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3,258,830

METHOD OF PRODUCING AN ELECTRICAL CONTACT ASSEMBLY

Filed Feb. 28, 1964

FIG. 1

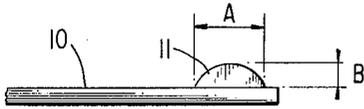


FIG. 1A



PRIOR ART

FIG. 2

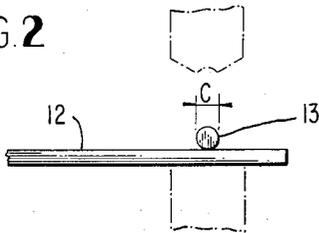


FIG. 2A

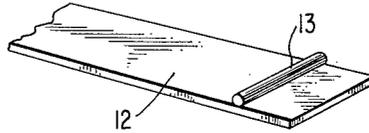


FIG. 3

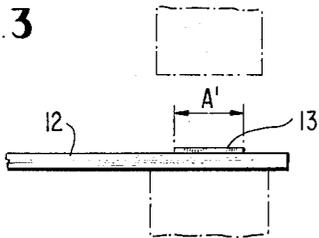


FIG. 3A

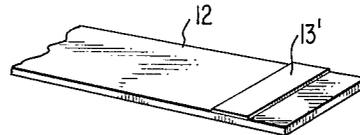


FIG. 4

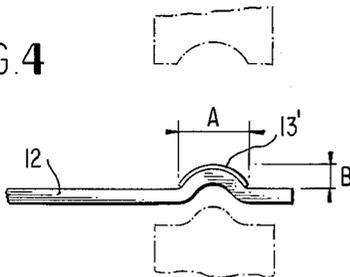
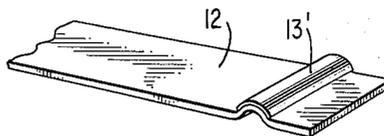


FIG. 4A



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METHOD OF PRODUCING AN ELECTRICAL CONTACT ASSEMBLY

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This invention relates to electrical contact elements and to a method of making the same.

More particularly, the invention is concerned with a method of applying a precisely dimensioned gold contact element to a thin strip or ribbon of Phosphor bronze or like material. The method is also applicable to making contacts from other precious metals on carrier strips of base metal other than Phosphor bronze.

The main object of the invention is to provide a method of the above-mentioned character which will effect the saving on the cost of gold of as much as 50% over prior art practices.

Another important object is to provide a method of the above-mentioned character which results in a finished product which has lost none of the dimensional accuracy of the prior art products while effecting great economies in the expensive materials employed.

Still another object of the invention is to provide a method of manufacturing electrical contact elements, which method lends itself to practice in high speed automatic equipment for feeding, holding, welding, severing and forming metal parts.

Other objects and advantages of the invention will be apparent during the course of the following detailed description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

FIGURES 1 and 1a are, respectively, a fragmentary side elevation and perspective view on a very enlarged scale of an electrical contact element made in accordance with the teachings of the prior art,

FIGURES 2 and 2a are, respectively, a fragmentary side elevation and perspective view of the invention product on an exaggerated scale and illustrating the first major step in the method of producing the product,

FIGURES 3 and 3a are similar fragmentary views of the product in an intermediate stage of completion and showing the intermediate step of the method, and

FIGURES 4 and 4a are similar views of the completed product and showing the final major step of the method.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention method and product, attention is directed first to FIGURES 1 and 1a which illustrate one of the prior art practices. In these figures, a blank, strip or ribbon 10 of phosphor bronze or the like is provided and may be about .010 inch thick and of any required width. A previously shaped gold contact element 11, approximately semi-cylindrical as shown, is electrically welded to one face of the strip 10, transversely thereof, as shown in the drawings. It is to be noted that the contact 11 at the completion of the product in the prior art is a solid slug of gold which has precise dimensions A and B which must be maintained to meet the requirements of industry. The dimension A, for example, may be .045 inch plus or minus a small tolerance and the dimension B may be .015 inch with a small allowable tolerance.

The present invention produces a contact element or assembly which possesses all of the attributes and dimensional requirements of the prior art product while at the same time saving about 50% on the amount and cost of the gold employed. Additionally, the invention product

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can be readily produced on high speed production equipment and the method lends itself to the use of such equipment.

The invention product and method is shown particularly in FIGURES 2-4a and in these figures, the first major step of the method is illustrated in FIGURES 2 and 2a. In these figures, a Phosphor bronze or like material ribbon or strip or blank 12 is provided and suitably positioned. The strip 12 is commonly .010 inch thick and its width may vary for certain applications. A small diameter round gold wire 13 is positioned transversely across the strip 12 and electrically welded to the strip by suitable electrode means shown diagrammatically in FIGURE 2. The diameter C of the gold wire 13 may be, for example, .015 inch to produce a finished product having the desired dimensional characteristics of the prior art but with a great saving of gold. The wire 13 may be fed onto the strip 12 and held and severed at the time of welding or immediately thereafter, all by conventional equipment, and these minor steps form no significant part of the invention herein. Basically, in FIGURES 2 and 2a, the invention method step resides in welding the round gold wire section 13 to the strip 12 as shown.

