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A. SCHIFFMANN
METHOD FOR THE PRODUCTION OF CONTACT-SAFE
AND CORROSION-PROOF TWIN METAL CONNECTORS
FOR ELECTRIC POWER CONDUCTORS

2,954,600

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2 Sheets-Sheet 1

Fig. 1

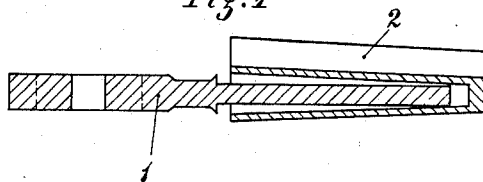


Fig. 2

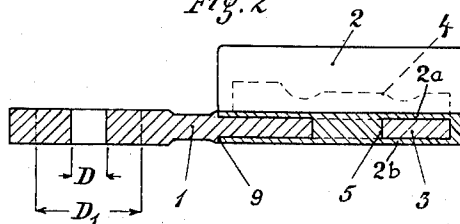


Fig. 3

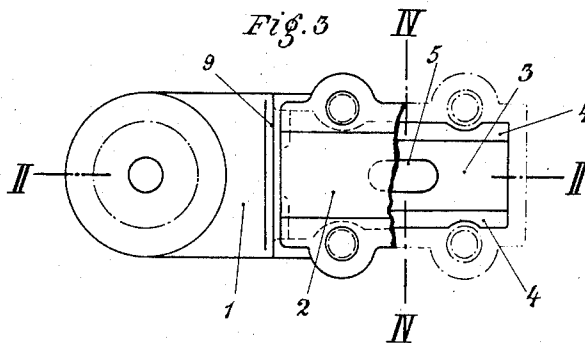
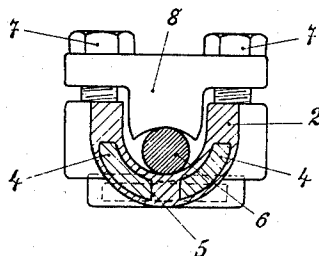


Fig. 4



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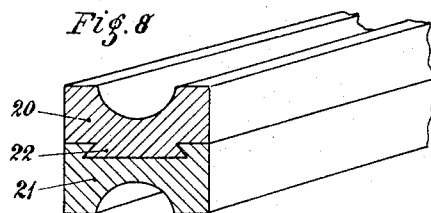
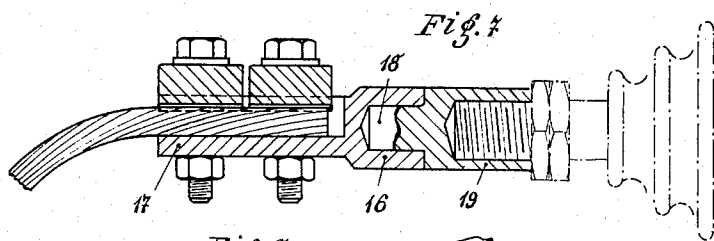
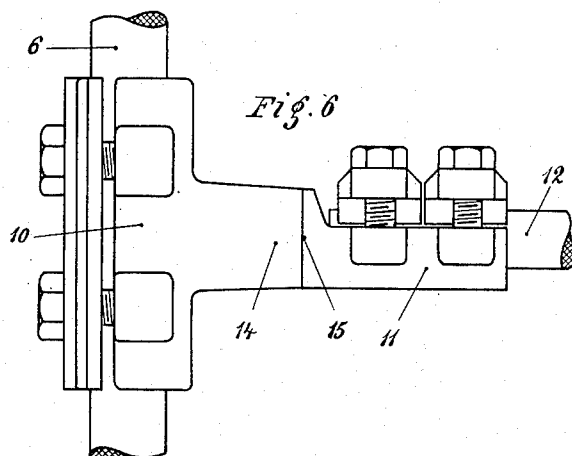
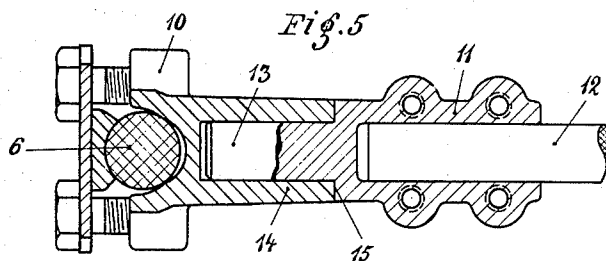
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METHOD FOR THE PRODUCTION OF CONTACT-SAFE AND CORROSION-PROOF TWIN METAL CONNECTORS FOR ELECTRIC POWER CONDUCTORS

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1 Claim. (Cl. 29-155.55)

The present invention relates to an electrical connector and to a method for producing contact-safe and corrosion-proof twin-metal connectors for electric power conductors.

