July 15, 1958 J. SCHMIDT 2,843,708

HEADER FOR ELECTRICAL DEVICES AND METHOD OF MAKING THE SAME

Filed May 31, 1955

Fig. 1

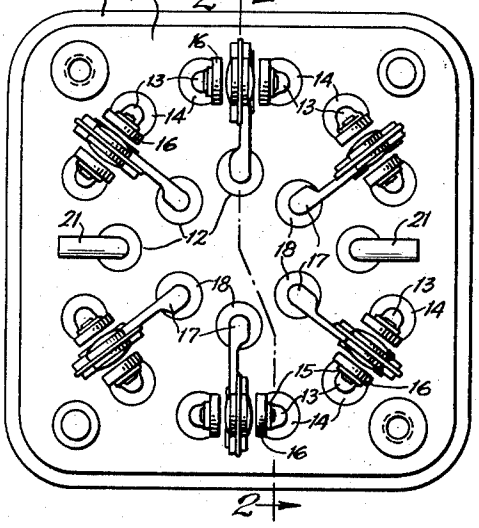


Fig. 2

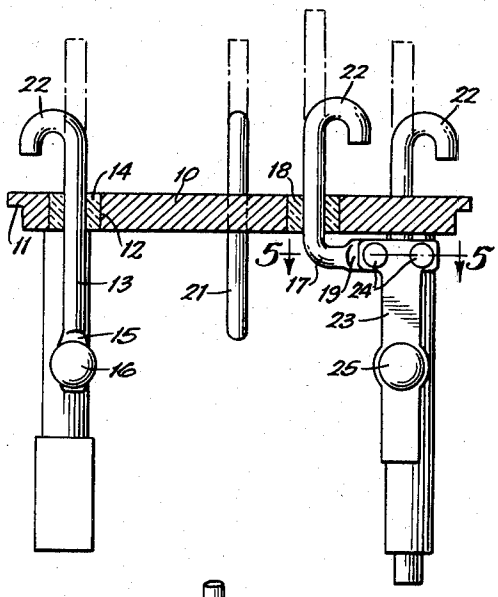


Fig. 3

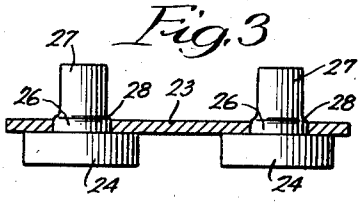


Fig. 4

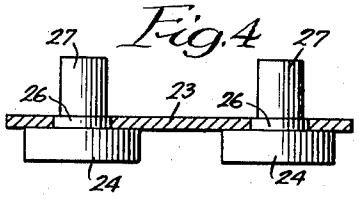


Fig. 5

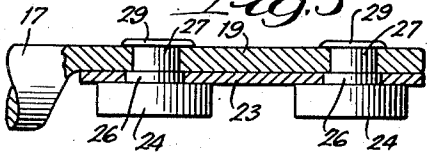


Fig. 7

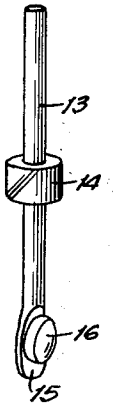
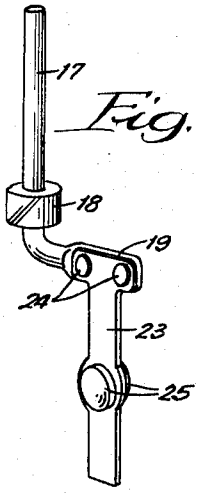


Fig. 6



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HEADER FOR ELECTRICAL DEVICES AND METHOD OF MAKING THE SAME

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6 Claims. (Cl. 200—166)

This invention relates to a header for electrical devices and method of making the same and more particularly to the manufacture of a header plate and contacts for relays and like electrical units.

It has been the customary practice heretofore to employ separate lead through conductors or contact pins and contact members which are connected inside of the relays or the like by soldering, brazing or in some similar manner. This results in a large number of small parts and a large number of soldered or brazed joints which are very difficult of inspection and which may develop high resistance. Assembly of the parts in proper relationship has also been very difficult and costly due to the necessity of handling a large number of small parts in a very small space.

It is one of the objects of the present invention to provide a header and method of making the same in which the parts are mechanically connected by riveting to insure a tight joint capable of visual inspection.

According to one feature of the invention, the rivets are formed with external fillets which have been pressed down to expand the rivet shank portion into an opening in a contact member and with a projecting end shank which is thereafter riveted over to form a strong and tight mechanical joint.