In FIGURES 3 and 3a, the second major step of the method is shown wherein the previously welded gold wire element 13 is subjected to pressure from suitable forming means and flattened as depicted at 13'. This forming operation or flattening operation does not appreciably effect the thickness or cross section of the carrier strip 12 but only effects the shape of the gold element. After the flattening operation, the gold element 13' is precisely rectangular and has a thickness above the strip 12 of about .003 inch. A width dimension A', FIGURE 3, is established at this time which is slightly greater than the dimension A in FIGURE 1. The flattened gold element 13' extends for the entire width of the strip 12, FIGURE 3a, and is precisely defined.

Finally, in FIGURES 4 and 4a, the invention product is completed by a single simple forming operation shown diagrammatically in FIGURE 4. As shown in this figure, both the strip 12 and the previously flattened gold element 13' are subjected to a forming or crowning operation, and this operation establishes the critical dimensions A and B above noted in connection with the prior art product. That is to say, in FIGURE 4, the forming operation produces a dimension A of .045 inch plus or minus an allowable small tolerance and the dimension B of .015 inch plus or minus a small allowable tolerance. Also, in FIGURE 4, the curvature or contour of the gold element 13' conforms precisely to the desired shape shown in the prior art embodiment.

As should now be apparent, the completed product, FIGURES 4 and 4a, possesses the dimensional characteristics of the prior art product, FIGURES 1 and 1a, with a great saving in the amount of gold utilized. Additionally, the invention method lends itself well to practicing with available automatic high speed equipment and this is not true of prior art methods. The invention method comprising welding, flattening and forming is highly expeditious and results in extreme accuracy and uniformity of results in the end product.

It is to be noted in FIGURE 4a that the finished product which is an electrical contact has the crowned gold element 13' extending as a segment of a cylinder for the full width of the strip 12 carrying it. The shape of the element 13' is precisely defined and very accurate and uniform, as stated. It is further to be noted that the strip 12 is offset or crowned by the operation in FIGURE 4 but does not have its thickness altered by the invention processing and the thickness of the strip 12 remains substantially constant throughout the process.

It should be mentioned that the dimensions of the product set forth herein, while typical, are not critical in the sense that the product can obviously be made in a variety of sizes according to the method. That is to say, the dimensions mentioned herein pertain to a particular sized product for a particular industrial application. Quite conceivably, the product produced by the method could be somewhat smaller or somewhat larger but proportionally, it will remain the same. It should also be mentioned that the wire element 13 and the subsequently formed element 13' need not necessarily extend for the entire width of the carrier strip 12, as shown in FIGURE 4a.

If desired, as a modification of the method for producing the same end product shown in FIGURE 4a, the first step shown in FIGURES 2 and 2a and the flattening step shown in FIGURES 3 and 3a may be omitted. Instead thereof, the element 13' in FIGURES 3 and 3a may be applied to the strip 12 as a preformed or prefabricated thin ribbon of gold or the like, say, .003 inch thick. When this procedure is followed, the prefabricated ribbon 13' is electrically welded to the strip 12 while positioned thereon as in FIGURE 3a. Subsequent to the welding, the product is formed into its final shape exactly as shown in FIGURES 4 and 4a and as previously described, the only difference being that a prefabricated thin gold ribbon is utilized instead of the wire 13 in FIGURE 2 with the subsequent flattening step.

It is to be understood that the forms of the invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

Having thus described my invention, I claim:

1. A method of producing an electrical contact assembly comprising the steps of positioning a wire element formed of precious metal transversely across a base metal contact strip and electrically welding said wire element to said strip, flattening said precious metal wire element on said strip without appreciably changing the thickness of the strip, and then forming the strip and flattened precious metal element to establish critical width and height dimensions and a critical contour for the precious metal element on said strip.

2. A method of producing an electrical contact assembly comprising positioning a small diameter round precious metal wire transversely upon a base metal contact strip, electrically welding said wire to said strip, flattening the precious metal wire on said strip to establish substantially a critical width dimension for the contact, and then forming the strip and the flattened precious metal upon it

to thereby establish a critical height dimension for the contact.

3. A method of producing an electrical contact assembly comprising the steps of positioning a small diameter gold wire element transversely upon one side of a flat base metal strip, electrically welding said gold wire element to said strip, flattening the gold wire element on said strip and thereby shaping the same into a thin flat precisely defined rectangular element on said strip, and then forming the strip and said flattened rectangular gold element to impart to the latter a crowned substantially cylindrical curved configuration having a precise width and a precise height measured from one face of said strip.

4. A method of making an electrical contact assembly comprising positioning a small wire element transversely of a substantially flat contact strip and electrically welding the wire element to the strip, flattening the wire element upon the strip into a thin accurately defined rectangular shape without altering the thickness of the strip, and then shaping the strip and flattened element to impart to the latter a cylindrically rounded contour having a precise height measured from one face of said strip and a precise width.

5. A method of producing an electrical contact assembly comprising the steps of positioning an elongated precious metal element transversely across a base metal contact strip and while maintaining such positioning electrically welding said element to said strip, flattening said precious metal element on said strip to greatly reduce the thickness of the element and without appreciably changing the thickness of said strip, and then forming said strip and flattened precious metal element simultaneously as a unit to establish critical width and height dimensions and a critical contour for the precious metal element on said strip.

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