Dec. 3, 1963 H. E. SPOONER ETAL 3,113,196

ELECTRICAL CONTACT

Filed Oct. 31, 1960

FIG. 1

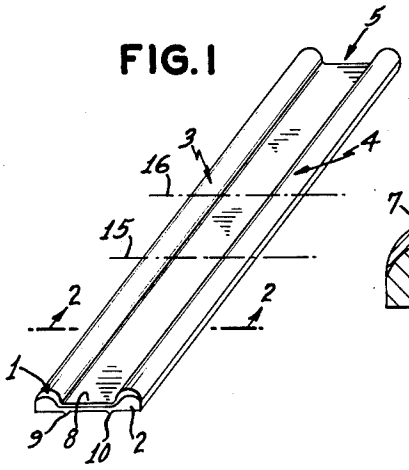


FIG. 2

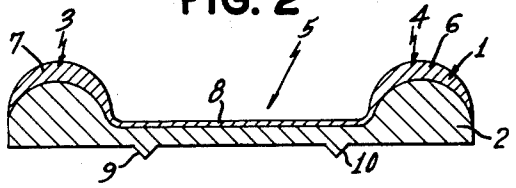


FIG. 3

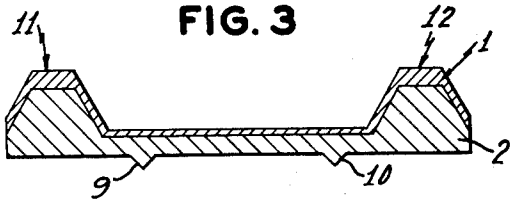


FIG. 5

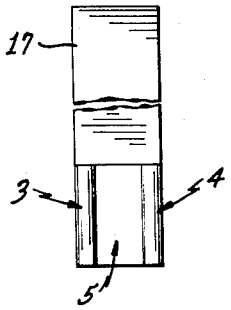


FIG. 4

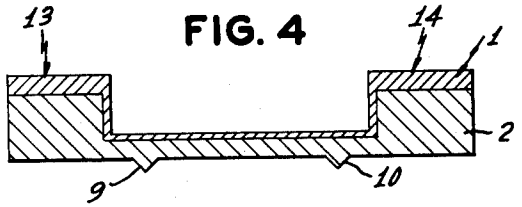


FIG. 7

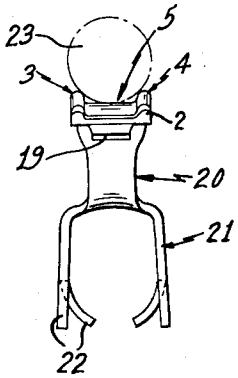
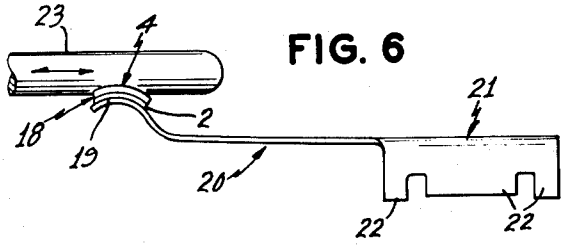


FIG. 6



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3,113,196

ELECTRICAL CONTACT

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3 Claims. (Cl. 200—166)

The present invention deals with an electrical contact and more particularly with an electrical contact adapted for cooperative use with a sliding contact conductor.

Electrical contacts adapted for cooperative use with sliding contact conductor rods have been heretofore made by providing a contact arm in the form of a strip of conductive base metal and welding short lengths of laterally-spaced parallel precious metal wires on one strip surface near or at one end of the strip. A cooperative slidable conductive rod was positioned in contact with both precious metal wires and spaced from the base metal strip, whereby the contact rod was slidable longitudinally of and substantially between the wires.

Such heretofore made contacts have the disadvantage that the lateral spacing between the wires is not always precisely uniform. Otherwise, after considerable wear of the wires, the contact rod engages the base metal strip at a location between the wires. Under such conditions, there are three contact areas contacting the conductive rod, two contact areas between the rod and the wires and one contact area between the rod and the base metal strip. Should the predominating spring pressure of the base metal strip be at the center of the strip and in contact with the strip, there would be no effective contact with the precious metal wires. In such case, the electrical resistance of the contact would be increased by at least some oxide or sulphide deposits between the base metal strip and the conductor rod. Also, the precious metal wires, when welded on the contact arm, provide a mass of precious metal throughout the wire cross-section, and this mass of precious metal is an unnecessary excess of precious metal, since at least one-quarter of the precious metal surface of each wire is remote from the contact areas and provides no advantageous contact function.

The present invention contemplates a relocation of such excess precious metal to provide a new function hereinafter more particularly described. The present invention further deals with an electrical contact comprising a composite contact element of an electrically conductive base metal layer and a precious metal layer, the composite material being rolled or otherwise formed to provide the precious metal surface with laterally spaced parallel ridges having a groove therebetween, the ridges and groove having a surface provided by a continuous precious metal layer.

It is an object of the invention to provide an electrical contact for use with a cooperative slidable contact conductor.

