April 19, 1932. E. F. SUTER 1,854,529

HEATER FOR HAIR WAVING APPARATUS

Filed March 11, 1929

Fig. 1.

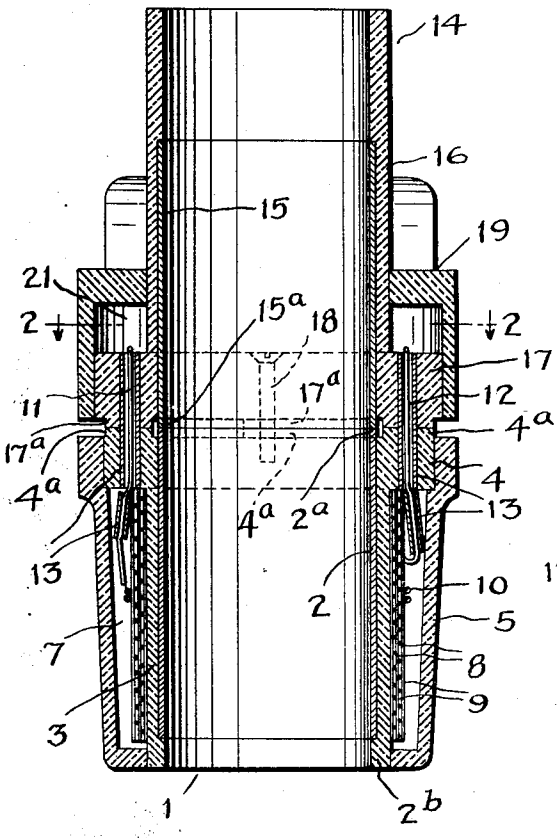


Fig. 2.

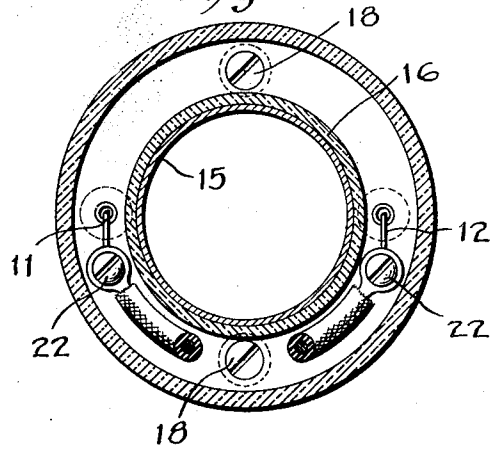
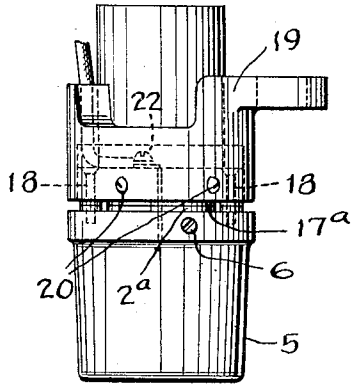


Fig. 3.



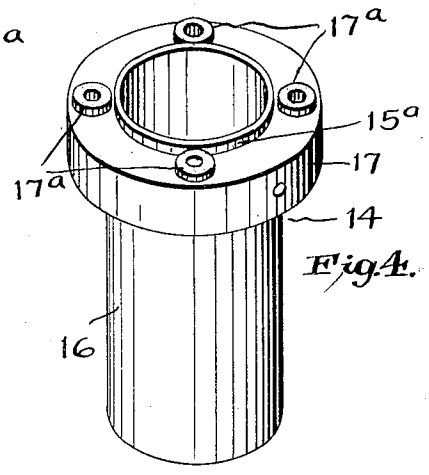


Fig. 4.

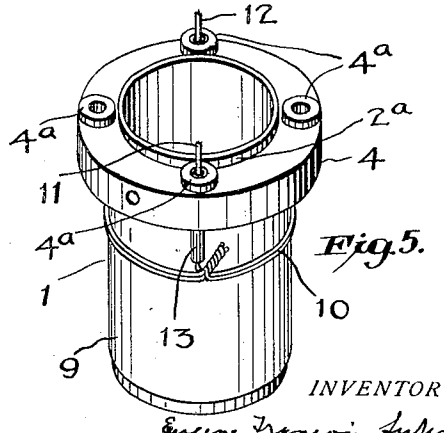


Fig. 5.

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UNITED STATES PATENT OFFICE

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HEATER FOR HAIR WAVING APPARATUS

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The present invention relates to heaters for curling the hair, and has particular reference to heaters of the type wherein a tube adapted to receive a suitably prepared tress of hair is externally heated by an electric heating element, the requisite heat being transmitted to the hair by conduction through the tube.

