United States Patent

[11] **3,546,368**

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[54] **CONSTRUCTION OF ELECTRICAL CONTACT**
3 Claims, 6 Drawing Figs.

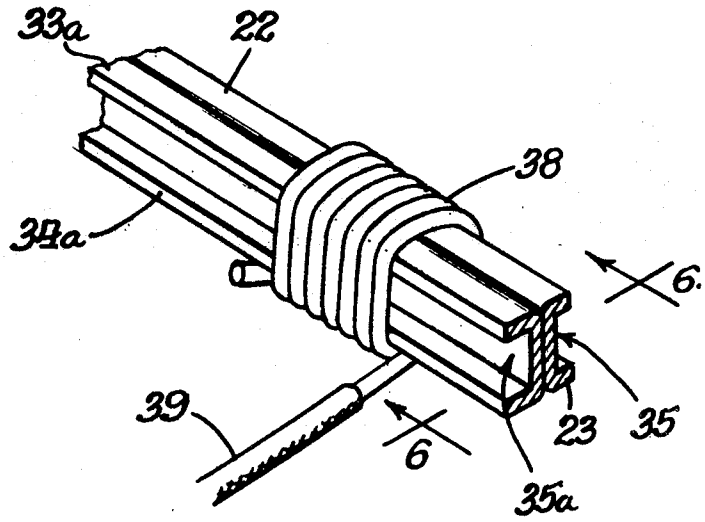
[52] **U.S. Cl.** 174/94; 29/193.5, 629; 339/176, 276
[51] **Int. Cl.** **H02g 15/08**
[50] **Field of Search** ..... 174/94; 339/276(A), 176; 29/425, 628, 629, 193, 193.5

[56] **References Cited**
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2,759,166	8/1956	Mallina	174/94
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Primary Examiner—Darrell L. Clay
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ABSTRACT: An electrical contact made from a thin sheet metal stamping including a channel portion and the channel portion bent back upon itself to form an end with four sharp corners about which a wire conductor is wrapped to make electrical contact without further fastening means.



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SHEET 1 OF 2

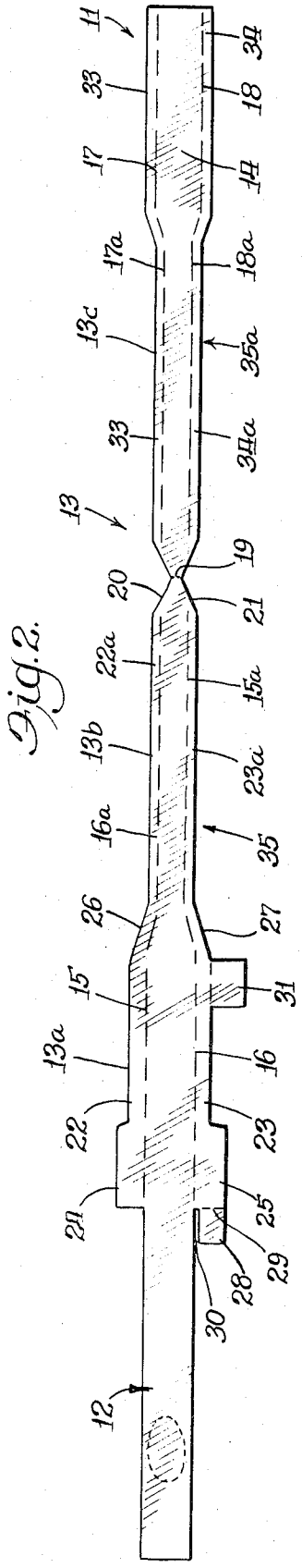


Fig. 2.