According to another feature of the invention, the contact members are coated with a metal of high electrical conductivity before riveting.

The above and other objects and features of the invention will be more readily apparent from the following description when read in connection with the accompanying drawing, in which:

Figure 1 is a plan view of a header embodying the invention;

Figure 2 is a section on the line 2—2 of Figure 1;

Figures 3, 4 and 5 are partial sectional views illustrating steps in the riveting of the flexible contact blades to contact pins;

Figure 6 is a perspective view of a contact blade and pin assembly; and

Figure 7 is a perspective view of a contact carrying pin.

The completed header constructed according to the present invention, as illustrated in Figures 1 and 2, comprises a header plate 10 formed of conventional low carbon steel and recessed at its edge, as indicated at 11, to fit into and to close the end of a metal container in which the relay or other mechanism is enclosed. The plate 10 is drilled or pierced with a series of cylindrical openings 12 therethrough through which contact pins are adapted to extend. In the construction shown, there are six two-way switches, each of which requires three contact pins so that there are eighteen openings 12, plus two additional openings 12, to receive contact pins for energizing the relay coil.

Each of the contact pins is supported and sealed in the header plate in the manner more particularly described and claimed in the co-pending application of Thedore

Obszarny, Serial No. 500,409, filed April 11, 1955. Each of the switch assemblies includes a pair of contact carrying pins 13, as shown in Figure 7, which is cylindrical in shape and which is embedded intermediate its ends in a glass bead 14. The beads 14 fit sealingly in openings 12 in the header plate with the ends of the pin 13 projecting beyond opposite sides of the plate. Before assembly of the pins 13 in the header plate, one end of each pin is flattened as shown at 15 and is pierced to receive a contact 16. In the manufacture of the parts, the pins are flattened and pierced before assembly, but the contacts 16 are not assembled thereon. The flattened ends 15 of the pins thus provide convenient surfaces for engagement or gripping by an asesmbly fixture so that the pins can be accurately assembled in the header plate in the desired angular relationship with respect to each other so that in the final assembly the contacts 16 will be in spaced parallel relationship, as shown in Figure 1.

A third contact pins 17 for each switch assembly includes a similar cylindrical portion embedded intermediate its ends in a glass bead 18 adapted to be mounted in certain of the openings 12 in the header plate, as shown in Figure 1. At one end, the pins 17 are flattened and bent over as indicated at 19 to lie substantially parallel to the header plate with their flattened surfaces perpendicular to the header plate and between adjacent contact pins 13. The flattened surfaces 19 of the contact pins 17 provide convenient surfaces for gripping by an assembly fixture to insure proper assembly of these pins with relation to the pins 13. The pins which provide terminals for the coil, as shown at 21, may be embedded in glass beads in the same manner as the pins 13 and 17 and may have their end portions bent over, as seen in Figure 1, for soldering coil leads thereto.

After all of the pins have been assembled in the header plate in the manner described in the Obszarny application referred to above, the exposed end portions of the pins and the exposed surfaces of the header plate are preferably coated or plated with a metal having a high electrical conductivity, such as copper. As explained in the Obszarny application, this reduces the electrical resistance of the pins and leaves a hard uncoated portion of the pin within the glass beads for strength and proper seal. After copper plating the surfaces are preferably tinned to facilitate subsequent soldering operations.

After the pins have all been mounted in the header plate, the outer ends thereof are bent over into open hooks, as shown at 22 in Figure 2. The hooks open toward the outer surface of the header plate so that each hook can easily receive one or more conductors which may be soldered thereto. Since the hooks may be positioned very close together in the final assembly, the provision of hooks greatly facilitates the connection of external leads thereto and makes it possible where desired to connect more than one lead to the same contact pin.

The contacts 16 are thereafter riveted to the flattened and coated end portions of the pin 13. The contacts 16 are preferably formed of a relatively soft and ductile metal of high electrical conductivity, silver being preferred for this purpose. The flattened and bent over portions 19 of the pins 17 have flexible contact blades 23 riveted thereto by rivets 24 and extend outwardly between the facing pairs of contacts 16 as shown in Figure 1. The contact strips 24 carry double contacts 25 which are also preferably formed of silver or the like riveted to the contact strips through openings therein intermediate their ends.