It is another object of the invention to provide a composite electrical contact member capable of increased and efficient contact life.

It is a further object of the invention to provide a composite electrical contact in the form of a long strip for providing a plurality of electrical contact members.

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 an isometric view of an electrical contact strip according to the invention,

FIGURE 2 illustrates a cross-sectional view along lines 2—2 of FIGURE 1,

FIGURE 3 illustrates a modified form of FIGURE 2,

FIGURE 4 illustrates another modified form of FIGURE 2,

FIGURE 5 illustrates a top view of a contact element of the invention mounted on a contact arm,

FIGURE 6 illustrates a side view of a mounted contact element and a cooperating contact rod, and

FIGURE 7 illustrates a front view of FIGURE 6.

Electrical contacts of the present invention are made by bonding a precious metal strip to a base metal strip to form a composite strip. One method of making such composite strips is disclosed in patent application Serial No. 493,536, filed March 10, 1955, now Patent No. 2,984,901 although other methods for forming the composite strips are also contemplated. For example, the strips may be bonded together by welding one strip to the other. Having provided such composite strip, the strip is rolled or otherwise formed to provide the shape illustrated by FIGURES 1 and 2 having a precious metal layer 1 and a base metal layer 2. The precious metal layer is composed of gold, or silver, or a metal of the platinum or of alloys of these metals. The electrically conductive base metal layer is composed of copper, brass, bronze, nickel, steel, etc. The composite strip comprises laterally spacel parallel ridges 3 and 4 having precious metal surfaces with a precious metal surfaced groove 5 therebetween, the ridge and groove surfaces being formed by a continuous layer 1 of said precious metal. The precious metal layer forming the surface of said ridges has a greater thickness, as at 6 and 7, than the precious metal forming the surface of said groove as at 8. During the forming operation of the composite strip of the invention, the bottom surface of the base metal layer is provided with a plurality of longitudinal laterally spaced welding beads 9 and 10.

As an example, the composite strip has a width of 0.104". The thickness of the strip through the ridges 3 and 4 is 0.020". The thickness through the composite metal between the ridges is 0.005". The thickness of the precious metal layer covering ridges 3 and 4 is 0.004". Thickness of the precious metal layer covering the surface of the groove 5 is 0.001". The distance between the crests of ridges 3 and 4 is 0.080". The parallel longitudinal welding beads are spaced apart 0.044", each 0.022" from the center of the base metal 2, and extend 0.006" from the bottom of base metal layer 2.

Generally the thickness of the precious metal layer at the ridges 3 and 4 is at least twice the thickness of the precious metal layer covering the groove 5 and the groove has a width greater than the width of ridge 3 or 4.

FIGURES 3 and 4 show variations in the surface configuration of the ridges 3 and 4 of FIGURES 1 and 2. The composite strip of FIGURES 3 and 4 may have dimensions corresponding to that of FIGURE 2, but the ridges 11 and 12 taper upwardly to a flat surface, while the ridges 13 and 14 of FIGURE 3 are flat surfaces of ridges having a rectangular cross-section.

FIGURE 5 illustrates a composite contact member cut from the long strip of FIGURE 1, for example, by cuts 15 and 16, the contact member being welded onto a base metal contact arm 17, which is preferably made of spring metal, by means of the welding beads 9 and 10.

FIGURES 6 and 7 illustrate a composite contact element 18 which is curved longitudinally and mounted on a corresponding curved end portion 19 of a modified contact arm 20, of which the other end portion 21 thereof is in the form of a split tube having prongs 22 extending therefrom for clamping onto a support (not shown). The slidable rod 23 is shown mounted in slidable engagement with the ridges 3 and 4.

In operation, as the ridges 3 and 4 become worn through use, the rod 23 contacts the precious metal sur-

face of the groove 5. When the rod engages the surface of the groove 5, there is a three-way contact area between the rod and the precious metal surfaces of the composite contact. As soon as the rod engages the surface of groove 5, further wear of the ridges is slowed up because of the three-way contact area. Also, regardless of contact pressure on the surface of the groove, there is still a desirable precious metal contact function since the rod even of substantial wear of the ridges 3 and 4, contacts only precious metal surfaces. Furthermore, since the excess of precious metal, as hereinbefore described in connection with the solid precious metal wires, is now relocated in the form of a layer on the surface of recess 5, there is a low resistance current path between the ridges 3 and 4.

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

What is claimed is:

1. A composite electrical contact member having a plurality of laterally spaced elongated contact ridges on a surface thereof for use with a second contact member slidable between and in contact with said composite contact member ridges, comprising a layer of electrically conductive base metal, the base metal layer having a surface in the form of a plurality of laterally-spaced longitudinally parallel ridges having a groove therebetween, a layer of precious metal bonded to the said surface of the base metal layer, the thickness of the precious metal layer on the ridges being at least twice the thickness of the precious metal layer on the groove.

2. A composite electrical contact according to claim 1, wherein the precious metal layer forming the groove is a flat layer.

3. A composite electrical contact according to claim 1 wherein the groove has a width greater than the width of each ridge.

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