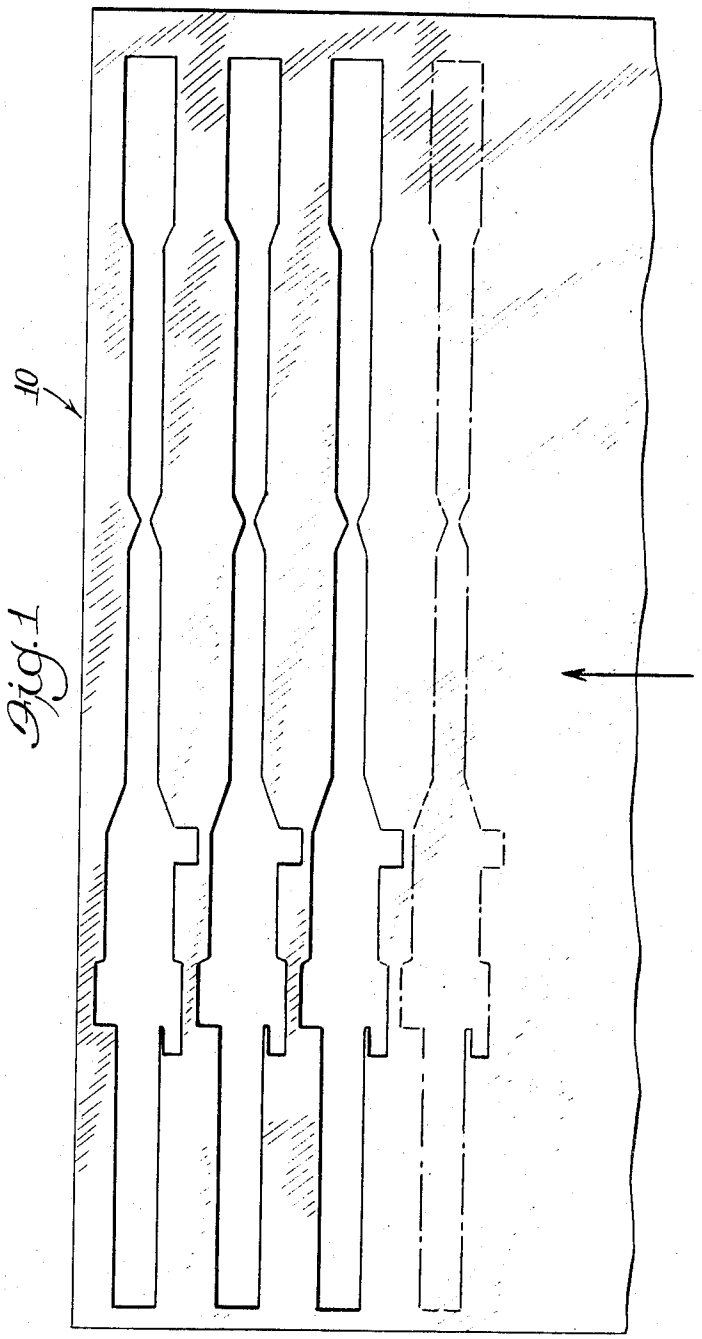


Fig. 1.

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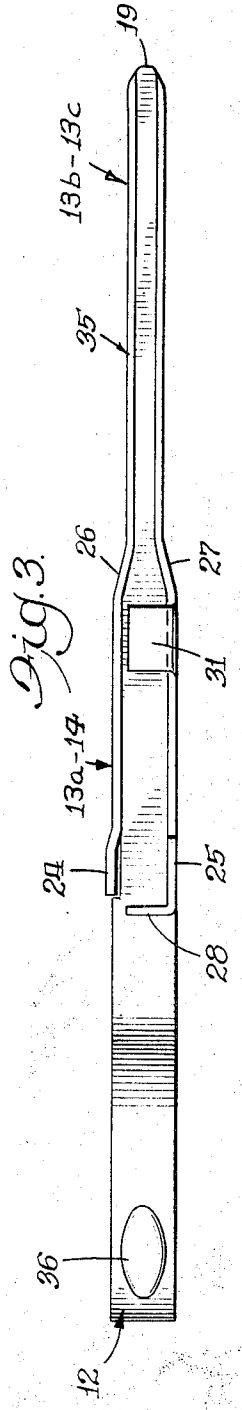


Fig. 3.

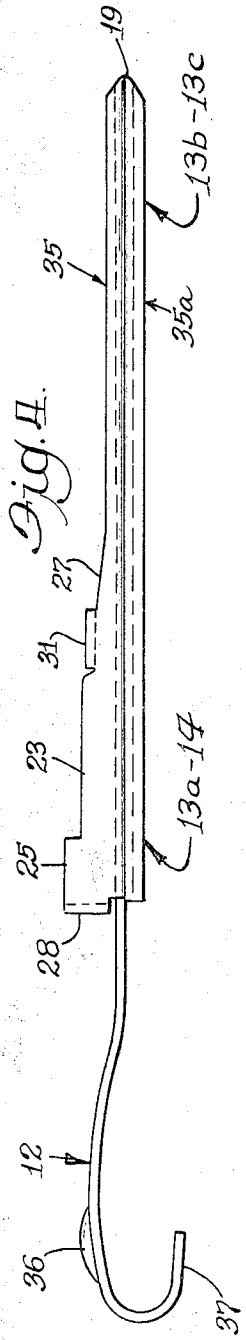


Fig. 4.

