March 21, 1950 G. DURST 2,501,164

METHOD OF MAKING ELECTRICAL CONTACTS

Original Filed Sept. 27, 1943

FIG. 1.

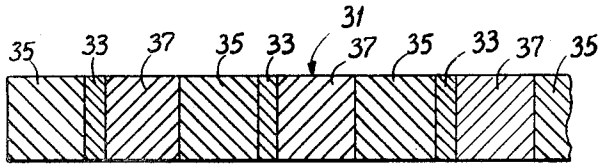


FIG. 2.

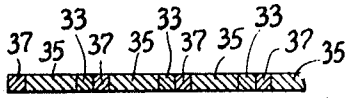


FIG. 3.

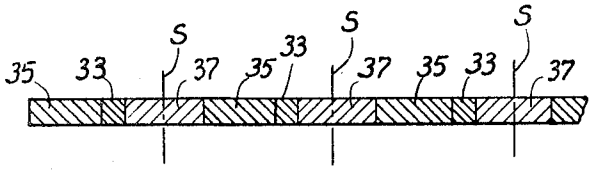


FIG. 4.

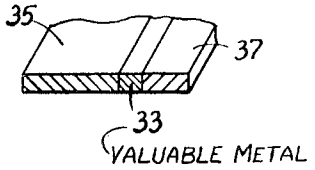


FIG. 5.

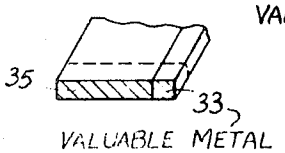
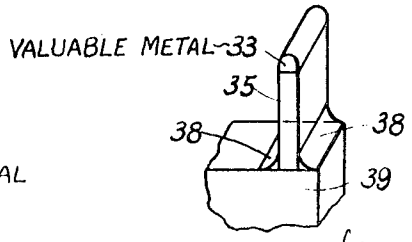


FIG. 6.



George Durst
Inventor
Haynes and Koenig
Attorneys

Patented Mar. 21, 1950

2,501,164

UNITED STATES PATENT OFFICE

2,501,164

METHOD OF MAKING ELECTRICAL CONTACTS

George Durst, Attleboro, Mass., assignor to Metals & Controls Corporation, Attleboro, Mass., a corporation of Massachusetts

Original application September 27, 1943, Serial No. 504,079, now Patent No. 2,433,687, dated December 30, 1947. Divided and this application May 13, 1946, Serial No. 669,285

5 Claims. (Cl. 29—155.55)

1

This invention relates to methods of making contacts and the like, and with regard to certain more specific features to methods of making electrical contacts composed of the more costly metals.

This application is a division of my co-pending application Serial No. 504,079, filed September 27, 1943, issued as Patent 2,433,687, December 30, 1947.

Among the several objects of the invention may be noted the provision of a method of making a new form of contact which employs at the point of engagement of the contact only very little costly metal ordinarily used for the purpose; the provision of a method of making a contact of the class described in which the desired contact metal per se is exposed in definite relief and which at the same time is very strongly and rigidly supported on the remainder of the contact assembly; the provision of a method for economically making said contacts; and the provision of a method of making contacts of the class described particularly applicable to small contact structures such as used in radio, telephones, relay applications et cetera. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the steps and sequence of steps, and features of construction and manipulation which will be exemplified in the methods hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing, in which several of various possible embodiments of the invention are illustrated,

Fig. 1 is an enlarged section showing a scheme for carrying out my invention;

Fig. 2 is a section showing an alternative scheme after a rolling operation;

Fig. 3 is a section of the material of Fig. 1 after a rolling operation;

Figs. 4 and 5 are perspective views of results of operations subsequent to those of Figs. 2 and 3; and,

Fig. 6 shows an example of a final product made from the process and structure illustrated in Figs. 1–5.

Similar reference characters indicate corresponding parts throughout the several views of the drawing.

