

June 16, 1931.

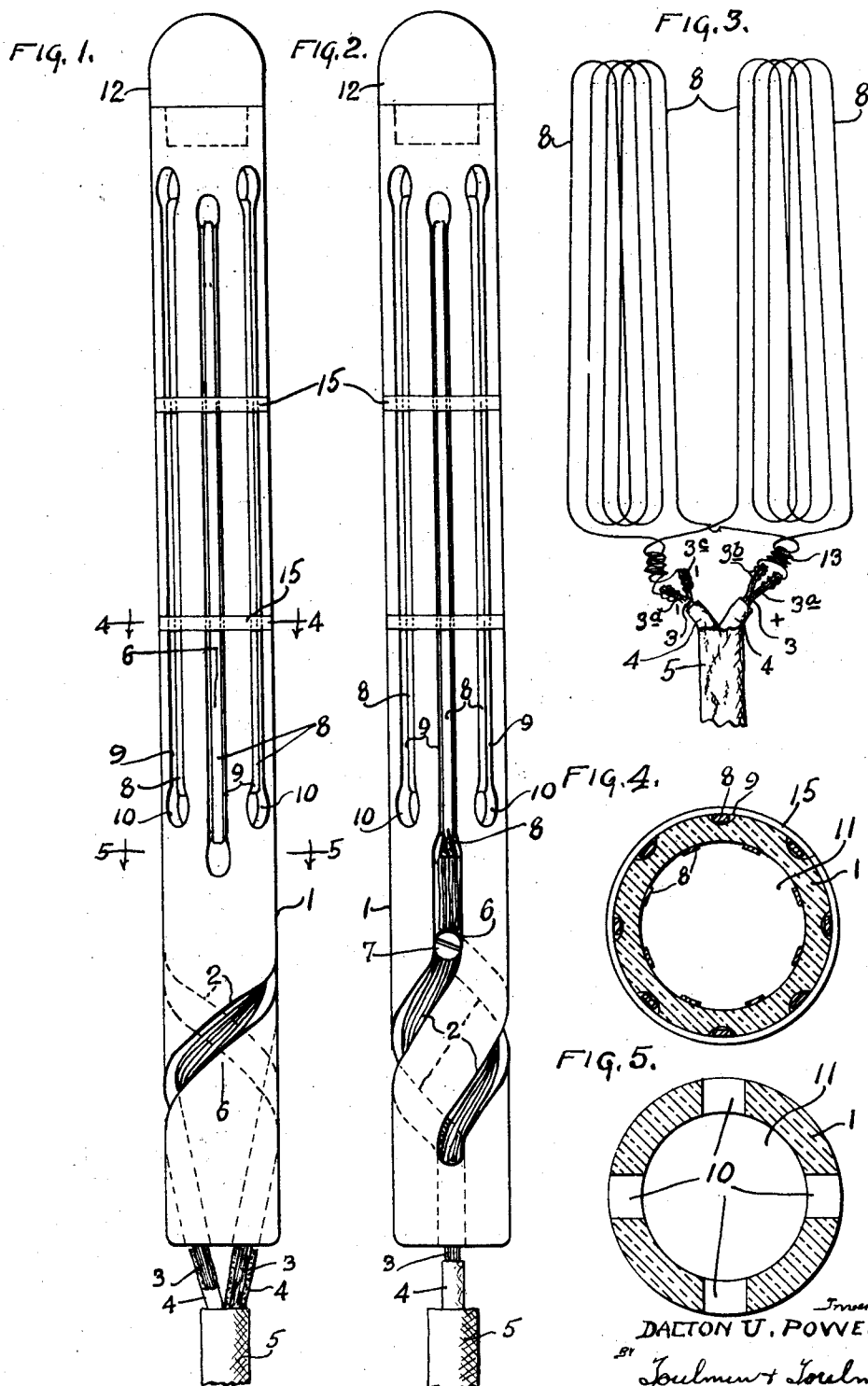
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HEATING APPARATUS FOR LIQUIDS

Filed May 1, 1929

2 Sheets-Sheet 1



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FIG. 6.