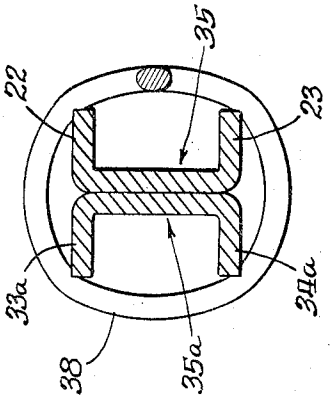


Fig. 6.

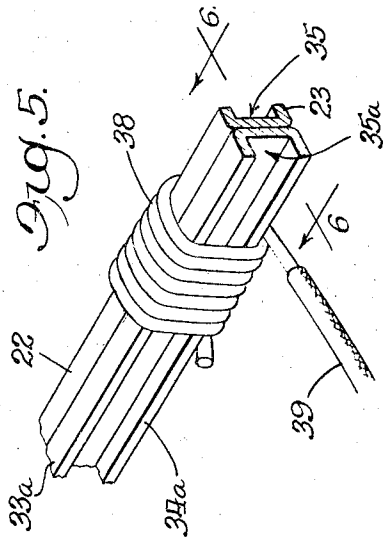


Fig. 5.

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CONSTRUCTION OF ELECTRICAL CONTACT

BACKGROUND OF THE INVENTION

1. Field of the Invention

The subject invention is in the field of electrical contacts such as used in circuit boards, computers, communications, and other electrical apparatus. Electrical contacts of this type commonly have one portion thereof used to make physical contact with an electrical circuit component such as a printed circuit board and another portion to receive a wire connection. The wire connection is of the type where a wire conductor is merely wrapped around the contact without other attaching means. The physical wrapping of the conductor must effectively make good electrical contact. In the past electrical contacts of this type have been manufactured from metal stock thick enough to receive a wire wrapped therearound to engage sharp corners of the metal for good electrical contact. More particularly the metal stock has been generally square or rectangular in cross section and the four corners made sharp by swaging or milling so that wrapping of the conductor therearound will cause the sharp corners to bite into the conductor. The contacts about which we are speaking are very small and machining of the square shanks to receive the wire wrapping, machining of a contact portion at the other end, and machining of an intermediate socket receiving portion becomes very intricate and expensive work. It is with this background that applicant developed an effective way of making a contact by a stamping and forming process in a special manner to create a new electrical contact to accommodate a wire wrap that insures good transfer of electricity.

2. Description of the Prior Art

We have been unable to find any pertinent prior art patents that utilized the procedure of winding a wire conductor around sharp corners of a metallic member other than a solid or a substantially solid cross section to make electrical contact. In the following U.S. Pat. Nos. Zepp, 1,780,289, Felt et al. 2,630,468 and Thompson 1,706,005, there is depicted the present state of the electrical contact art. In each of these prior patents an electrical contact is made by bending or folding of a metal having various configurations which are arranged to pierce the insulation of an electrical conductor and thereupon make electrical contact. There appears to be no prior art which could be found in a reasonable search where an electrical contact was formed by a metal stamping process and thereafter bent to form four sharp corners which tend to bite into a noncovered conductor wire when the wire is merely wound around the sharp corners.

SUMMARY OF THE INVENTION

This invention relates to a new and improved construction of electrical contacts.

An important object of this invention is to provide a particular novel construction of an electrical contact wherein the contact is preliminarily formed by a stamping thereupon forming the contact into an appliance engaging end, a socket engaging portion if desired, and a channel portion at its other end which is subsequently bent back upon itself to form opposing outwardly facing channels thereby presenting four sharp corners for the wrapping of an electrical conductor therearound.

An important object of this invention is to provide a process for making an electrical contact of the type wherein an electrical conductor is fastened thereto merely by wrapping the conductor around the contact and in which the process includes the forming of a thin sheet metal by stamping and subsequently folding portions of the stamped contact to produce an effective electrical contact.

Other and further important objects and advantages will become apparent from the disclosures in the following specification and accompanying drawings.

IN THE DRAWINGS

FIG. 1 is a plan view of the thin sheet of copper or other suitable metal from which the electrical contacts of this invention are blanked and subsequently formed.

FIG. 2 is a plan view of one of the blanked electrical contacts stamped from the thin sheet of copper as shown in FIG. 1.