2

Certain valuable metals and alloys form extraordinarily good electrical contacts, such as for example, platinum, platinum-iridium, gold-platinum, palladium, etc. However, due to their high cost, it is desirable to limit the use of such metals only to the precise locations where they are needed, namely, in the case of electrical contacts where current-carrying contact is actually made. Hereinafter the metals above specified will be called valuable metals in the sense that they need to be conserved for one reason or another. The differentiating adjectives will be non-valuable or less valuable to designate more economical metals such as iron, steel, copper, brass et cetera.

Heretofore difficulties had been encountered in reducing the amount of valuable metal used because the smaller the mass of metal becomes, the more difficult it is to handle and to attach to the adjacent base or metal support. For example, it has been heretofore proposed electrically to weld a plain platinum wire to a metal base and to use the surface of the wire as the contact region. The difficulty with this is that it requires a size of wire than can be handled, and the larger the wire, the more is the cost. In addition, even for small wires this method produces a metal contact ridge which is lower than desired in some applications.

The present invention produces a relatively high ridge of valuable-metal contact strongly anchored, which employs an electrically determined minimum of the valuable metal.

In Figs. 1 to 6 is shown a form of the invention in which so-called "fancy" composite wire is formed and used instead of the composite bonded Wollaston type wire utilized in certain of the embodiments shown in my said application Serial No. 504,079. Referring to Fig. 1, this is produced with any desired thinness of platinum or similar component layer as follows:

A composite plate 31 is welded up from valuable strips 33, for example of platinum. The left side of each strip 33 is a strip of non-valuable metal 35, for example a non-ferrous electrically conductive metal such as copper or brass. On the other side of each strip 33 is a strip of other non-valuable metal (mild steel 37 for ex-

ample). All strips are welded. Then this assembly is rolled out into a thin sheet which of course elongates. This sheet is cut longitudinally as shown at S (Fig. 3). The cutting needs not to be particularly accurate and may be done by any suitable machining operation such as shearing, sawing, milling, shaping or otherwise. This provides a strip such as shown in Fig. 4 wherein a thin strip of platinum **33** is sandwiched in between two thin strips of non-ferrous material **35** and steel **37**. Finally, said assembly of Fig. 4 is pickled to remove the steel strip **37** thus leaving the base **35** with the valuable metal edge **33** (Fig. 5). The "fancy" wire thus obtained may be drawn or rolled to round off one edge. The composite strip **33**, **35** constitutes electrical contact stock and is then cut into pieces for attachment to a base **39** if desired, as shown in Fig. 6. In Fig. 6, the strip **35** is welded as shown at **38** to the electrically conductive base **39**.

Fig. 5 illustrates a segment of the "fancy" wire which takes the place of the composite Wollaston type wire shown in my application Serial No. 504,079. It is different however, in that it has a relatively large mass of base material **35** admitting of direct welding without the necessity after attachment has been made for subsequent removal of material from over the precious material.

The slitting operation of Fig. 3 may be omitted by directly pickling the rolled sheet in which event the strips **37** are etched away from between the strips **33** and **35**. In this case the etchable strip is made narrower in order to save weight and material in the original assembly. This is illustrated in Fig. 2 at **37**. The other numerals **33** and **35** in Fig. 3 designate parts corresponding to those already mentioned in connection with Figs. 1 and 3. Or it is possible simply to make up an assembly of parts **33**, **35** and **37** without further assembling these to make up a larger plate. That is to say, a sub-assembly such as shown at **33**, **35** and **37** at the left of Fig. 1 may be dealt with separately, in which case the separating operation will not be required.

Instead of using the wire shown in Fig. 5 as shown in Fig. 6, it may be cut up into shorter segments as indicated by the dotted lines in Fig. 5 to produce stem-like contacts. That is to say the contacts are chopped off from the pieces of "fancy" wire. They may then be spot-welded into position or staked into position in whatever structures they are desired. They may also be used as square rivets or swaged round and are attached by a heading or riveting operation.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above methods without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. The method of making composite electrical contact stock, comprising the steps of forming an assembly of a plurality of groups of metal strips, each group consisting of a strip of a valuable metal contact material between a strip of a first electrically conductive non-valuable metal and a strip of a second and dissimilar non-valuable metal, said second non-valuable metal being selectively etchable in respect to said first non-valuable metal and the valuable metal, edgewise welding the strips together with the groups so arranged that the first non-valuable metal strip and the second non-valuable metal strip of adjacent groups are edgewise welded, rolling the resultant welded assembly into a flat sheet, and forming from the resultant sheet a plurality of individual composite strips each consisting of a valuable metal strip edgewise welded to a strip of the first non-valuable metal by a process including the etching away of the second non-valuable metal strips without etching the first non-valuable metal strips or the valuable metal strips.

