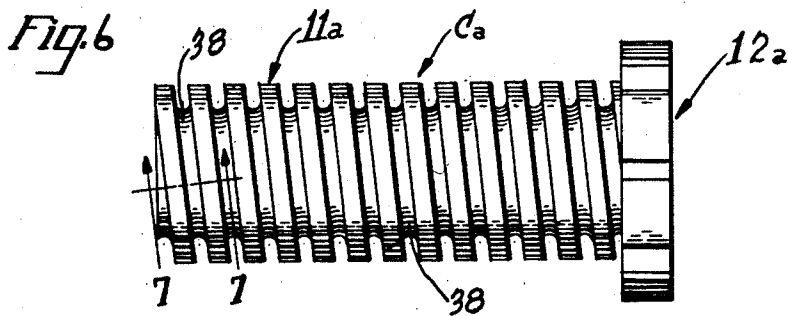
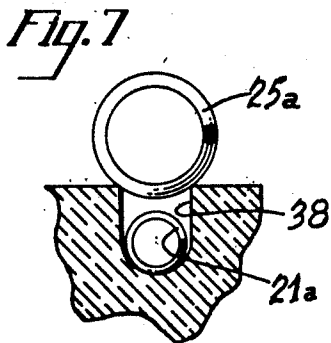
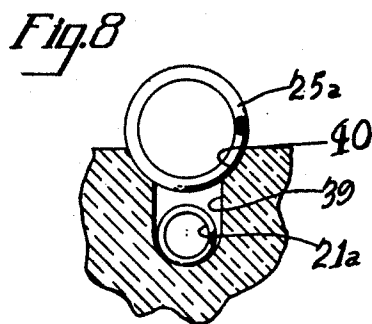
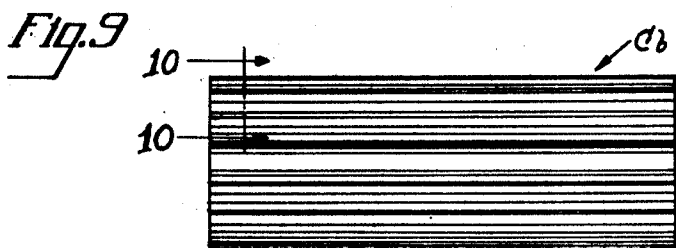
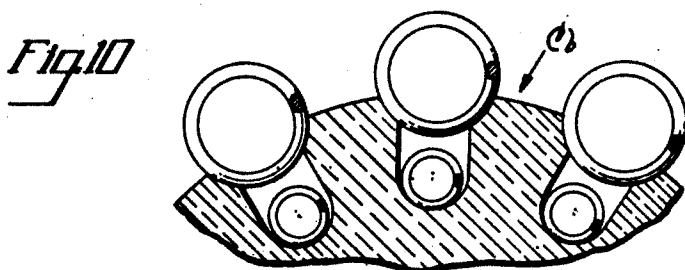
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ELECTRIC HEATERS

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3 Sheets-Sheet 3



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ELECTRIC HEATERS

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13 Claims. (Cl. 201—67)

Our invention relates to electric heaters, more particularly to electric resistance heaters having two or more resistors each providing a specific heat output, and the principal object of our invention is to provide new and improved electric heaters of the character described.

The embodiments of the invention herein disclosed are particularly adapted for use in electric percolators and each comprises a plurality of turns of electric resistance wire enclosed in a sheath that is adapted to be immersed in the liquid container in the percolator. However, it will be apparent that our invention has utility in other related fields.

In the past, percolator heaters have been constructed by winding electric resistance wire about a core; disposing the core within a sheath; filling the sheath with electrical insulating, heat-conductive granular material; and then sealing the sheath to prevent loss of the granular material and to protect against the entrance of foreign matter. However, prior-art percolator heaters having two separate resistors providing high and low heat output have been expensive to manufacture and have been relatively short lived because of the multiplicity of parts and because of the difficulty in tightly packing the granular material in the sheath.

Our invention greatly reduces the cost of producing percolator heaters since it reduces the number of parts, facilitates assembly operations, and greatly reduces the possibility of having spaces within the sheath that are not filled with the granular material. These and other advantages will become apparent from a study of the following description and of 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 our invention may assume, and in these drawings:

Figure 1 is an elevational view of an electric heater constructed in accordance with our invention, parts being broken away to show interior construction,

Figure 2 is a slightly enlarged perspective view of the core forming a part of the embodiment of our invention shown in Figure 1 and upon which the electric resistance wires are adapted to be wound,

Figure 3 is a sectional view generally corresponding to the line 3—3 of Figure 2, the electric resistance wires being shown positioned upon the core,

Figures 4 and 5 are views of the perspective ends of the core shown in Figures 2 and 3,

Figure 6 is an elevational view of a core similar to that shown in Figure 2 but somewhat modified therefrom,

Figure 7 is an enlarged, fragmentary sectional view generally corresponding to the line 7—7 of Figure 6 but showing the resistance wires positioned on the core,

Figure 8 is a view similar to Figure 7 but showing a modified groove construction,

Figure 9 is an elevational view of a further modified core, and

Figure 10 is an enlarged, fragmentary sectional view

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generally corresponding to the line 10—10 of Figure 9 but showing the resistance wires positioned thereon.

