

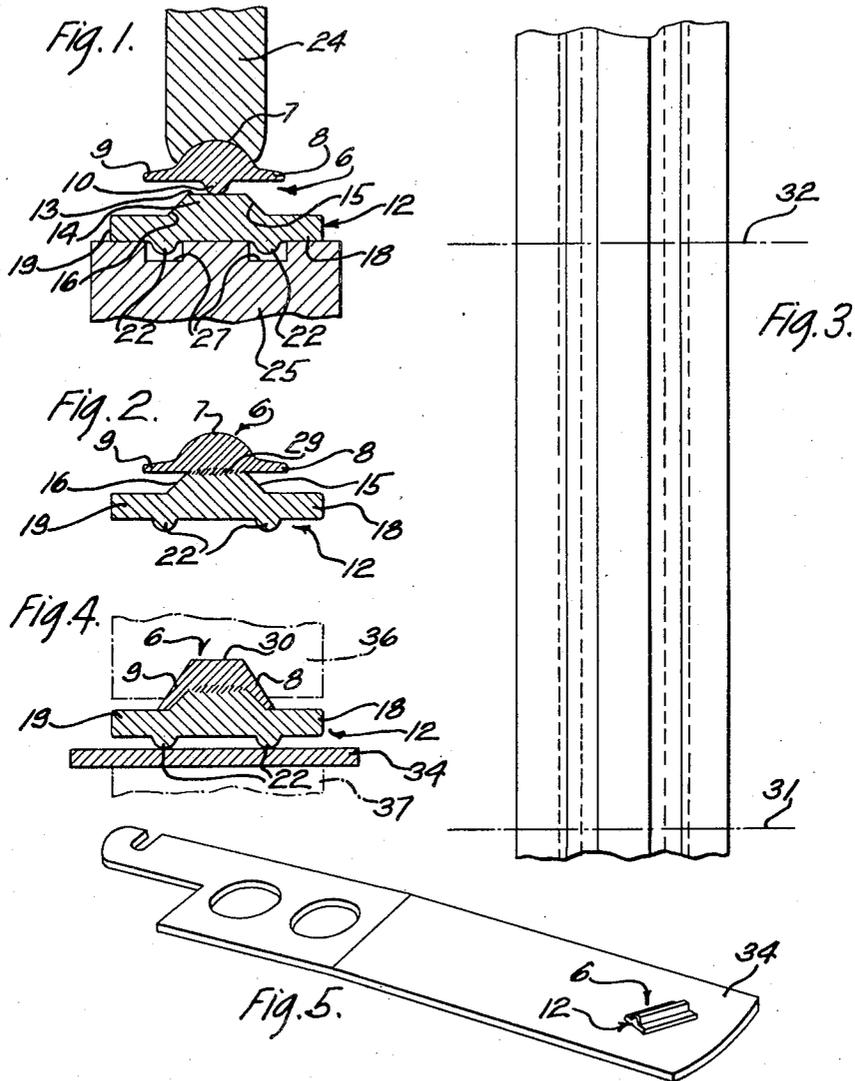
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PROCESS OF MANUFACTURING ELECTRICAL CONTACT MEMBERS

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PROCESS OF MANUFACTURING ELECTRICAL CONTACT MEMBERS

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This invention relates to a process of manufacturing electrical contact members, and more particularly to a process of manufacturing bimetallic contact elements.

It is the object of the present invention to provide an efficient process of forming and attaching to electrical contact springs, bimetallic contact elements utilizing a minimum quantity of contact metal while providing a maximum contacting surface.

In accordance with one embodiment, the invention contemplates forming a wire of contact metal with a rounded upper surface, laterally extending substantially flat projecting surfaces, and a small rounded lower surface and combining the small rounded lower surface of the contact metal with a flat, raised upper surface of a ribbon of base metal having downwardly extending rounded projections extending longitudinally of the lower surface thereof. After combining the wire of contact metal and the ribbon of base metal a welding current is passed through the contact metal and base metal to fuse them at the line of contact therebetween, whereupon the contact metal is formed downwardly over an upwardly extending surface of the base metal to provide an apron for preventing oxidation of the base metal due to arcing between the contacts when in operation. The composite strip thus formed may be cut to predetermined lengths and positioned upon contact springs with the downwardly extending projections of base metal engaging the upper surface of the spring and the electrodes of a welding circuit engaging substantially all of the exposed surfaces of the contact metal and an electrode of opposite polarity engaging the undersurface of the contact spring to weld the composite element to the contact spring.