It is already known in the art to produce twin-metal connectors for electric power conductors, i.e., connectors consisting of two materials of different strength for conductors of the same material, by providing the connectors with a coat of the second material through casting.

Twin-metal connectors of this kind may suffice for certain purposes. However, connectors produced by this casting method are unsatisfactory in cases where greatest importance must be attached to a contact-safe and corrosion-proof transition or flow of the current, or where in addition to the electric qualities also the strength of the connector is of considerable importance as for example for connectors which must resist pull.

The invention pertains to a method for the production of contact-safe and corrosion-proof twin-metal connectors for electric power conductors, and an important object of the invention is to force the metals employed in such connectors, for example copper and aluminum, into such tight and intimate contact with each other that the finished product practically consists of one single piece of material. Further advantages of the new method are: that it is of remarkable simplicity and is well-suited for mass production; and furthermore that the individual parts of the connectors appear in their customary formation.

The method of the invention is carried out as follows: The connector to be produced consists of an aluminum part and a copper part, which are inserted one into the other, then after both parts are strongly heated, for example, up to at least red-heat, one part is pressed around the red-hot other part while deforming the parts to an ultimate desired shape.

Depending upon the kind of connector to be manufactured, the individual parts are produced in customary manner through casting, drawing, stamping, pressing or the like. It is also possible to provide the parts with their shape merely through the hot pressing step of this invention.

Additional features and advantages of the invention will be understood from a consideration of the following detailed description taken in connection with the accompanying drawings, forming a part of this specification and in which several embodiments of the invention have been shown by way of example. However, the scope of the invention is not to be confined to any strict conformity with the showing of the drawings, but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appending claim.

In the drawings:

Fig. 1 is a longitudinal sectional view of a connecting member of copper having approximately half the length of its body loosely inserted into a casing of aluminum;

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Fig. 2 is a longitudinal sectional view of a cable-socket provided with a cover as taken along line II-II of Fig. 3;

Fig. 3 is a top-view of a cable-socket provided with a cover and having a portion of the clamping body removed;

Fig. 4 is a sectional view of a cable-socket in clamped condition, i.e., with the cover screwed on, as taken along line IV-IV of Fig. 3;

Fig. 5 is a longitudinal sectional view of a branch terminal;

Fig. 6 is a side elevation of the branch terminal of Fig. 5 in which the connector for the feeder consists of aluminum and the connector for the branch cable of copper;

Fig. 7 is a longitudinal sectional view of a terminal in which the casing of an aluminum connector is pressed around the coupling bolt of a copper casing;

Fig. 8 is a perspective view of a portion of a profiled bar consisting of an aluminum member and a copper member.

Referring now to the drawings in detail, reference numeral 1 in Fig. 1 designates a connecting member of hard metal, for example copper, loosely inserted into a casing 2 of aluminum or of an aluminum alloy, whereupon the casing 2 is transformed through hot pressing into a clamping body which tightly surrounds the portion of the connecting member 1 which is to be anchored in the tubular casing 2. The portion of the connecting member 1 to be anchored in the clamping body is approximately half as long as the entire connecting member and preferably provided with projections and openings or recesses permitting a perfect connection and an improved current conduction.

According to the invention it is possible to proceed in such manner that, first, a block of aluminum is cast around the portion of member 1 to be anchored, which, then, is transformed through hot pressing into a clamping body of an ultimate desired shape.

In Figs. 2 to 4 a cable-socket has been illustrated. Here again the connecting member 1 consists of hard metal and extends through the entire length of the cable-socket. The connecting member 1 has its portion 3, which is to be anchored, embedded in the clamping body 2 (see Fig. 2). For its reliable fastening to the clamping body or casing 2, the elongated body portion 3 of the connecting member 1 is provided with laterally extending wing-shaped flanges 4 and with one or a plurality of recesses or openings 5 for the engagement therein of a projection emanating from the material of the clamping body 2. Thus, tubular clamping body or casing 2 having upper and lower portions 2a, 2b is firmly united with connecting member 1 and the aforesaid projection extends into and completely fills opening 5 and integrally interconnects said upper and lower portions 2a, 2b of body 2 as clearly seen in Fig. 2. This formation of the anchoring portion 3 has been clearly shown in Fig. 3, where for this purpose a portion of the clamping body 2 has been broken away.