The herein disclosed embodiments of our invention comprise immersion heaters adapted for use with percolators and the like. In each embodiment, a core supporting a plurality of resistors is adapted to be disposed within a casing 10 (see Figure 1) that is in turn adapted to be immersed within the liquid-filled interior of the percolator (not shown).

In the embodiment of the invention shown in Figures 1 through 5, the core C may be formed of any suitable dielectric material and comprises an elongated body portion 11 having one end formed to provide an enlarged shoulder portion 12. In this embodiment, the body portion 11 has a relatively shallow, spiral groove 13 formed in its periphery for a purpose to be disclosed, and a plurality of grooves, shown in Figures 2 through 5 to be four in number and indicated at 14, 15, 16 and 17, extend longitudinally from one end to the other of the core. As illustrated, the grooves 14, 15, 16 and 17 extend well below the periphery of the core for a purpose to be shown.

As best shown in Figures 3 and 4, the shoulder portion 12 is slotted at 18 to provide a channel that joins the grooves 14, 16 at this point. As shown in Figures 2 and 5, arcuate grooves 19 are formed in that end of the body 11 which is opposite the shoulder portion 12 to provide respective channels that join certain of the longitudinally extending grooves at this end of the core. In the presently disclosed embodiment, one of the arcuate grooves 19 connects groove 14 with groove 15 and the other arcuate groove 19 connects groove 16 with groove 17.

The end portion of the body 11 opposite the shoulder portion 12 is provided with a central recess 20 (see Figures 2 and 3) which is cooperable with a portion of the sheath 10 to center the core within the sheath in a manner later to be disclosed.

In the embodiment disclosed in Figures 1 through 5, a resistance wire is formed to provide an elongated coil 21 which has relatively low wattage and which is adapted to be wound upon the core C in the grooves 14, 15, 16 and 17. Respective ends of the coil 21 are secured to terminal leads 22 which extend outwardly and axially of the shoulder portion 12. The leads 22 are adapted to be secured to the respective ends of the coil 21 by any suitable mechanical and electrical connectors 23, and the connectors are adapted to seat in recesses 24 which are formed in the shoulder portion 12 of the core C and which are aligned with the grooves 15, 17.

As illustrated, the coil 21 extends from the recess 24 adjacent groove 15, in one direction longitudinally along groove 15 to one of the arcuate grooves 19, along groove 19 to groove 14, in the opposite direction longitudinally along groove 14 to slot 18, along slot 18 to groove 16, in said one direction longitudinally along groove 16 to the other arcuate groove 19, and along groove 19 to groove 17, and in said opposite direction longitudinally along groove 17 to the recess 24 adjacent this groove.

Another resistance wire is formed to provide an elongated coil 25 which, in the embodiment shown in Figures 1 through 5, has a relatively high wattage, and this coil is adapted to be wound in the spiral grooves 13 which are formed in the periphery of the body portion 11. Opposite ends of the coil 25 are adapted to be secured, by any suitable means, to respective electrical leads 26, 27 which extend outwardly and axially of the shoulder portion 12. Mechanical and electrical connectors similar to connectors 23 may be used if desired.

One end of the coil 25 is adapted to be secured to lead 26 which extends through a bore 28 (see Figures 2 and 4) formed in the core and disposed longitudinally thereof.

The other end of the coil is secured to lead 27 which extends through a slot 29 (see Figure 4) formed in the shoulder portion 12.

As previously mentioned and as shown in Figure 1, the core C and supported coils 21, 25, are adapted to be enclosed within a sheath 10. The sheath 10 is preferably formed of metal or other suitable material and is provided, in the present embodiment, with an integrally formed end wall 30. The end wall 30 is formed to provide a centrally disposed, axially and inwardly extending projection 31 which is adapted to seat in the recess 20 formed in the core C.

In assembled relation, the end of the casing 10 opposite the wall 30 extends beyond the shoulder portion 12 of the core C and this end is adapted to be turned radially and inwardly over the shoulder portion 12 at 32 so as to securely lock the core within the casing. In the relation of parts shown in Figure 1, it will be clear that the left-hand end of the core C will be centered within the casing 10 because of the interengagement between the projection 31 and the recess 20, and the right-hand end of the core will be centered by interengagement of the shoulder portion 12 with the interior of the casing.