A better understanding of the invention may be had by referring to the following detailed description of one embodiment thereof when considered in conjunction with the accompanying drawing, wherein

Fig. 1 is a sectional view through a wire of contact metal and a ribbon of base metal positioned between welding electrodes prior to the welding thereof;

Fig. 2 is a sectional view through a com-

posite strip of contact and base metal after the welding operation and prior to the forming of the contact metal to surround partially the base metal;

Fig. 3 is a plan view of a composite strip of contact and base metal after the contact metal has been formed to its ultimate shape;

Fig. 4 is a sectional view through a composite strip of base and contact metal after the contact metal has been formed to its ultimate shape, the strip being shown positioned upon a contact spring with the position of welding electrodes used in securing the contact element to the spring shown in dot and dash lines, and

Fig. 5 is a perspective view of a contact spring with a composite bimetallic contact element secured thereto.

Referring now to the drawing wherein the same reference characters designate the same parts throughout the several views, numeral 6 indicates generally a strip or wire of contact metal which may be composed of platinum, palladium, or an alloy of gold with either palladium or platinum or any of the metals commonly used for electrical contact elements. The wire of contact metal 6 is formed to have a rounded upper surface 7, laterally extending flat portions 8 and 9, and a downwardly extending rounded portion 10 extending longitudinally thereof. After the wire of contact metal 6 has been formed, it may be combined with a strip 12 of base metal such as nickel silver, pure nickel or other metals having a high degree of resistance to corrosion. The strip of base metal is formed with an upwardly extending projection 14, the upper surface 13 of which is flat and which has surfaces 15 and 16 thereof inclined downwardly from the surface 13 to meet laterally projecting flat portions 18 and 19, respectively, and with downwardly extending rounded ridges 22 extending longitudinally thereof.

After the strips 6 and 12 of contact and base metal, respectively, have been formed to the hereinbefore described shape, they are combined as shown in Fig. 1 with the downwardly extending portion 10 of the contact metal strip 6, engaging the flat upper sur-

face 13 of the projection 14 and welding electrodes 24 and 25 connected to a suitable welding circuit are placed in engagement with the strips 6 and 12, respectively. The electrode 24 is shaped at its lower end to conform to the curvature of the rounded surface 7 to provide a large area of contact between the electrode and the contact metal, and the electrode 25 is formed with slots 27 therein for receiving the downwardly extending rounded ridges 22 of the base metal so that an intimate contact will be provided between the flat under surface of the base metal and the upper surface of the electrode to provide a comparatively large area of contact therebetween. The electrodes may be of any known type but the preferred form of electrodes are circular constantly driven disk electrodes which permit the continuous welding of the composite strip in any desired lengths.

With the base and contact metal thus combined and positioned between the electrodes 24 and 25, they may be welded together by passing a welding current between the electrodes and through the base and contact metal strip. A welding current, in passing through the strip of contact metal and the strip of base metal, will encounter its greatest resistance at the line of engagement of the ridge 10 with the surface 13 of the base metal and due to the formation of the strip 6 only a small area of contact is provided between the base and contact metals resulting in a concentration of the welding current along the line of contact. This concentration of the welding current and the shape of the contact and base metal strips will cause fusion of the contact metal and the base metal strip and will prevent the base metal and/or the contact metal from sticking to the welding electrodes or from burning due to the fact that the relatively large area of base metal adjacent the line of contact with the contact metal permits of the dissipation of a comparatively great amount of heat, while the comparatively small cross-sectional area of the contact metal adjacent the line of contact with the base metal permits of very little heat dissipation in the contact metal, thereby resulting in the base metal and contact metal strips reaching their respective fusing temperatures at approximately the same time, providing in a strong welded union. Simultaneously with the application of the welding current to the strips, pressure is exerted thereupon in the usual manner and the strips are forced together ultimately assuming substantially the configuration shown in Fig. 2 wherein the numeral 29 indicates the area of alloyed base and contact metal after the fusing operation.

A strip of base and contact metal joined together as shown in Fig. 2 may then be

pressed or formed by suitable forming members (not shown) to the shape shown in Figs. 3 and 4 wherein the rounded upper surface 7 of the contact metal has been flattened as shown at 30 and the projecting portions 8 and 9 of the contact metal have been bent downwardly to form aprons of precious or contact metal, extending over the surfaces 15 and 16 of the base metal strip 12. These aprons or protecting layers of contact metal serve to prevent objectionable oxidation of the contacting surfaces of the contact metal by preventing the arcing, which is incident to the operation of the contacts in electrical apparatus, from striking the base metal.

A composite strip of base and contact metal welded together and formed as shown in Figs. 3 and 4 may then be cut to predetermined lengths along the lines 31 and 32 (Fig. 3) and placed upon the flat surfaces of contact springs 34 in predetermined angular position with the ridges 22 of the base metal engaging the upper surface of the contact spring whereupon electrodes 36 and 37 as shown in dot and dash lines in Fig. 4 may be engaged with the upper surface of the composite contact element and the under surface of the spring to transmit a welding current through the spring and contact member to weld the contact member onto the spring. The electrode 36 it will be noted, engages substantially the entire surface of the contact strip, thereby providing a large area of contact between the electrode and the composite contact member. This, together with the line contacts between the ridges 22 and the upper surface of the spring 34, will result in the concentration of the welding current along a line of contact between the spring and the ridges 22 to concentrate the welding current at that point, thereby resulting in bringing the base metal and the metal of the spring to a fusing temperature at substantially the same time.