In Fig. 4 the conductor 6 consists of aluminum and is secured in clamped position with the aid of the cover 8 fastened to the clamping body 2 by means of screws 7. As shown in Fig. 2, it is possible to provide the connecting member 1 with a bore D of any suitable diameter for the cable connection bolt (not shown in the drawings), as the hitherto customary outer jacket is omitted and as the bore D may be enlarged to a diameter D₁, so that one type of connecting member 1 may be employed for use with connection bolts of different diameters.

In addition to this a considerable improvement of the current conduction between the two metals is obtained by the feature that the conductive connection is located

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within the clamping body 2 and that it extends over a comparatively large area of contact, and that furthermore both parts which effect the connection form practically one single part.

The butt joint 9 between the two metals which is exposed to the moisture of the air is certainly shorter than in cable-sockets of the hitherto customary type and can be protected by known means, i.e., coating with insulating varnish, silver-plating of the hard metal, arrangement of an insulating ring in a groove or of a padding preventing moistening. Furthermore, the wing-shaped flanges 4 and the openings or recesses 5 are perfect means for fastening the connecting member 1 in the clamping body 2. They also increase the rigidity of the clamping body 2 and completely eliminate the danger of breaking of the connecting member 1 at the place which in case of pull exerted by the conductor 6 is most exposed to strain, namely the proximity of the butt-joint 9.

Figs. 5 and 6 show a branch terminal devised in conformity with the method of the present invention, whereby Fig. 5 is a longitudinal sectional view, while Fig. 6 is a side elevation of the branch terminal. Here the clamping member 10 for the feeder 6 consists of aluminum, while the connector 11 for the branch cable 12 consists of copper.

The two clamping members 10 and 11 are connected with each other by the bolt 13 branched off from the copper-connector 11 (see Fig. 5), while hitherto the bolt 13 was provided with a screw thread by means of which it was screwed into the casing 14 of the connector 10.

According to the invention the bolt 13 and the casing 14 are no longer provided with screw threads. They are first heated, then pushed into each other, and then united with each other through pressing. A method like this avoids the formation of hollow spaces between the joints and between the metal parts to be united, and produces a connection similar to that of welding and of equal rigidity. The result further is that there is no gap any more between the different metals at the joint 15, which gap formerly had to be filled up by weatherproof insulating rings, although such insulating rings never really constituted a lasting protection against corrosion.

Fig. 7 is a longitudinal sectional view of a lead-in connector in which the casing 16 of the aluminum connector 17 is pressed after heating around the coupling bolt 18 of the copper casing 19 in exactly the same way as in the branch terminal of Figs. 5 and 6.

The new method may be applied to all twin-metal connections. Fig. 8 shows a portion of a profiled bar consisting of an aluminum member 20 and a copper member 21 secured to each other by means of a dove-tailed portion 22. Also in this case both members are first strongly heated, whereupon the groove of the copper

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member 21 is pressed around the dove-tailed portion 22 of the aluminum member 20.

Particularly for small parts like this the hot pressing is very desirable, as a close and tight connection of flat metal parts is difficult, but very much facilitated by the new method, and as the two grooves at the butt-joints for the arrangement therein of the insulating material are no longer necessary. Particularly the groove extending all around the profiled bar takes up much time for the packing.

Various changes and modifications may be made without departing from the spirit and scope of the present invention and it is intended that such obvious changes and modifications be embraced by the annexed claim.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

A method of producing contact-safe and corrosion-proof connectors for electric power conductors constituted by a plurality of connecting members, the first of said connecting members being copper and having an opening therein and the second connecting member being aluminum, comprising the steps of heating said connecting members to a temperature sufficient to bond copper and aluminum together, then inserting only a portion of said first connecting member into a recessed portion in said second connecting member with another portion of said first connecting member remaining outward of said recessed portion, and thereafter applying pressure to said second connecting member to press said second connecting member against said first connecting member while in heated condition to securely bond said members to one another while simultaneously deforming both said members to an ultimate desired shape and causing said second connecting member to fill said opening in said first connecting member.

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