June 19, 1923. 1,459,665

S. ABEL

ELECTRIC IMMERSION LIQUID HEATER

Filed Jan. 21, 1922 2 Sheets-Sheet 1

FIG.1

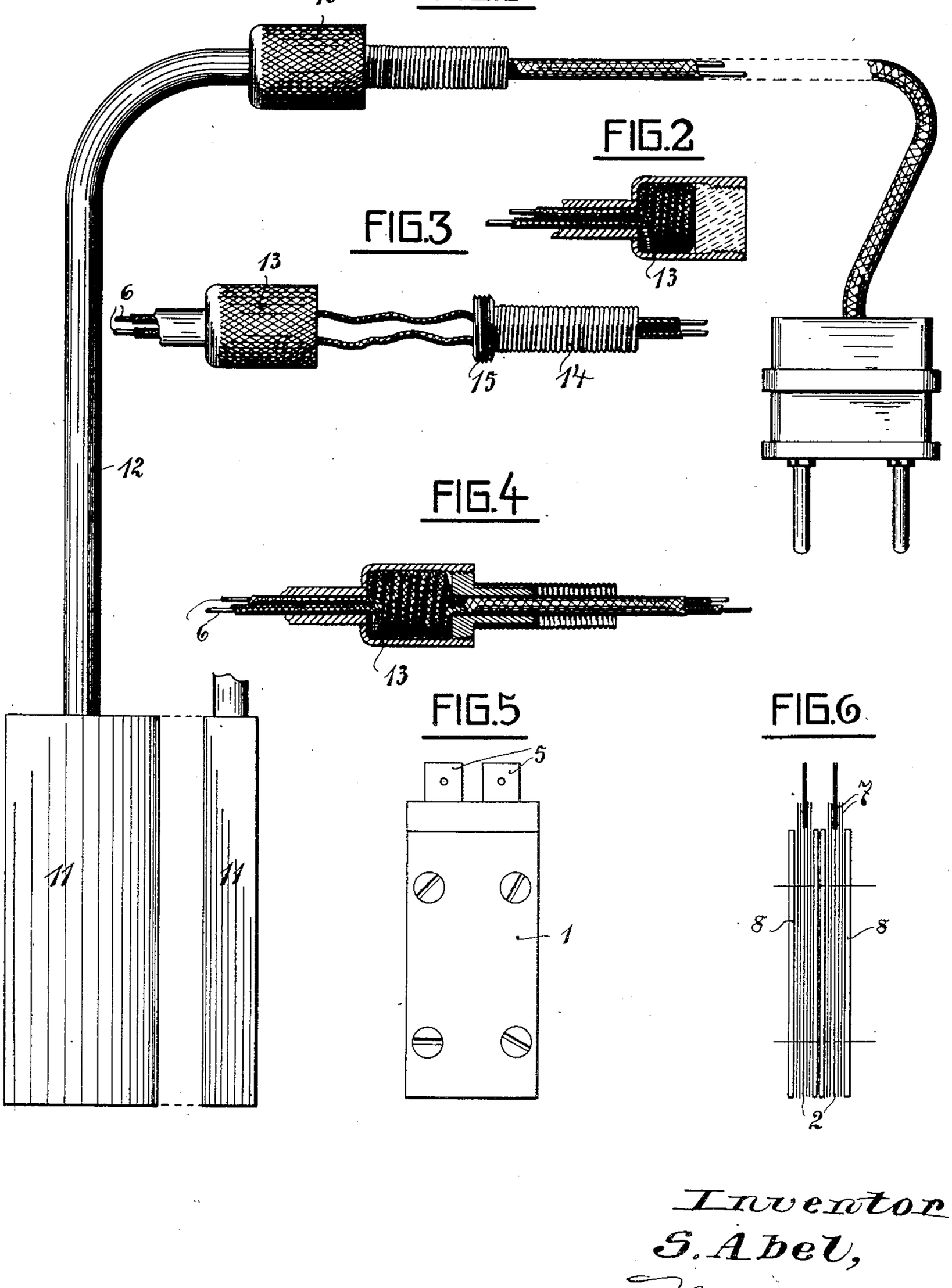

FIG.2

FIG.3

FIG.4

FIG.5

FIG.6

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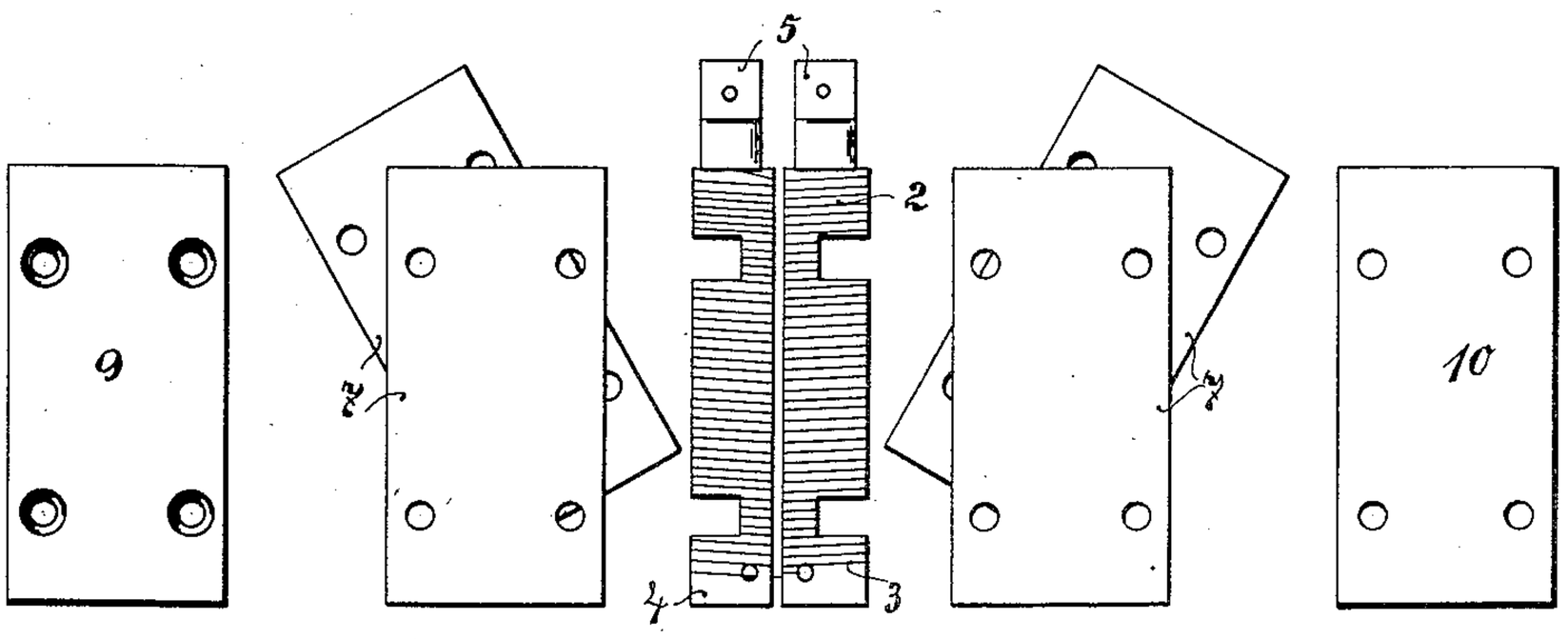
FIG.7



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UNITED STATES PATENT OFFICE.

SIEGFRIED ABEL, OF BERLIN, GERMANY.

ELECTRIC IMMERSION LIQUID HEATER.

Application filed January 21, 1922. Serial No. 530,908.

To all whom it may concern:

Be it known that I, SIEGFRIED ABEL, a citizen of the German Republic, and residing at 2 Heilbronner Strasse, Berlin W. 30, Germany, have invented certain new and useful Improvements in and Relating to Electric Immersion Liquid Heaters, of which the following is a specification.

This invention relates to electric immersion heaters of the kind comprising a heating resistance mounted on an insulating support and insulated from an enclosing metal casing by which the heat is transferred to the liquid to be heated.

Appliances of the kind referred to are usually made for a definite voltage of either 110 or 220 volts and an apparatus intended for one of these voltages cannot be used for the other. Hence the electric liquid heater, hereinafter referred to as the immersion heater, as it is immersed in the liquid to be heated, has to be selected for the particular voltage in each case. Since such appliances are intended to be used more especially on journeys and the voltages in different towns are different, the use of immersion heaters is relatively restricted or they are in many cases very rapidly destroyed, if sufficient care is not taken as regards the available voltage.

The object of the present invention is to obviate these drawbacks, by the immersion heater being made so that it may be used on any of the usual voltages between 110 and 220.

As is well known, heating of such appliances is effected by the current being passed through resistance wires, which are thereby heated. Hitherto, these resistances have been dimensioned according to the voltage for which the immersion heater was intended, the dimensions used for a 110 volts circuit being chosen differently from those used for a 220 volts circuit, thinner wires being employed in heaters constructed for the lower voltage of 110 and thicker wires in heaters constructed for the higher voltage of 220. Now, if a current at the voltage of 220 was inadvertently passed through a resistance intended for a 110 volts circuit, the heat developed was so great that the wire was rapidly fused, whereby the whole appliance was destroyed. This destruction of the appliance was all the more certain in the case of those appliances which had not sufficient provision for rapid radiation.