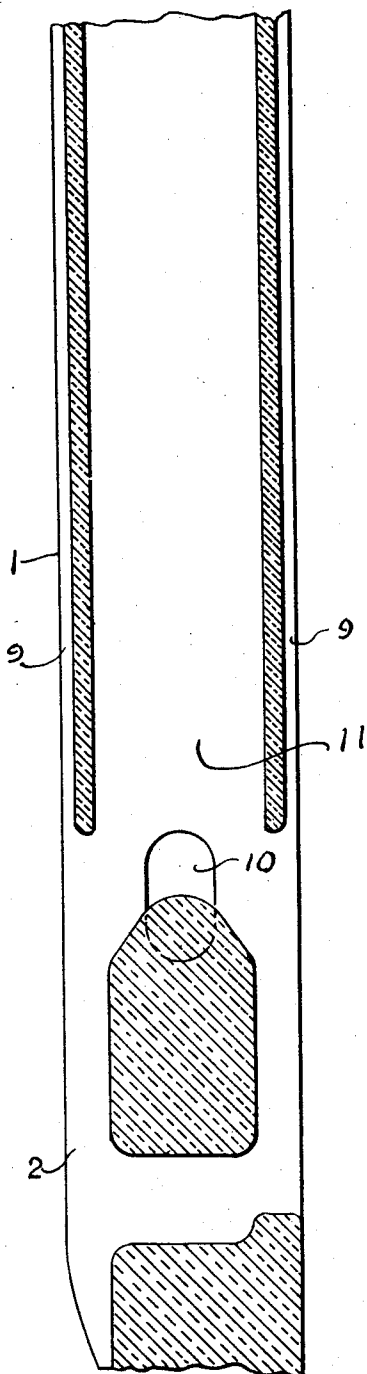
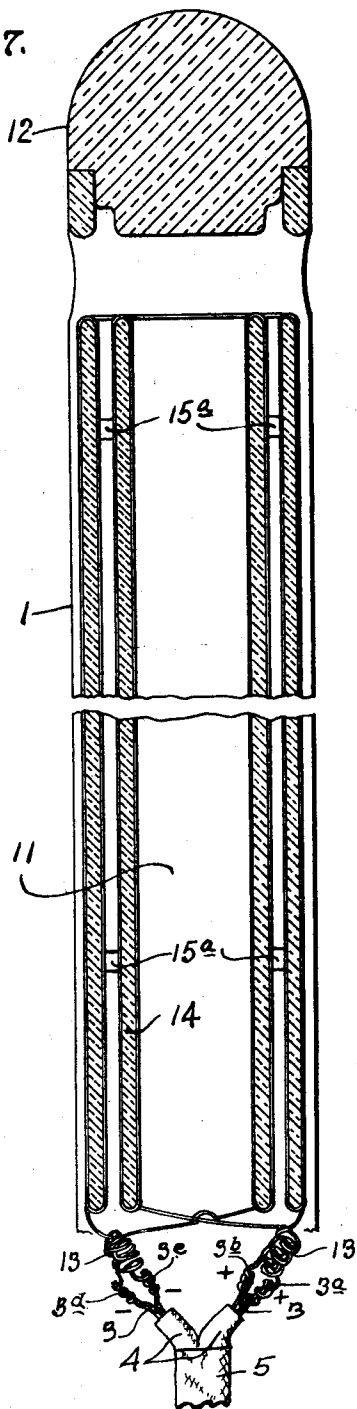


FIG. 7.



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HEATING APPARATUS FOR LIQUIDS

Application filed May 1, 1929. Serial No. 359,435.

My invention relates to electrical heating apparatus for liquids.

It is the object of my invention to provide means of very rapidly heating liquids, particularly volatile liquids, such as oils, by inserting in the liquid in direct contact therewith the heating element through which the current is flowing.

It is a further object to provide such a heating element that may be used with any type of current.

Referring to the drawings:

Figure 1 is an elevation of one side of the heating element of my invention;

Figure 2 is an elevation of the other side;

Figure 3 is a diagrammatic view of the arrangement of the electrical feed wires of the heating ribbons used as resistances;

Figure 4 is a section on the line 4—4 of Figure 1;

Figure 5 is a section on the line 5—5 of Figure 1;

Figure 6 is a section on the line 6—6 of Figure 1;

Figure 7 is a section through a portion of Figure 1 showing the installation of a supplementary telescoped concentric insulation support in order to give greater resistance in the ribbon area in the liquid.

Referring to the drawings in detail, 1 is a tubular member of porcelain, or other insulation material, which is provided with a pair of spiral grooves 2 in which are located a plurality of copper wires 3 which form, respectively, the positive and negative sides of a circuit. Such wires are encased in an insulation of varnished fabric 4. The two cables thus formed are encased in a rubber housing 5. The free ends of these cables enter the bottom of the insulator 1 and thence make their exit in separated condition into the spiral grooves 2 on the outside of the container and then re-enter the hollow interior of the insulator as at 6 where they cross over being held in position by the set screws or screw bolts 7. The free ends are then connected to the resistance ribbons 8 that are wound around portions of the insulator in the grooves 9 through the apertures 10, the

insulator being hollow at 11. The hollow end is closed by the plug 12.

Referring to the wiring diagram in Figure 3, the ribbons 8 are connected at their free ends to the split cable 3 which is divided into two parts 3a and 3b. 3a and 3b are connected to the respective ends of the ribbons 8, which ribbons are connected together as at 13.

By this arrangement, if the portion of the cable 3a is positive, its ribbon will be twisted at 13 and thence proceed to the negative cable 3c having been twisted with the corresponding ribbon which is attached to the portion of the cable marked 3d. The cables 3c and 3d are negative.

When it is desired to increase the length of the ribbons, I provide an interior telescopic sleeve of porcelain 14 on which the metal ribbons constituting the resistance are wound continuously.