2. The method of making composite electrical contact stock comprising the steps of forming an assembly of a plurality of groups of metal strips, each group consisting of a strip of a valuable metal contact material between a strip of a first electrically conductive non-valuable metal and a strip of a second and dissimilar non-valuable metal, said second non-valuable metal being selectively etchable in respect to said first non-valuable metal and the valuable metal, edgewise welding the strips together with the groups so arranged that the first non-valuable metal strip and the second non-valuable metal strip of adjacent groups are edgewise welded, rolling the resultant welded assembly into a flat sheet, slitting the sheet through said second non-valuable metal strips into a plurality of individual composite strips each consisting of a strip of valuable metal between strips of said first and second non-valuable metals, and etching away the second non-valuable metal strip of said composite strips without etching the first non-valuable metal strip or the valuable metal strip to form contact stock consisting of a valuable metal strip edgewise welded to a strip of the first non-valuable metal.

3. The method of making electrical contacts, comprising the steps of edgewise welding together a plurality of groups of metal strips, each group consisting of a strip of a valuable metal contact material between a strip of an electrically conductive non-ferrous metal and a strip of an etchable ferrous metal, the three strips of each group being themselves welded together and the groups being arranged so that the non-ferrous metal strip and the ferrous metal strip of adjacent groups are edgewise welded, rolling the resultant welded assembly into a flat sheet, forming from the resultant sheet a plurality of individual composite strips each consisting of a valuable metal strip edgewise welded to a strip of the non-ferrous metal by a process including the etching away of the ferrous strips without etching the valuable or non-ferrous metal strips, and transversely cutting said composite strips into individual contacts.

4. The method of making electrical contacts, comprising the steps of edgewise welding together a plurality of groups of metal strips, each group consisting of a strip of a valuable metal contact material between a strip of an electrically conductive non-ferrous metal and a strip of an etchable ferrous metal, the three strips of each group being themselves welded together and the groups being arranged so that the non-ferrous metal strip and the ferrous metal strip of adjacent groups are edgewise welded, rolling the resultant welded assembly into a flat sheet, slitting the sheet through the ferrous metal strips into a plurality of individual composite strips each consisting of a strip of valuable metal between strips of said non-ferrous and ferrous metals, etching away the ferrous metal strips of said composite

strips without etching the non-ferrous or the valuable metal strips to form a plurality of individual composite strips each consisting of a valuable metal strip edgewise welded to a strip of the non-ferrous metal, and transversely cutting said last-named composite strips into individual contacts.

5. The method of making electrical contacts, comprising the steps of edgewise welding together a plurality of groups of metal strips, each group consisting of a strip of a valuable metal contact material between a strip of an electrically conductive non-ferrous metal and a strip of an etchable ferrous metal, the three strips of each group being themselves welded together and the groups being arranged so that the non-ferrous metal strip and the ferrous metal strip of adjacent groups are edgewise welded, rolling the resultant welded assembly into a flat sheet, etching away the ferrous metal strips without etching the non-ferrous metal strips or the valuable metal strips to form a plurality of individual composite strips each consisting of a valuable metal strip edgewise welded to a strip of the non-ferrous metal, and transversely cutting said composite strips into individual contacts.

GEORGE DURST.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
437,862	Knight	Oct. 7, 1890
625,117	Martin	May 16, 1899
1,700,172	Marshall	Jan. 29, 1929
2,197,753	Liebmann	Apr. 23, 1940
2,303,497	Reeve	Dec. 1, 1942