A portion of the casing 10 intermediate its ends is formed to provide a shoulder 33 and an adjoining portion of the casing is threaded at 34 as shown. As will be understood, the shoulder 33 and the threads 34 provide means for securing the heater to a support, such as the wall surface of a percolator (not shown).

After assembly of the core C with the casing 10 as described above, the interstices within the sheath 10 are filled with any suitable heat-conductive, electric-insulating material 35. The insulating material is introduced into the casing by disposing the heater vertically with the terminal leads uppermost and feeding the insulating material into the casing through slots 36 formed in the periphery of the shoulder portion 12 and through the previously described slots and grooves formed therein. As will readily be apparent, filling the casing 10 with the insulating material and compacting of such material may be facilitated by vibrating the heater during such operation.

After the casing 10 has been substantially filled with insulating material and such material has been suitably compacted, a suitable cement 37 may be employed to seal the open end of the casing against the entrance of foreign material and to prevent shifting of the insulating material within the casing. The cement 37 may be of the air-dry type which is plastic during the time it is positioned within the casing and which dries to form a hard, impervious closure.

When the cement 37 has set, the heater may be installed within a percolator (not shown) and suitable electrical connections may be made to the leads 22, 22, 26 and 27 to provide for current flow through the coils 21, 25. It will be appreciated that the electrical connections may be made to selectively energize either one or the other of the coils, or to energize both of the coils at the same time.

Another embodiment of our invention is shown in Figures 6 and 7 to comprise a core Ca which is similar to Core C and which has an elongated body portion 11a and an enlarged shoulder portion 12a. However, in this embodiment, a relatively deep spiral groove 38 is formed in the periphery of the body portion 11a for receiving the electric resistance wires 21a, 25a.

As illustrated in Figure 7, the groove 38 is so proportioned that the coiled resistance wire 21a may be disposed in the bottom of the groove well below the periphery of the body portion 11a. The coiled resistance wire 25a is adapted to also be disposed in the groove 38; however, since this wire is formed to a coil of larger diameter than that formed by wire 21a and since this large diameter coil can only partially enter the groove 38, it will seat in

the groove 38 in the manner shown in Figure 7 and in spaced relation with the wire 21a.

Obviously, in the embodiment shown in Figures 6 and 7, wire 21a will first be wound upon the body portion 11a of the core Ca so that it seats in the bottom of the groove 38. The wire 25a may then be wound about the body portion 11a so that it seats in the groove 38 in the manner shown. Although not shown, the ends of the respective wires 21a, 25a may be secured to respective leads in the manner hereinbefore described and those leads may extend through holes and/or the slots in the core Ca in a manner similar to that disclosed with respect to core C. Furthermore, it is to be understood that the core Ca, together with its wires 21a, 25a, may be assembled with a casing 10 as hereinbefore disclosed.

Referring to Figure 8, the core may be formed, if desired, with grooves 39 which are similar to grooves 38; however, grooves 39 are enlarged at 40 adjacent the periphery of the core to provide an enlarged seat for the coiled wire 25a wherein it will be more securely supported against displacement.

Figures 9 and 10 disclose a shoulderless core Cb having grooves which extend longitudinally of the core instead of spiralling thereabout as shown in Figure 6. This construction is advantageous in that it is well-suited for production of the core by extrusion. If desired, a separate shoulder portion may be positioned adjacent the core Cb upon assembly of the heater or the shoulder portion may be secured thereto or formed integrally therewith as will be clear. Although the embodiment shown in Figures 9 and 10 employs grooves formed as shown in Figure 8, it will be obvious that the groove shown in Figure 7 could also be employed.

In view of the foregoing it will be apparent to those skilled in the art that we have accomplished at least the principal object of our invention and it will also 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 our invention is not limited thereto.

We claim:

1. An electric heater, comprising a core having a plurality of longitudinally extending channels, and a resistance wire having a plurality of turns wound upon said core, certain of said turns being wound longitudinally of said core and disposed in said channels and certain other of said turns being wound transversely about said core.
2. An electric heater, comprising a rod-like core having a plurality of longitudinally extending slots, and a resistance wire having a plurality of turns wound upon said core, certain of said turns being wound longitudinally of said core and disposed in said slots below the peripheral surface of said core and certain other of said turns being wound transversely upon the periphery of said core.
3. A multi-heat electric heater, comprising a core having a plurality of longitudinally extending channels, and a pair of resistance wires each having a plurality of turns wound upon said core, one of said wires being wound longitudinally of said core and disposed in said channels and the other of said wires being wound transversely about said core.
4. A multi-heat electric heater, comprising a rod-like core having a plurality of longitudinally extending slots formed in its periphery, and a pair of resistance wires each having a predetermined wattage rating and each having a plurality of turns wound upon said core, one of said wires being wound longitudinally of said core and disposed in said slots below the peripheral surface of said core and the other of said wires being wound transversely upon the periphery of said core.
5. A multi-heat electric heater, comprising a rod-like

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core having a plurality of longitudinally extending slots formed in its periphery and also having an axially extending spiral groove formed in its periphery, and a pair of resistance wires each having a predetermined wattage rating and each having a plurality of turns wound upon said core, one of said wires being wound longitudinally of said core and disposed in said slots below the peripheral surface of said core and the other of said wires being wound transversely of said core and disposed in the spiral groove formed therein.

