Feb. 23, 1960 S. P. JONES ET AL 2,925,647

METHOD OF MAKING ELECTRICAL CONTACTS

Filed Jan. 28, 1958

FIG. 1

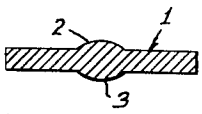


FIG. 2

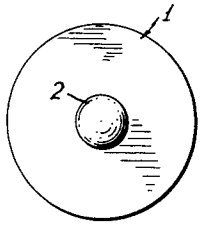


FIG. 3

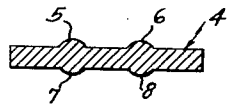


FIG. 5

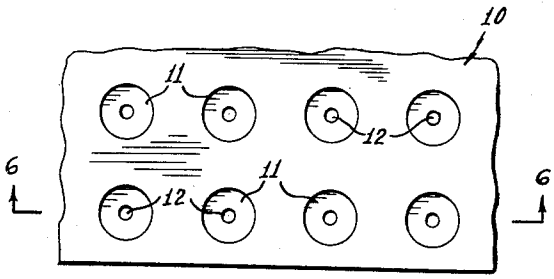


FIG. 4



FIG. 7

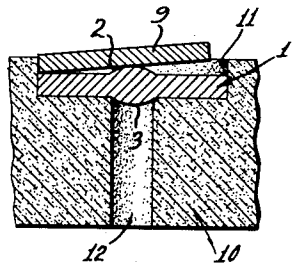


FIG. 6

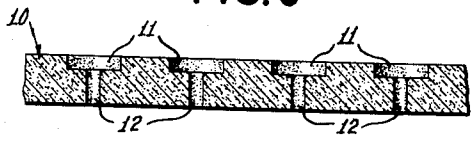


FIG. 9

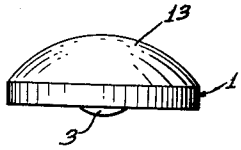
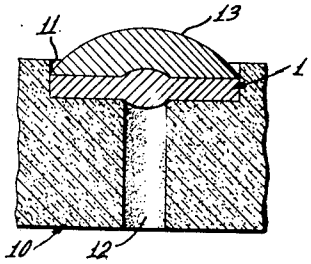


FIG. 8



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METHOD OF MAKING ELECTRICAL CONTACTS

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3 Claims. (Cl. 29—155.55)

The present invention deals with electrical contacts, especially for the making and breaking of electrical current, and more particularly with the method of making such contacts.

Conventional electrical contacts are often composed of two or more layers, or laminations, of dissimilar metals of which a precious metal or alloy thereof forms the contact working face while a non-precious metal or alloy forms a backing used for attachment to rivets, armatures, and the like conductive components of a contact system.

It is often desirable to attach the contact backing layer to a contact arm or rivet by resistance welding, and for this purpose either the rivet or the contact backing is advantageously provided with welding points or projections such, for example as described and illustrated in U.S. Patent No. 1,155,4277 to A. J. Liebmann et al.

It is an object of the present invention to provide an electrical contact adapted for resistance welding. It is another object of the present invention to provide a method of manufacturing electrical contacts adapted for resistance welding onto contact arms and the like, which method facilitates mass production of the contacts and increases production many times that possible by conventional methods. Other objects and advantages of the invention will become apparent from the description hereinafter following and the drawings forming a part hereof, in which:

Figure 1 illustrates a cross-sectional view of a contact backing according to the invention,

Figure 2 illustrates a top view of Figure 1,

Figure 3 illustrates a modification of Figure 1,

Figure 4 illustrates a side view of a contact metal in the form of a disc,

Figure 5 illustrates a top fragmentary view of a refractory plate containing a plurality of recesses,

Figure 6 illustrates a cross-sectonal view of Figure 5 along lines 6—6,

Figure 7 illustrates a cross-sectional view of a contact metal and backing metal positioned in one of the recesses of Figures 5 and 6 prior to heat treatment.

Figure 8 illustrates a cross-sectional view of a contact metal and backing metal positioned in one of the recesses of Figures 5 and 6 after heat treatment, and

Figure 9 illustrates a side view of a completed contact according to the invention.