On the other hand, appliances constructed for the higher voltage of 220 did not become sufficiently hot when connected to the lower voltage of 110, so that they could not be used in practice for being connected to both circuits.

The immersion heater according to the present invention is so constructed as to be capable of being used on any of the usual supply voltages of approximately 110 and 220 volts. This is attained by giving the heating resistance which is wound on an insulating support and lies between mica sheets, a value calculated for the intermediate voltage of approximately 150 volts, which is not a commercially usual voltage, and by securing the heating element comprising the said resistance and mica sheets in between relatively thick masses of a metal, such as copper, which is a good conductor of heat, the whole of the heating element including the said copper plates being mounted in a metal casing with which the said masses of metal are in contact and by which the heat is transferred to the liquid in which the heater is immersed. When the heater thus constructed is connected to a circuit having the lower voltage of about 110, it gives off sufficient heat to heat the liquid in a short time, whilst when connected to a circuit having the higher voltage of about 220, it continues to work satisfactorily and it does not fuse, because of the rapid conduction of heat that is ensured by the said copper plates.

In the accompanying drawings a constructional example of the new immersion heater is shown,

Fig. 1 showing the immersion heater in elevation,

Fig. 2 the handle in section,

Fig. 3 the handle with the cable connector,

Fig. 4 the same handle in section,

Fig. 5 a front view of the heating body,

Fig. 6 the heating body in section and

Fig. 7 the separate parts of the heating body.

The heating body 1 shown in Figs. 5, 6 and 7 consists of the heating elements 2, which are made in the usual manner of resistance wires 3, which are wound on suitably shaped plates of insulating material 4. The resistance wires terminate in connecting lugs 5 for the flexible wires 6. The plates 2 lie between mica sheets 7. On either side of the mica sheet there is a

metal plate 8 of copper, the thickness of which is many times greater than that of the thin mica sheets. In this manner large masses of metal come in contact with the heating body and the heat produced in the heating wires 3 is very rapidly conducted away. Any number of such heating elements consisting of two resistance wires and mounted on insulating plates lying between mica sheets and two end copper plates can be mounted next to each other. In the constructional example shown two such elements are combined and fixed together by means of plates. The cover plate 9 and the bottom plate 10 are screwed together, the whole heating element being held together by this means.

The heating element fits as closely as possible in the casing 11 and the flexible wire 6 passes through the tube 12 to the handle 13.

The casing 11 with the tube and the handle consists in the present case of brass, so as to secure as good a heat conduction as possible. Brass is, however, not suitable for immersion in liquids in every case. For this purpose the parts must be provided with another covering of metal that will resist the action of the liquid, in most cases nickel. This cover is made electrolytically. Until this is effected the flexible wire 6 must be pressed together in the handle 13 in the manner shown in Fig. 2 and the hollow space is then completely closed by a stopper or a suitable filling. In this way the outer metal covering can be applied galvanically, without danger of the electrical contact parts in the interior being in any way damaged. After the galvanizing has been completed, the stopper is removed, the flexible wire is drawn out and connected in the usual manner to the flexible wire leading to the plug contact. A protecting piece 14, the thread 15 of which fits in the thread inside the handle, is first slid over the flexible wire. The thread of this protecting piece is screwed into the handle and thus protects the flexible wire at the point of connection.

Owing to the peculiar shape of the heating body it is possible to make an immersion heater having perfectly smooth surfaces, without any projecting parts, angles or the like, which might easily harbour dirt. Air spaces, which would prevent an immediate conduction of heat and the good transmission of heat aimed at, are entirely avoided.

The handle 13 does not only make it easy to manipulate the appliance, but makes it possible for it to be subsequently tinned in the manner described above.

What I claim is:—

An immersion heater for electrically heating liquids and intended to be used on supply circuits of approximately 110 and 220 volts comprising an insulating support, a heating resistance mounted on said insulating support and dimensioned for a voltage of approximately 150 volts, large masses of metal in the close proximity of the said heating resistance which metal is a good conductor of heat, means capable of electrically insulating the said large masses of metal from the heating resistance and of allowing the transfer of heat from the heating resistance to the said large masses of metal, and a casing the interior surface of which is in contact with the said masses of metal in order to receive the heat therefrom and transfer it to the liquid to be heated.

In testimony whereof I have signed my name to this specification.

SIEGFRIED ABEL.

Witnesses:
CHARLES L. TURRILL,
E. HOLTZERMAN.