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ELECTRICAL CONTACT MEMBERS HAVING CORROSION-RESISTANT ELECTRICALLY-CONDUCTIVE COATINGS WITH ONE COATING HAVING A GREATER LENGTH THAN THE OTHER

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Fig. 1

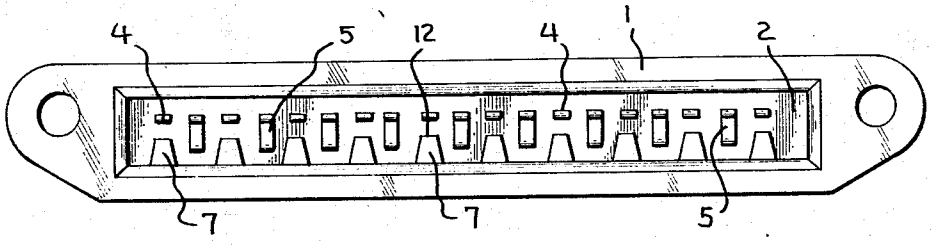


Fig. 2

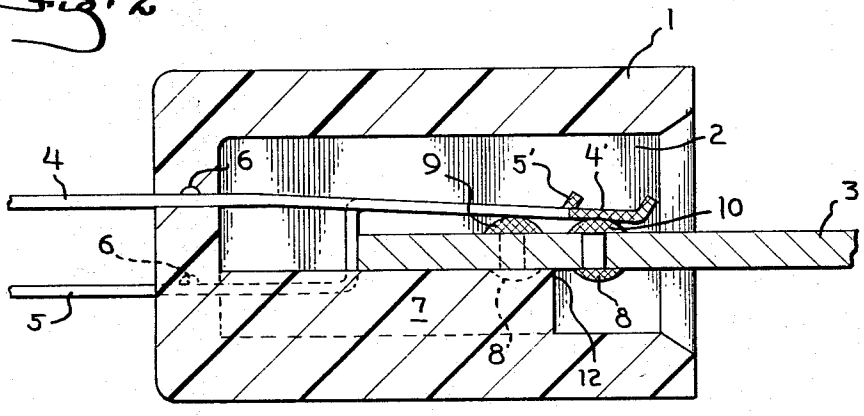
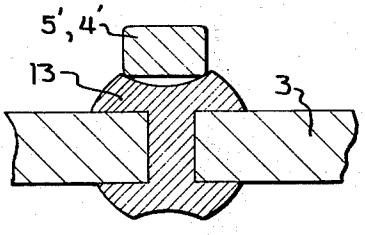


Fig. 3



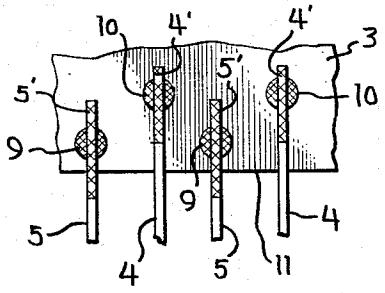


Fig. 4

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ELECTRICAL CONTACT MEMBERS HAVING CORROSION-RESISTANT ELECTRICALLY-CONDUCTIVE COATINGS WITH ONE COATING HAVING A GREATER LENGTH THAN THE OTHER

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8 Claims. (Cl. 200—166)

There are in common use, printed circuit edge connector assemblies comprising spring contacts carried by an insulating block which mates with the edge of a printed circuit panel so that the spring contacts make resilient electrical contact with printed conductors on the panel.

The printed conductors and the contacts have a contact surface provided by a corrosion-resistant electrically-conductive coating, for example, of gold, rhodium, palladium or tin. As the block and the panel are mated, there is sliding engagement between the contact surfaces of the contacts and the printed conductors. Since the printed conductors are flat, the contact surfaces of the contacts are made arcuate so as to make essentially tangential contact with the contact surfaces of the conductors to ensure effective contact pressure between these contact surfaces.

Since the path swept along the contact surface of each conductor, as the block and panel are mated, by the contact surface of the contact engaging the conductor, is many times the length of path along the contact surface of the contact swept by the conductor, the thickness of the coating of the contact is reduced by wear, as a result of the sliding engagement, to a correspondingly greater extent than the thickness of the coating of the conductor.

Where the contacts form part of a permanently installed connector assembly for which several interchangeable panels are provided, the conductive coatings of the contacts will be subjected to even greater wear relative to the conductive coatings of the printed conductors.