The invention deals with an electrical contact and the method of manufacture thereof, wherein the backing metal is preformed, e.g. by cold forming, into a disc or the like flat member with substantially identical welding projections positioned on both faces of the flat member substantially opposite to each other, whereby the flat members can be positioned in a heat treating recess in a refractory plate and assuring at all times the provision of an effective welding projection regardless of which side is coated with a contact metal, e.g. silver.

In the manufacture of electrical contacts of the type contemplated, a number of contact backings having welding projections are riffled into recesses formed in a refractory plate, e.g. a plate of graphite, carbon, or of such other refractory material which does not adhere to molten contact metal. When the welding projections are provided only on one face of the backing metal and riffled into the recesses, the welding projections of the backings are positioned in different directions, which necessitates turning of a large number of backings so that all projections will be positioned in the same direction. This procedure is time consuming and limits the number of contacts which can be made in a given time. However, in accordance with this invention, the welding projections are provided on both sides of the backing whereby the turning operation for the undesirably positioned backings is entirely eliminated and results in approximately a tenfold increase in production. For example, with the welding projections on only one face of the backings, and because of the necessary turning operation, about 3000 contacts per hour have been produced. However, with a contact according to the invention, approximately 30,000 contacts per hour have been produced.

Referring to Figures 1 and 2, a contact backing is preformed from metal powder, wire or strip material into a disc or flat member **1** having at least one welding projection **2** on one face thereof and at least one welding projection **3** on the opposite face thereof, the projections on one face being positioned substantially opposite to those on the other face.

Figure 3 illustrates a flat backing member **4** having projections **5** and **6** on one face and projections **7** and **8** on the opposite face, with the projections positioned substantially opposite each other.

Figure 4 illustrates a contact metal, e.g. a precious metal or precious metal alloy, in the form of a disc **9**, preformed from wire, powder or sheet material.

Figures 5 and 6 illustrate a refractory plate **10**, e.g. a plate of ceramic material, graphite, carbon, etc., which will not adhere to molten contact metal, and which contains a plurality of recesses **11** in one face of the plate and, preferably, a plurality of bores **12** through the plate in communication with the recesses **11**. The bores **12** are for the purpose of facilitating removal of excess material or foreign matter.

In operation, according to Figures 7 and 8 a number of backings **1** are placed on the plate **10** and riffled, either by hand or by mechanical vibration, whereby the backings fall into the recesses **11**. The depth of a recess **11** is less than the width of a backing **1**, but preferably slightly greater than the thickness of the backing, so that the backing seats itself properly into the recess during riffling. Having filled the recesses with backings, a preweighed disc **9**, or its equivalent in the form of metal powder, is positioned on the backing **1** by known methods and heat treated, preferably in a reducing or inert atmosphere at a temperature sufficient to melt the contact metal **9**. On melting, the contact metal **9**, e.g. silver, flows over the face of the backing and forms a convex contact surface **13** on the face of the backing, the convex surface being a convex meniscus which forms naturally due to the surface tension of the molten silver, the adhesion of the silver to the backing, and the non-wetting property of the refractory plate **10**. Since the recess **11** is slightly deeper than the thickness of the backing, any possible capillary flow of the silver is prevented. The backing **1** preferably consists of base metal or base metal alloys which may or may not be provided with a flash coating of nickel, copper or silver adherent to the contact metal. For example, the backing consists of a base metal such as steel plated or flash coated with nickel.

Figure 9 illustrates the completed contact member formed by the method of the invention.

Various modifications of the invention are contemplated within the scope of the appended claims.

What is claimed is:

1. The method of making an electrical contact comprising forming welding projections on both faces of flat backing members, riffling the backing members into recesses in a refractory plate, positioning a contact metal on one face of the backing, heat treating the materials until the contact metal melts and forms a convex surface.

2. The method according to claim 1, wherein a welding projection on one backing face is positioned substantially opposite a welding projection on the other backing face.

3. The method according to claim 1, wherein the backings are riffled by vibrating the refractory plate.

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