Although a specific embodiment of the invention has been described in detail hereinbefore, it will be understood that modifications and adaptations of the method described may be made without departing from the scope of the invention, which is to be limited only by the scope of the appended claims.

What is claimed is:

1. The process of manufacturing bimetallic contact elements which includes forming a strip of contact metal with a rounded upper surface, a rounded lower surface and horizontally extending projecting portions at each side thereof forming laterally projecting flat portions, forming a strip of base metal with an upwardly extending projection having a flat upper surface, combining the strip of contact metal and the strip of base metal with the flat upper surface of the base metal engaged by the small rounded surface

of the contact metal, and welding the contact metal to the base metal.

2. The process of manufacturing bimetallic contact elements which includes forming a strip of contact metal with a rounded upper surface, a rounded lower surface and horizontally extending projecting portions at each side thereof forming laterally projecting flat portions, forming a strip of base metal with an upwardly extending projection having a flat upper surface, combining the strip of contact metal and the strip of base metal with the flat upper surface of the base metal engaged by the small rounded surface of the contact metal, welding the contact metal to the base metal, and forming the composite strip to its final shape.

3. The process of manufacturing bimetallic contact elements which includes forming a strip of contact metal with a rounded upper surface, a rounded lower surface and horizontally extending projecting portions at each side thereof forming laterally projecting flat portions, forming a strip of base metal with an upwardly extending projection having a flat upper surface, combining the strip of contact metal and the strip of base metal with the flat upper surface of the base metal engaged by the small rounded surface of the contact metal, welding the contact metal to the base metal, and forming the projecting portions of the contact metal into overlapping relation with the upwardly extending portion of the base metal.

4. The process of manufacturing bimetallic contact elements which includes forming a strip of contact metal with a rounded upper surface a rounded lower surface and horizontally extending projecting portions at each side thereof forming laterally projecting flat portions, forming a strip of base metal with an upwardly extending projection having a flat upper surface, combining the strip of contact metal and the strip of base metal with the flat upper surface of the base metal engaged by the small rounded surface of the contact metal, welding the contact metal to the base metal, and forming the composite strip to its final shape to provide a flat upper surface and downwardly inclined surfaces of contact metal covering the base metal.

5. The process of manufacturing bimetallic contact elements which includes forming a strip of contact metal with a rounded upper surface, a rounded lower surface and horizontally extending projecting portions at each side thereof forming laterally projecting flat portions, forming a strip of base metal with an upwardly extending projection having a flat upper surface, combining the strip of contact metal and the strip of base metal with the flat upper surface of the base metal engaged by the small rounded surface of the contact metal, welding the contact metal to the base metal, and forming the com-

posite strip to its final shape, the exposed portions of the contact metal being formed with a flat upper surface and downwardly inclined side surfaces.

6. The process of manufacturing bimetallic contact elements which includes forming a strip of contact metal with a rounded upper surface, a rounded lower surface, and horizontally extending projecting portions at each side thereof forming laterally projecting flat portions, forming a strip of base metal with an upwardly extending projection having a flat upper surface and downwardly extending projections having rounded surfaces, combining the contact metal and the base metal with the small rounded portion of the contact metal engaging the flat upper surface of the base metal, welding the contact metal to the base metal, forming the projecting portions of the contact metal into overlapping relation with the upwardly extending surfaces of the base metal, and welding the composite strip of base and contact metal to a contact spring.

7. The process of manufacturing bimetallic contact elements which includes forming a strip of contact metal with a rounded upper surface, a rounded lower surface and horizontally extending projecting portions at each side thereof forming laterally projecting flat portions, forming a strip of base metal with an upwardly extending projection having a flat upper surface and downwardly extending projections having rounded surfaces, combining the contact metal and the base metal with the small rounded portion of the contact metal engaging the flat upper surface of the base metal, welding the contact metal to the base metal, forming the projecting portions of the contact metal into overlapping relation with the upwardly extending surfaces of the base metal, positioning the composite strip of base and contact metal upon a contact spring with the downwardly extending projections of the base metal in engagement with the contact spring, and welding the composite strip to the contact spring.

8. The process of manufacturing bimetallic contact elements which comprises forming a strip of base metal with a projection on one surface, forming a strip of contact metal with a projection on one surface, combining said strips with said projections in contact with each other, welding the contact metal to the base metal, and forming the contact metal over the projection on the base metal.

In witness whereof, I hereunto subscribe my name this 15th day of November A. D., 1930.

FRED E. HENDERSON.