6. A multi-heat electric heater, comprising a rod-like core having a radially extending shoulder portion adjacent to one end thereof and having an axially extending recess entering from the other end thereof, said core having a plurality of longitudinally extending slots formed in its periphery, a pair of resistance wires each having a predetermined wattage rating and each having a plurality of turns wound upon said core, one of said wires being wound longitudinally of said core and disposed in said slots below the peripheral surface of said core and the other of said wires being wound transversely of the axis and upon the periphery of said core, and a tubular casing for said core, one end of said casing having an end wall provided with a projection directed axially and inwardly of said casing and engageable within the recess in said core to thereby position said core within said casing, and the opposite open end of said casing being turned inwardly over the shoulder portion of said core to maintain said core within said casing.

7. A multi-heat electric heater, comprising a rod-like dielectric core having a radially extending shoulder portion adjacent to one end thereof and having an axially extending recess entering from the other end thereof, said core having a plurality of longitudinally extending slots formed in its periphery, a pair of resistance wires each having a predetermined wattage rating and each having a plurality of turns wound upon said core, one of said wires being wound longitudinally of said core and disposed in said slots below the peripheral surface of said core and the other of said wires being wound transversely of the axis and upon the periphery of said core, a tubular casing for said core, one end of said casing having an end wall provided with a projection directed axially and inwardly of said casing and engageable within the recess in said core to thereby position said core within said casing, the opposite open end of said casing being turned inwardly over the shoulder portion of said core to maintain said core within said casing, electric-insulating, heat-conducting material filling the interstices within said casing, and means closing the open end of said casing to guard against entrance of foreign material.

8. A multi-heat electric heater, comprising a core having a groove in its exterior, the cross-section of said groove providing a shoulder portion spaced from the bottom of said groove, a first electric resistance wire disposed in said groove and supported by the bottom of said groove, and a second electric resistance wire disposed in said groove and supported by said shoulder portion in overlying spaced relation with respect to said first electric resistance wire.

9. An electric heater comprising a core having groove means formed in its exterior and extending radially inwardly thereof, and electrical resistance means having a plurality of turns wound in spaced relation upon said

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core, certain of said turns being seated wholly within said groove means radially inwardly of the exterior of said core and confined against displacement and separated from each other by the defining walls of said groove means and certain other of said turns being spaced radially outwardly of said core from said first mentioned turns.

10. An electric heater comprising a core having groove means formed in its exterior and extending radially inwardly thereof, and electrical resistance means having a plurality of turns wound in spaced relation upon said core, certain of said turns being of a size to fit wholly within said groove means inwardly of the exterior of said core and confined against displacement and separated from each other by the defining walls of said groove means and certain other of said turns being of a size only partially fitting within said groove means whereby such turns are spaced radially outwardly of said core from said first mentioned turns.

11. An electric heater comprising a core having an axially extending recess entering from one end thereof, electrical resistance means wound upon said core and having terminal conductor portions extending axially from the other end as said core, a relatively thin casing enclosing said core and having a tubular wall portion of a length somewhat greater than said core, said casing having one end closed by a structurally integral wall which is depressed axially and inwardly of said casing to provide an internal projection which seats in said core recess to thereby locate said core in spaced relation to the tubular wall portion of said casing, said core being inserted within said casing through the end opposite to that which carries said end wall and a portion of said opposite end of said casing being turned inwardly over said core for engagement therewith to maintain the latter in position within said casing.

12. An electric heater comprising a core having groove means formed therein, a first electric resistor carried by said core and of a size to fit wholly within said groove means and seated against the latter's bottom defining wall, and a second electric resistor carried by and spaced radially of said core from said first resistor and of a size to seat against groove means defining portions spaced from said bottom defining wall.

13. An electric heater comprising a core having groove means formed therein, and a pair of electric resistors wound upon said core in generally co-extensive relation and comprising a first resistor of a size to fit wholly within said groove means and seated against the latter's bottom defining wall and a second resistor spaced radially of said core from said first resistor and of a size to seat against groove means defining portions spaced from said bottom defining wall.

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