According to one feature of the invention, the rivets are formed to provide an extremely tight contact with the

members to which they are secured so that good electrical conductivity and high mechanical strength will be provided. Figures 3, 4 and 5 illustrate steps in the riveting of the blades 23 to the flattened end portions 19 of the contact pins 17 by the rivets 24. As shown in Figure 3, the rivets 24 are formed with enlarged heads which rest against one surface of the contact strip 23 with intermediate shank portions 26 and with end shank portions 27. The intermediate shank portions 26 are of a length to extend through the contact strip 23 and are joined to the end contact portions 27 through fillets 28 which project beyond the surface of the strip 23.

With the rivets placed in the strip 23, the first step in the assembly is to flatten out the fillets 28, as indicated in Figure 4. This operation will expand the intermediate shank portion 26 into extremely tight contact with the walls of the opening in the strip 23 to insure good electrical contact therewith. The end portions 27 may then be extended through openings in the flattened end 19 of the contact pins 17 and may be riveted over as indicated at 29. The riveting 29 completes a very strong and tight mechanical joint and at the same time expands the shank portion 27 into tight engagement with the walls of the openings in the flattened ends 19 to insure good electrical contact. The joint when completed can easily be inspected visually and possesses a high mechanical strength as well as good electrical conductivity, the electrical conductivity being augmented by the coating of highly conductive metal on the flattened end portion 19 of the pin. The rivets may be formed of good conducting material such as soft brass so that they will also have good conductivity, as well as the requisite mechanical strength.

The contacts 16 and 25 may be riveted in the same manner as the rivets 24, being initially formed with fillets which are pressed out to expand the intermediate shank portion and being then riveted over at their ends further to expand the metal and to complete a tight mechanical connection. In forming the double contacts 25, one end of the initial rivet may provide one contact and the shank portion may be swedged over to the desired shape to form the outer contact. After completion of the riveting operations as described above and bending over of the hook portions 22, the header assembly is completed ready for assembling into a complete relay.

While the invention has been particularly described in connection with the mounting of contact pins in a relay and while it has particular application thereto, it will be understood that contact pins for various other types of electrical devices could be assembled in headers therefor in the same manner. It is therefore not intended to limit the scope of the invention to the precise construction shown nor otherwise than by the terms of the appended claims.

What is claimed is:

1. In the method of making a header for an electrical device, the steps of piercing a flat contact member formed of hard metal, coating the member with a metal of high electrical conductivity, and thereafter riveting a contact in the pierced opening.

2. In the method of making a header for an electrical device, the steps of piercing a flat contact member, inserting in the pierced opening a rivet member having an enlarged head engaging one side of the contact member, an intermediate shank portion fitting closely in the pierced opening, and a reduced end shank portion connected to the intermediate shank portion through an external fillet, pressing the fillet flush with the surface of the contact member and thereby expanding the intermediate shank portion, and riveting over the end shank portion.

3. In the method of making a header for an electrical device, the steps of piercing a flat contact member, coating the pierced contact member with a metal of high electrical conductivity, inserting in the pierced opening a rivet member having an enlarged head engaging one side of the contact member, an intermediate shank portion fitting closely in the pierced opening, and a reduced end shank portion connected to the intermediate shank portion through an external fillet, pressing the fillet flush with the surface of the contact member and thereby expanding the intermediate shank portion, and riveting over the end shank portion.

4. In the method of making a header for an electrical device, the steps of piercing a flat contact member, inserting in the pierced opening a rivet member having an enlarged head engaging one side of the contact member, an intermediate shank portion fitting closely in the pierced opening, and a reduced end shank portion connected to the intermediate shank portion through an external fillet, pressing the fillet flush with the surface of the contact member and thereby expanding the intermediate shank portion, inserting the end shank portion through an opening in a second flat contact member with the end of the shank portion projecting beyond the second contact member, and deforming the projecting end toward the second contact member to expand the end shank portion and to rivet over the end thereof.

5. In the method of making a header for an electrical device, the steps of molding a bead of insulating material around the intermediate portion of a contact pin, flattening and piercing one end of the pin, securing the bead in an opening in a plate, coating the ends of the pin with a metal having a high electrical conductivity, and riveting a contact member to the flattened and pierced end of the pin.

6. In a header for an electrical device, a flat contact member formed of hard metal having an opening therethrough, a continuous coating of a softer metal of high electrical conductivity on the surface of the contact member and on the walls of the opening, and a contact having a head lying against one surface of the contact member and a shank extending through the opening and engaging the coating on the walls thereof, the end of the shank opposite to the head being deformed into tight engagement with the other surface of the contact member.

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