Sept. 11, 1934. H. HOFER 1,973,629

METHOD OF MANUFACTURING ELECTRICAL HEATING BARS

Filed Feb. 8, 1932

Fig. 1

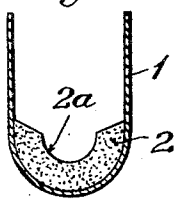


Fig. 2

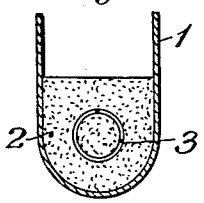


Fig. 3

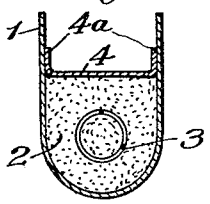


Fig. 4

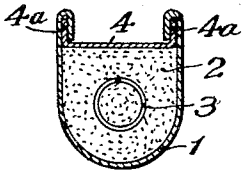


Fig. 5

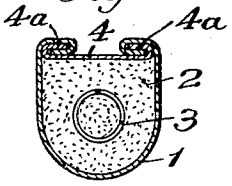


Fig. 9

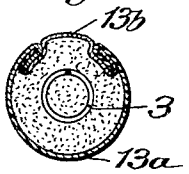


Fig. 6

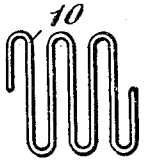


Fig. 8

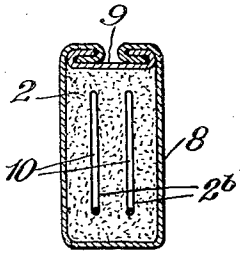
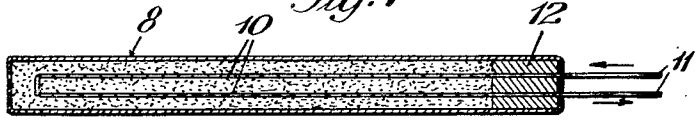


Fig. 7



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METHOD OF MANUFACTURING ELECTRICAL HEATING BARS

Hans Hofer, Aarau, Switzerland

Application February 8, 1932, Serial No. 591,687
In Switzerland February 15, 1931

1 Claim. (Cl. 201—67)

This invention relates to electrical heating bars comprising a heating member enclosed in a metal shell and to methods of manufacturing the same.

Heating bars of this type were hitherto made from tubular members in which the heating member provided with insulating members, for example insulating beads is loosely inserted. Such heating bars are, however, only applicable for low temperatures, the heat being compelled to pass through an air space on its way from the heating element to the shell.

It is also known to produce heating bars by pressing the heating member together with an insulating mass in a round tube by means of a special method, but this arrangement is disadvantageous in so far as the manufacture of tubes of heat resistive material requisite for this purpose is a matter of considerable difficulty and expense.

According to the present invention these drawbacks are eliminated by embedding the heating member of the heating bar in an insulating mass which is surrounded on all sides by a shell bent up from sheet metal.

In manufacturing heating bars in this manner preferably the mode is adopted that in a sheet metal channel of a U-shaped cross-section an insulating mass is inserted, the heating member embedded therein and the channel closed by bending and folding its free longitudinal edges in the manner of a seam, whereby in folding and pressing the metal shell the insulating mass including the heating member is compressed to form a compact body.

In a heating bar manufactured in this manner no hollow spaces are apt to be formed so that the heat conduction from the heating member to the insulating mass and from thence to the metal shell occurs in the best possible manner, and a heating member may be employed in the form of a straight massive bar or a helical coil or a conductor bent into zig-zag shape respectively.

Heating bars of this type are adapted to be assembled in grills or plates and permit of being bent, so that they may be readily adapted to the available space.

In the accompanying drawing, the method according to the invention is illustratively exemplified as well as several constructional forms of heating bars carried out with the aid of this method, in which

Figs. 1 to 5 illustrate in cross-section several stages in the manufacture of a heating bar

Fig. 6 is a fragmentary view of a heating member,

Fig. 7 is a longitudinal section of a modified constructional form of a heating bar,

Fig. 8 is a cross-section of the same on a larger scale, and

Fig. 9 is a cross-section of another constructional form of a heating bar.

The method of manufacturing a heating bar may, by way of example, be carried into effect in the following manner:

In a channel 1 of a U-shaped cross-section an insulating mass 2 is inserted and a longitudinal groove 2*a* of semi-circular cross-section impressed in the mass. In this groove a helically wound heating member or wire 3 is inserted and embedded in additional insulating mass up to approximately half the height of the channel (Fig. 2). A sheet metal cover 4 formed with upwardly bent longitudinal edges 4*a* is then placed on top of the mass (Fig. 3) and the marginal portions of the sheet metal channel folded inwardly over the edges 4*a* (Fig. 4) and subsequently the thus formed triple edge portions bent inwardly until they engage the sheet metal cover 4 snugly (Fig. 5) so as to provide a contour for the bar in the form of a U. Owing to the folding and bending operations the sheet metal shell is subjected to a certain amount of tension, thus causing it to bear firmly on the insulating mass 2, so that hollow spaces are avoided which would hinder the heat conduction. At the same time, in consequence of the pressure exerted on the insulating mass during folding the shell into seams, the insulating mass is compressed to form together with the heating member a compact body.

Instead of a helically coiled heating member, a conductor formed in zig-zag shaped convolutions may be inserted for this purpose, as shown in the Figs. 7, 8 and 9. The sheet metal channel 8 to form a rectangular shell, when open at one side is filled up to a part of its height with an insulating mass 2 and narrow longitudinal slots 2*b* impressed in the same. In the slots heating members, for example in the form of wires 10 bent into zig-zag-shaped convolutions, as illustrated in Fig. 6, are inserted and completely embedded in the insulating mass.

With the constructional form of the heating bar represented in the Figs. 7 and 8 the cover 8 is closed in the same manner as shown in the Figs. 1 to 5 for the respective example by combining a sheet metal strip 9 with the shell by folding the adjoining edges into seams. In the

insulating mass 2 the two heating conductors 10 formed in zig-zag-shaped convolutions are in parallel disposition and are connected in series, one conductor providing the supply member and the other the return member for the electrical current. In this manner both terminals are disposed at the same end of the bar and the supply wires 11 are held in a connecting plug, for example of steatite or the like.

Alternatively the heating bar may be given a circular cross-section in which case the shell is formed by a main part of originally U-shaped cross-section and a cover member combined with the same by folding the adjoining portions in a seam (Fig. 9).

Preferably the metal shell is composed of a heat resistive sheet metal of an approximate thickness of from 0.3 to 1 mm.

The insulating mass may either be inserted in moist or dry state respectively, for example in pulverized form.

Flat heating members, as shown in the Fig. 8, are readily assembled in plates (heating plates) the individual members being placed side by side with their flanks contacting each other.

I claim:

In a method of producing electrical heating bars comprising a heating wire embedded in an electrical insulating refractory substance encased in a metal shell under circumferential tension, the steps comprising forming a sheet metal channel of U-shaped transverse cross-section, inserting a mass of electrical insulating material in the U-shaped channel, embedding a coiled electrical heating wire in the mass of material, placing a metal plate having upstanding longitudinal marginal portions upon the material in the U-shaped channel, turning the edges of the channel about the upstanding edges of the plate and bending over the upstanding edges about each other whereby the metal casing so formed is placed under circumferential tension and the enclosed material is maintained under compression.

HANS HOFER.