In the earlier forms of heater of this type, metal tubes have been employed, because of their relatively high heat conductivity, and upon these tubes, and insulated therefrom by thin sheet mica, have been wound the resistance wires comprising the heating units. It has been found, however, that this form of construction presents a serious objection, as misplacement of any part of the heating unit, or a break of any sort in the insulation protecting the lead-in wires, is likely to cause a short circuit through the metal tube. As heaters of this character are used in groups of relatively large numbers, the total current consumption from a single source is sufficiently great to necessitate the use of relatively heavy fuses, which will in the case of a short circuit pass sufficient current to cause a relatively large arc before a fuse blows. Short circuits have in the past caused arcs of sufficient magnitude to fuse relatively large sections of the metal tube, and the seriousness of such mishaps with the heater close to the scalp of the person whose hair is being treated is obvious. Many different expedients have been tried to eliminate this trouble, but without success. For example, tubes of porcelain or similar material have been employed, but have been found unsatisfactory because of their necessary bulk and weight, and also because of breakage due to alternate heating and cooling and other causes. Likewise, heating tubes of various synthetic compositions, such as bakelite, have been tried and found unsatisfactory because of their warping at the high temperatures to which they must be heated.

The present invention has for its principal object the elimination of the difficulties heretofore encountered, by the provision of an improved form of heating tube which combines with strength and lightness a high coefficient of heat conduction and high dielectric strength. A further object is the provision of a heater of the class described in which a metal tube may be employed without danger thereto from possible short circuits, due to the isolation thereof from the entire electrical circuit in the heater. The more detailed objects of the invention and the advantages to be derived from its use may best be understood from the following description of an illustrative embodiment of the invention as shown in the accompanying drawings forming a part hereof, in which:

Fig. 1 is a central vertical section on an enlarged scale of a heater constructed in accordance with the invention;

Fig. 2 is a section taken on the line 2—2 of Fig. 1;

Fig. 3 is an elevation of the heater shown in Fig. 1; and

Figs. 4 and 5 are enlarged perspective views of parts of the device.

Referring now to the drawings, the primary heating tube 1 is of composite form, comprising an inner metal sleeve 2 and an outer insulating sleeve 3. The primary requisites of this tube are high heat conductivity and high dielectric strength, and to this end the sleeve 2 is preferably made of aluminum or an aluminum alloy, which not only possesses a high coefficient of heat conductivity but is also relatively light in weight. The outer sleeve 3 is relied upon for the high dielectric strength necessary, and in order to secure this characteristic, together with the requisite lightness and heat-conducting capacity, this sleeve is preferably formed of some variety of phenol condensation product such as bakelite, which may be molded around the sleeve 2. Obviously, other materials having the same general electrical and physical properties, such as known hard rubber compositions, may be employed. Also, the sleeves 2 and 3 may be mechanically fitted, but the form of tube in which the outer sleeve is molded on the inner sleeve is to be preferred, as this construction insures an intimate contact, resulting in a substantially integral tube in which the possibility of relative displacement of the component parts is eliminated. Furthermore, such intimate contact

insures the maximum efficiency of heat transfer through the wall of the tube.

In the preferred form, the sleeve 2 extends slightly beyond the sleeve 3 at one end, as at 2^a, while at the opposite end of the tube the outer sleeve 3 extends beyond and over the end of sleeve 2, as at 2^b.

Sleeve 3 is provided at its upper end with a flange 4, upon the upper face of which are a plurality of bosses 4^a, the height of which is preferably the same as that of the extended end 2^a of the sleeve 2.

A generally conical insulating casing 5, preferably of the same material as sleeve 3, is fitted over tube 1, seating at one end around flange 4 and at the other end around the lower end of sleeve 3. The casing 5 may be conveniently secured in place by screws 6 entering flange 4.

The space 7 between the sleeve and the casing provides room for the heating element, which is of the conventional resistance type, comprising a number of layers of resistance wire 8 wound around sleeve 3 and insulated from each other by thin sheets of mica 9. The heater assembly is preferably held in position by the usual copper binding wires 10, to which one end of resistance wire 8 and also lead-in or connecting wire 11 are secured. A second lead-in wire 12 is secured to the other end of wire 8, and the lead-in wires are carried through suitable holes bored through flange 4. In order to hold the lead-in wires in position and to further insulate them, they may be enclosed in glass or other tubular beads 13.

Heaters of the class described usually comprise two or more distinct heating sections, and in the form chosen for illustration a secondary heating tube 14, receiving heat by conduction and radiation from the primary heating tube, is employed. In accordance with this invention, the secondary tube 14 is formed by an inner sleeve 15 and an outer sleeve 16, said sleeves being of the same materials and assembled in the same manner as the primary tube already described. Sleeve 16 is provided at one end with a flange 17, similar to flange 4, and a plurality of spaced, longitudinally extending bosses 17^a. As in the case of tube 1, one end of sleeve 15 extends beyond the corresponding end of sleeve 16, as at 15^a, for a distance corresponding to the height of bosses 16^a.