FIG. 3 is an enlarged top plan view of the electrical contact of this invention.

FIG. 4 is a side elevational view of the electrical contact of FIG. 3.

FIG. 5 is an enlarged perspective view detail of a portion of the electrical contact of FIGS. 3 and 4 with an electrical wire wrapped therearound.

FIG. 6 is a sectional view taken on the line 6–6 of FIG. 5.

AS SHOWN IN THE DRAWINGS

The reference numeral 10 indicates generally a thin sheet of copper or other metal or metal alloy from which electrical contacts of this invention are made. For illustration several blanks have been shown to have been stamped from the sheet of copper 10 as shown in FIG. 1. Although the blanking has been shown to have been made by delivering metal stock through the die in a transverse direction it should be understood that the stock material could be fed either longitudinally or at some angle and still have the die blank the same parts. A dashed line outline on the sheet shows where the next succeeding blanking of the electrical contact parts will be made. FIG. 2 shows the electrical contact part blanked or cut to overall shape. As best shown in FIG. 2 there is a generally elongated flat strip 11 having an end portion 12, a central portion 13, and the other end portion 14. The central portion 13 includes a first section 13*a*, a middle section 13*b*, and a third section 13*c*. The section 13*b* and 13*c* are substantially identical in size and shape.

The section 13*a* of the elongated strip 11 is provided with parallel, laterally spaced apart, longitudinally extending bend lines 15 and 16. The other end portion 14 is provided with parallel and laterally spaced apart longitudianlly extending bend lines 17 and 18 which are in general alignment with the bend lines 15 and 16 respectively. The section 13*b* is provided with parallel and laterally spaced apart longitudinally extending bend lines 15*a* and 16*a* which are spaced narrower than the bend lines 15 and 16 which they adjoin by a slight tapering juncture. The section 13*c* is provided with parallel and laterally spaced apart longitudianlly extending bend lines 17*a* and 18*a* which are spaced narrower than the band lines 17 and 18 which they adjoin by a slight tapering juncture. The bend lines 15*a* and 16*a* are in axial alignment with the bend lines 17*a* and 18*a*. Intermediate the sections 13*b* and 13*c* there is provided a transverse bend line 19 about which the section 13*c* and the other end 14 are ultimately bent back for abutting engagement by the end 14 with the section 13*a* and by the section 13*c* with the section 13*b*. At the outer ends of the transverse bend line 19 there are generally provided V-shaped opposed notches 20 and 21. The bent and formed electrical contact is shown in both of FIGS. 3 and 4 which will be later described in detail.

The section 13*a* of the central portion 13 has relatively wide lateral projections 22 and 23 which are disposed laterally outwardly of the bend lines 15 and 16 respectively. Both laterally projecting flanges 22 and 23 are provided with wide step portions 24 and 25 at one end with downwardly tapering portions 26 and 27 respectively at the other end. The tapering portions lead downwardly and inwardly to the middle section 13*b*. The socket engaging portion 13*a*—14 which this part ultimately becomes, may be made of any construction to hold the device to and within a socket and may employ friction means, barbs, or an actual molding of the member into the socket.

As best shown in FIG. 2, the lateral flange 23 of the section 13*a* has a longitudinally extending portion 28 adjoining the step member 25. The extension 28 is joined to the step

member 25 by a transversely disposed bend line 29. A space or slot 30 is cut between the end portion 12 of the blanked sheet of copper and the side of the extension 28 as shown in FIG. 2.

The lateral flange 23 is also provided with a lateral extension 31 at the location of the downwardly tapering portion 27 thereof. The lateral extension 31 is joined to the flange 23 by a generally longitudinally extending bend line 32.

The next step in the construction of the electrical contact of this invention is to bend upwardly the lateral flanges lying outside all of the bend lines 15, 15*a*, 16, 16*a*, 17, 17*a*, 18*a* and 18*b*. In addition to the flanges 22 and 23 there are the lateral flanges 33 and 34 located outside the bend lines 17 and 18 of the end portion 14, the lateral flanges 22*a* and 23*a* located outside the bend lines 15*a* and 16*a*, and the lateral flanges 33*a* and 34*a* located outside the bend lines 17*a* and 18*a*. This upward bending of the lateral flanges is continued until the flanges 22, 22*a*, 23, 23*a*, 33, 33*a*, 34 and 34*a* are disposed at substantially right angles to the lateral center portion 35 which extends from the end 12 throughout the elongated strip 11 of this device to the bend line 19. Thereafter the longitudinal extension 28 is bent about its bend line 29 to a right angle position relative to the now upwardly bent flange 23 at a position adjacent the step member 25. The lateral extension 31 is then bent about its bend line 32 to a position where it is disposed at right angles to the flange 23 which has previously been bent upwardly. The lateral extension 31 now lies over the center portion 35 and substantially spans the now upwardly projecting flanges 22 and 23 of this device.