A printed circuit edge connector assembly according to the invention, comprises a series of spring contacts carried by an insulating block arranged to mate with a printed circuit panel, so that the spring contacts make resilient electrical contact with counter-contact elements on the panel, a first corrosion-resistant electrically-conductive coating on each contact slidably engaging a second corrosion-resistant electrically-conductive coating on one of the counter-contact elements as the block and panel are mated, the length of the surface of the first coating swept by the surface of the second coating being greater than the length of the surface of the second coating swept by the surface of the first coating.

The second coating may be on the head of a stud, rivet or the like, which forms the counter-contact element. The head may be, for example, dome-shaped or flat or the head may have a guide channel receiving the spring contact which is preferably straight over that part thereof which engages the head. For automatically centering the contact in the guide channel, the guide channel may have an arcuate internal surface, the contact being generally rectangular, preferably with rounded-off corners.

Where the counter-contact elements are fixed to the panel by shanks, portions of which project on the opposite side of the panel to that on which the counter-contact elements are, for example, where the counter contact elements are formed by the heads of rivets or by the heads of studs staked to the panel, stand-off means are preferably provided to prevent these projecting portions of the shanks from engaging the block.

The stand-off means may comprise a series of ribs lying within an aperture in the block through the mouth of which the panel is inserted, the ribs being arranged to support the panel. The counter-contact elements may be staggered in the longitudinal direction of the contacts so that when the block and the panel are mated, some of the counter-contact elements lie between the ribs and the remainder beyond the ribs towards the mouth of the aperture. In this case, the contacts for engaging the counter-contact elements which lie between the ribs will be shorter than the remaining spring contacts. The relative arrangement of the counter-contact elements, the contacts and the blocks may conveniently be such that the panel is supported without tilting about the ribs.

It is an object of the present invention to provide an electrical contact assembly with one contact having a corrosion-resistant electrically-conductive coating which has a length greater than the length of a corrosion-resistant coating on another contact.

Another object of the present invention is the provision of a contact assembly wherein the contact surfaces have a corrosion-resistant electrically-conductive coating with one coating having a greater length than the other.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjuction with the drawings in which there is shown and described an illustrative embodiment of the invention; it is to be understood, however, that this embodiment is not intended to be exhaustive nor limiting of the invention but is given for purposes of illustration and principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

In the drawings:

FIGURE 1 is a front elevational view of a printed circuit edge connector block having spring contacts fixed therein;

FIGURE 2 is an enlarged cross-sectional view on the lines 2—2 of FIGURE 1, showing the block mated with a printed circuit panel;

FIGURE 3 is a fragmentary plan view of a detail of FIGURE 2; and

FIGURE 4 illustrates a modification of the panel of FIGURE 2.

Reference will now be made to FIGURES 1–3. An elongated insulating block **1** has an aperture **2** for receiving a printed circuit panel **3** (FIGURE 2). Extending through block **1** are essentially straight spring contacts **4** and crank-shaped spring contacts **5** of essentially rectangular cross-sectional shape. Each contact **4** and **5** has been pushed through an aperture in block **1** to be resiliently retained therein with the aid of a protuberance **6** or other securing means on the contact. Contacts **4** and **5** have contact portions **4'** and **5'**, each having an electrically-conductive corrosion-resistant coating, for example, of gold, rhodium, palladium or tin, this coating extending longitudinally of each contact to substantially the same extent and being indicated by cross-hatching. Integrally formed with block **1** are stand-off ribs **7**, the upper surface (as seen in FIGURE 1) of each stand-off rib lying beneath one of spring contacts **4**. Each spring contact **5** extends between a pair of stand-off ribs **7**. Printed circuit panel **3** has fixed therein rivets **9** and **10**, portions **8** of these rivets which project beneath panel **3** being soldered to printed conductors (not shown) on panel **3**. The head

of each rivet has an electrically-conductive corrosion-resistant coating, for example, of gold, rhodium, palladium or tin, indicated by cross-hatching, rivets **9** and **10** being off-set from one another perpendicularly of the leading edge **11** of panel **3**, i.e., in the direction of the mouth of aperture **2** as best seen in FIGURE 3.