These ribbons may be held in position by horizontally disposed retaining bands 15. The inner insulator 14 is spaced from the outer insulator 1 by the spacing studs 15a.

It will be understood that I desire to comprehend within my invention such modifications as may be necessary to adapt it to varying conditions and uses.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In an electrical resistance unit, positive and negative electrical supply cables having their ends divided in two spaced parts, a resistance ribbon connected to one of said parts on the positive side to a corresponding part on the negative side, a second resistance ribbon so connected, said respective ribbons being twisted together adjacent their points of connection to the supply cables.

2. In an electrical resistance unit, positive and negative electrical supply cables having their ends divided in two spaced parts, a resistance ribbon connected to one of said parts on the positive side to a corresponding part on the negative side, a second resistance ribbon so connected, said respective ribbons being twisted together adjacent their points of connection to the supply cables, an insulating

member for supporting a winding of said resistance ribbons.

3. In an electrical resistance unit, a positive and negative supply cable comprising a plurality of fine wires wound together, the ends of each of said cables being divided into two parts, a resistance ribbon connected at its respective ends to a positive and negative part of each cable, a second resistance ribbon so connected, said ribbons being wound together adjacent their points of connections to the divided ends of the cables.

4. In an electrical resistance unit, a positive and negative supply cable comprising a plurality of fine wires wound together, the ends of each of said cables being divided into two parts, a resistance ribbon connected at its respective ends to a positive and negative part of each cable, a second resistance ribbon so connected, said ribbons being wound together adjacent their points of connections to the divided ends of the cables, an insulator adapted to support said supply cables and loops of the resistance ribbons in spaced condition.

5. In an electrical resistance unit, a positive and negative supply cable comprising a plurality of fine wires wound together, the ends of each of said cables being divided into two parts, a resistance ribbon connected at its respective ends to a positive and negative part of each cable, a second resistance ribbon so connected, said ribbons being wound together adjacent their points of connections to the divided ends of the cables, an insulator adapted to support said supply cables and loops of the resistance ribbons in spaced condition, said insulator comprising a hollow body through which liquid can circulate, said resistance ribbon being wound on both sides of said body.

6. In an electrical resistance unit, an insulator having end passageways, spiral exterior grooves communicating therewith, a horizontal transverse passageway and longitudinally-disposed passageways communicating with a transverse passageway and a spiral passageway, a hollow shell having a plurality of spaced apertures at either end communicating with said passageways.

7. In an electrical resistance unit, an insulator having end passageways, spiral exterior grooves communicating therewith, a horizontal transverse passageway and longitudinally-disposed passageways communicating with a transverse passageway and a spiral passageway, a hollow shell having a plurality of spaced apertures at either end communicating with said passageways, a resistance ribbon continuously wound on the exterior and interior of said shell, and supply cables connected thereto entering the passageways through said insulator and traveling through the grooves and passageways therein in spaced condition.

8. In an electrical resistance unit, an insulator having end passageways, spiral exterior grooves communicating therewith, a horizontal transverse passageway and longitudinally-disposed passageways communicating with a transverse passageway and a spiral passageway, a hollow shell having a plurality of spaced apertures at either end communicating with said passageways, a resistance ribbon continuously wound on the exterior and interior of said shell, and supply cables connected thereto entering the passageways through said insulator and traveling through the grooves and passageways therein in spaced condition, and transverse retaining bands on the exterior of said insulator over said resistance ribbons, and vertically disposed grooves in said insulator for retaining said ribbons in place laterally.

9. In an electrical resistance unit, an insulator comprising a cable supporting base and a hollow resistance ribbon supporting portion having apertures communicating with the hollow interior for the circulation of fluid therein, supply cables having divided ends, resistance ribbons connected to said respective positive and negative supply cables at their divided ends, means for connecting said resistance ribbons adjacent said divided ends.

10. In an electrical resistance unit, an insulator comprising a cable supporting base and a hollow resistance ribbon supporting portion having apertures communicating with the hollow interior for the circulation of fluid therein, supply cables having divided ends, resistance ribbons connected to said respective positive and negative supply cables at their divided ends, means for connecting said resistance ribbons adjacent said divided ends, and a supplementary concentric resistance insulating element mounted within the first mentioned hollow element in spaced relationship therefrom upon which said resistance ribbons are additionally wound.

11. In an electrical resistance unit, an insulator comprising a cable supporting base and a hollow resistance ribbon supporting portion having apertures communicating with the hollow interior for the circulation of fluid therein, supply cables having divided ends, resistance ribbons connected to said respective positive and negative supply cables at their divided ends, means for connecting said resistance ribbons adjacent said divided ends, and a supplementary concentric resistance insulating element mounted within the first mentioned hollow element in spaced relationship therefrom upon which said resistance ribbons are additionally wound, and a closure for the end of the hollow interior of said resistance element.

In testimony whereof, I affix my signature.

DALTON U. POWELL.