The next step in the formation of the electrical contact of this invention is to bend the section 13*c* and the end portion 14 about the transverse bend line 19 so that a lateral center portion 35*a* of those portions lies back-to-back and in abutting relationship with the lateral center portion 35 of the sections 13*a* and 13*b* of the electrical contact of this invention. With the blanked sheet of copper bent and formed as just described the electrical contact produced thereby is shown in FIGS. 3 and 4.

As stated in the Summary above, the longitudinally extending back-to-back portions 13*a* and 14 are utilized to engage a socket and thus hold the electrical contact in fixed position while it transmits electrical energy from one end to the other. The stepped and tapered flanges of the section 13*a* and including the flange spanning members 28 and 31 are all designed for firm retention in a suitably shaped socket.

The end 12 is adapted to provide a contact in any method desired with a circuit board or some other electrical device as desired. It should be understood that this contact end portion 12 may be made in any desired manner to effect electrical contact with some external apparatus. One form of contact has been shown in FIG. 3 where the end 12 is provided with an oval shaped button 36 and an outer hooklike end portion 37 which gives the extension a certain amount of rigidity to enable the device to maintain constant spring pressure against some surface.

The other end of the electrical contact is now H-shaped in cross section as shown in both of FIGS. 5 and 6. The H-shape is derived by the central channel sections 13*b* and 13*c* bent so that their lateral center portions 35 and 35*a* are in back-to-back relationship. The vertical legs of the H comprise the now planar aligned flanges 22*a* and 33*a* on one side and 23*a* and 34*a* on the other side. The purpose of the H-shape is to provide for sharp corners about which an uncovered electrical conducting wire may be wrapped as shown at 38 in FIGS. 5 and 6. The wire 38 has several turns wound on the sharp edges of the outwardly projecting flanges 22*a*, 23*a*, 33*a*, and 34*a*. The sharp edges of these flanges bite into the inside of the uncovered conductor 38 and it is wrapped therearound. It is this biting into the conductor that makes the electrical contact of this invention usable in this manner without soldering or other physical fastening means of the wire 38 to the tail portion of this contact. The electrical conductor wire 38 is shown to have an insulation covering 39 after it leaves the wrapping of the tail portion of the connector. It should be understood the wire used may be noninsulated throughout its length.

The electrical contact of this invention is frequently used in telephone installations, computers and other electrical devices which require field installation and where it is inconvenient or impractical to solder or otherwise physically connect the wire conductors to the contact. The field mechanic merely strips the insulation from the end of the electrical conductor and wraps the stripped end of the conductor wire around the H-shaped tail of this electrical contact. This operation immediately provides for the passage of electricity through the contact to a circuit board or other electrical device by reason of the engagement by the button 36. Quite often the electrical contacts with which persons are concerned in these highly sophisticated electronic fields are minute in size and the only practical way of making the connection is by wire wrapping. Thus, the making of this contact beginning with a thin sheet of copper rather than manufacturing out a solid piece of copper has many advantages over the solid milled connector. One of these advantages is the insurance of a more positive electrical interconnection between the contact and the manually wound uncovered electrical wire.

I claim:

1. An electrical contact comprising a generally elongated sheet metal member having one end portion for engaging an electrical appliance, a central portion thereof having a socket engaging configuration for holding the contact in a receiving socket, and the other end thereof having back-to-back channels with the channels facing outwardly presenting four distinct sharp edges about which an electrical conductor may be wrapped for the passage of electricity therebetween.

2. An electrical connector comprising a generally elongated sheet metal member having a portion thereof for engaging an electrical appliance, and still another portion for receiving a wire wrap, said last named portion including back-to-back channels with the channels facing outwardly presenting four distinct sharp edges about which an electrical conductor may be wrapped for effecting the passage of electricity.

3. An electrical connector comprising a generally elongated sheet metal member having a portion thereof for engaging an electrical appliance, another portion thereof for engaging a receiving socket, and still another portion for receiving a wire wrap, said last named portion including back-to-back channels with the channels facing outwardly presenting four distinct sharp edges about which an electrical conductor may be wrapped for effecting the passage of electricity.