The primary and secondary tubes are held together in aligned relation by screws 18 passing through flange 17 and two of the bosses 17^a into corresponding bosses 4^a, while the lead-in wires are preferably led through holes in two other pairs of bosses placed in alignment with the lead-in wire holes in flanges 4 and 17. As will be noted from Fig. 1, when the two tubes are assembled, the inner metal sleeve ends are in abutting relation, this contact forming a path for the conduction of heat from the primary to the secondary tube.

The secondary tube is surrounded by a holder 19, preferably of the same type of insulating material as sleeves 3 and 16, said holder fitting over flange 17 and being secured by screws 20. An annular space 21 is provided between the sleeve and the holder, and the usual flexible insulated cables are preferably led through the wall of the holder to this space, where they are connected to the lead-in wires by means of screws 22 secured in flange 17 and anchoring under their heads the ends of the cables and lead-in wires.

It will be noted that in the structure just described, the entire electrical system is completely isolated from the metal sleeves in the device, the heating element being entirely enclosed by the bakelite walls defining the space 7, while the lead-in wires, cables, connecting screws 22, etc., are likewise either enclosed in the space 21 or insulated from the metal sleeves and from each other by portions of the flanges 4 and 17. From this it will be evident that the danger of short circuit is minimized and, more important, that any short circuit which may occur, due to defective cable insulation, wire breakage, slippage, or any other cause, will be prevented from affecting the metal sleeves by some part of either sleeve 3 or 16, which are of sufficiently heat-resistant character to prevent the arc resulting from a short circuit from burning through to the metal.

While the invention has been illustrated as applied to a two section heater having a single heating element, it will be quite obvious that it may equally well be applied to other forms, such, for example, as those employing multiple heating elements, adjustable heating tubes and the like. The form shown is therefore to be considered as illustrative only and the invention is to be understood as limited only by the scope of the appended claims.

I claim:

1. In a heater of the class described, a composite heating tube comprising an inner metal sleeve and an outer flanged insulating sleeve, a spaced insulating casing around said outer sleeve, said casing having two spaced seats one of which engages the flanged portion of the sleeve and the other of which engages another portion of the sleeve, and an electric heating element in the space between the sleeve and the casing intermediate said seats.

2. In a heater of the class described, a pair of aligned composite heating tubes each comprising an inner metal sleeve and an outer insulating sleeve flanged at one end, means for holding said tubes in alignment with said flanged ends adjacent to each other, an electric heating element around one of said sleeves, connecting wires for energizing said element passing through said flanges, and insulating means for covering said element

and wires, said last-named means seating around said flange and being spaced from the insulating sleeves.

3. In a heater of the class described, an inner metal sleeve, an electric resistance heating element around a portion of said sleeve, connecting wires for energizing said element detachably secured thereto, and means for insulating all portions of said sleeve from the heating element and its connecting wires comprising a sleeve of insulating material between the heating element and said first-named sleeve, said insulating sleeve having passages therein through which the connecting wires pass.

4. In a heater of the class described, the combination of a primary composite heating tube comprising an outer insulating sleeve and an inner metal sleeve extending beyond one end of the outer sleeve, an electric heating element around said tube, a secondary composite heating tube comprising an outer sleeve of insulating material and an inner metal sleeve extending beyond one end of the outer sleeve, and means engaging said outer sleeves for holding the tubes in alignment with the extended ends of the metal tubes in abutting relation, whereby said secondary tube is heated by conduction from the primary tube.

5. In a heater of the class described, the combination of a primary composite heating tube comprising an outer insulating sleeve flanged at one end and an inner metal sleeve extending beyond said flanged end, an electric heating element around said tube, a secondary composite heating tube comprising an outer insulating sleeve flanged at one end and an inner metal tube extending beyond said flanged end, means for holding said tubes in alignment with the metal tubes in abutting relation, connecting wires for energizing said heating element passing through said flanges, means anchored in the flange of the secondary tube for joining the connecting wires to supply cables, an insulating casing attached to the primary tube flange and around the heating element, and an insulating holder having passages therethrough for the supply cables, said holder covering said joining means and being attached to the secondary tube flange.

6. In a heater of the class described, in which there is a heating tube to receive a tress of hair and an electric resistance heating element about said tube, a composite heating tube comprising an inner metal sleeve and an outer insulating sleeve formed of a phenol condensation product molded around said inner sleeve.

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