To mate panel **3** and block **1**, leading edge **11** of panel **3** is inserted into aperture **2** and the panel is advanced so that the contact portions of contacts **4** engage the heads of rivets **10** and the contact portions of contacts **5** engage rivets **9**, panel **3** being supported during its insertion by the ribs **7** and the offset portions of contacts **5** serve to limit the inward movement of the panel. Since portions **8** of rivets **9** lie between ribs **7** and portions **8** of rivets **10** lie beyond ribs **7** towards the mouth of aperture **2**, it is unnecessary to smooth-off portions **8**, for example, by a grinding operation to prevent their scraping block **1**. As the panel is advanced into aperture **2**, the surface of the corrosion-resistant coating of each rivet head sweeps the surface of the corrosion-resistant coating of the corresponding contact spring, the length of the path swept along the corrosion-resistant coating of each spring being very substantially greater than the length of the corresponding path swept by the surface of the contact on the rivet head coating.

Ribs **7**, rivets **9** and **10** and contacts **4** and **5** are so relatively arranged, that the force applied to rivet heads **10** by contacts **4** and which tends to swing panel **3** in a clockwise direction (as seen in FIGURE 2) about forward corners **12** of ribs **7** is substantially balanced by the force exerted by contacts **5** against rivet heads **9**. Panel **3** is accordingly automatically maintained in the position in which it is shown in FIGURE 3, relative to block **1**. Ribs **7** may have projections (not shown) which key into slots in the leading edge of panel **3** to facilitate correct alignment of rivets **9** and **10** with contacts **4** and **5**.

As shown in FIGURE 4, the heads of the rivets on panel **3** may have central arcuate guide channels **13** for cooperation with contact portions **4'** and **5'** of portions **4** and **5** so that the contact portions are automatically centered relative to the rivet heads as panel **3** is inserted into aperture **2**.

While the invention has been disclosed in relation to rivets on a printed circuit board, these rivets may be located on other electrical termination elements in which they are to be engaged by a spring contact member or the like in accordance with the principles of the instant invention. Also, it is to be understood that block **1** may be provided with multiple apertures each having spring contacts **4**, **5** and ribs **7**.

As can be discerned, there has been disclosed a unique concept regarding mating contact surfaces with one of the surfaces having a coating of corrosion-resistant electrically-conductive material which is greater in length than the other of the surfaces which is of like material.

It will, therefore, be appreciated that the aforementioned and other desirable objects have been achieved; however, it should be emphasized that the particular embodiment of the invention, which is shown and described herein, is intended as merely illustrative and not as restrictive of the invention.

What is claimed is:

1. A printed circuit edge connector assembly comprising in combination, an insulating block having a channel, a series of spring contacts carried by the block and lying within the channel, a printed circuit panel removably received in the channel, a series of studs arranged in spaced relationship on the panel and each resiliently engaged by one of the spring contacts, a first corrosion-resistant electrically-conductive coating on each spring contact, and a second electrically-conductive corrosion-resistant coating on each stud, the portions of the contact springs engaged by the studs being flat and elongate in a direction perpendicular to the channel so that the lengths of the first coatings swept by the second coatings are greater than the lengths of the second coatings swept by the first coatings when the printed circuit panel is inserted into and removed from the channel.

2. An assembly according to claim **1** in which the studs are off-set from one another perpendicularly to the leading edge of the panel, ribs in said channel opposite some of said spring contacts, some of the studs lying between the ribs when the block and panel are mated, the remaining studs lying beyond the ribs in a direction toward the mouth of the channel.

3. An assembly according to claim **2** in which ribs, the studs and the spring contacts are relatively arranged so that the panel is prevented by the force exerted by the spring contacts against the studs from pivoting about the ribs when the block and the panel are fully mated.

4. An electrical contact assembly according to claim **1** wherein said corrosion-resistant electrically-conductive coatings are selected from a group consisting of gold, rhodium, palladium and tin.

5. An assembly according to claim **1**, in which the studs are formed by the heads of rivets fixed in apertures in the panel.

6. An assembly according to claim **1**, in which the studs have channels with smoothly rounded internal surfaces for guiding the contact springs relative to the studs.

7. An assembly according to claim **1**, in which the studs have shanks projecting from the opposite side of the panel to that on which the contact springs lie, the block having grooves receiving the projecting portions of the studs.

8. A printed circuit edge connector assembly comprising in combination, an insulating block having a channel, a series of spring contacts carried by the block and lying within the channel, a printed circuit panel removably received in the channel, a series of studs arranged in spaced relationship on the panel and each resiliently engaged by one of the spring contacts, a first gold coating on each spring contact, and a second gold coating on each stud, the portions of the contact springs engaged by the studs being flat and elongate in a direction perpendicular to the channel so that the lengths of the first coatings swept by the second coatings are greater than the lengths of the second coatings swept by the first coatings when the printed circuit panel is inserted into and removed from the channel.

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