Aug. 2, 1960 G. C. MAPELSDEN ET AL 2,947,968

ELECTRICAL TERMINATION

Filed April 1, 1957

FIG. 1.

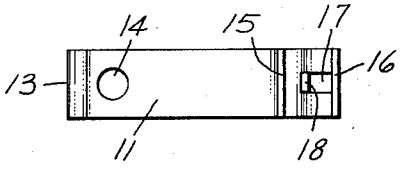


FIG. 2.

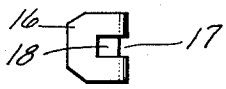


FIG. 3.

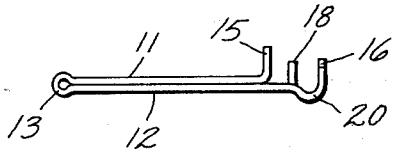


FIG. 4.

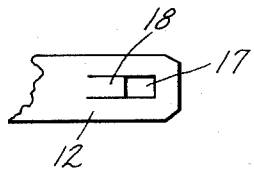


FIG. 5.

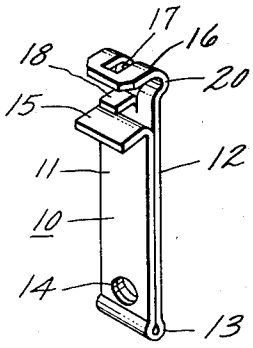
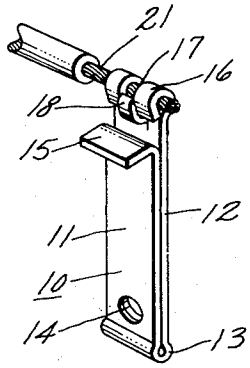


FIG. 6.



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ELECTRICAL TERMINATION

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3 Claims. (Cl. 339—276)

This invention relates to a means of crimping a wire conductor to an electrical contact or terminal. Portable electrical cords usually are provided with attachment plugs with two or more contacts or blades which are inserted into a convenience outlet for making an electrical connection. In some attachment plugs the contacts extend in a direction longitudinally of the cord, while in others the contacts are perpendicular to the cord. Such plugs in the latter category are oftentimes referred to as right angle plugs or merely as angle plugs.

The present invention finds its greatest use in angle plugs where the stranded wire is crimped to the contacts with a right angle crimp. This angular relation between the wire and the contact has fostered the use of the designation "flag-type crimp" for reasons which will be immediately apparent after studying the article in question. Previously, the wire conductors were fastened to the contacts of an angle plug in the same manner as in standard plugs so that the contacts were mere extensions of the conductors. However, this became very troublesome with the larger size conductors since the copper strands would oftentimes break when the conductors were bent at such a sharp angle before the plugs could be molded. This bending operation both stretches the outer strands of the conductors and work-hardens the material so that breakage may occur either in handling or during the molding operation. Our solution is to substitute a flag-type crimp so that little or no bending will be required in assembling the contacts in the molding machine.

The principal object of this invention is to provide an electrical connector with a flag-type crimp having a special latching feature which will resist the loosening of the gripping force when the wire conductor is under tension.

A further object of this invention is to provide a flag-type crimp for the contacts of an angle plug having a special latching arrangement that will hold the crimped portion firmly in engagement with the wire and will not tend to shear the strands of the wire.

The preferred embodiment of this invention is illustrated in the drawing as it would be incorporated with the contact blade of an angle plug. The same invention would also be useful as a connection between a wire and a terminal member; or wherever a wire, be it solid or stranded, is to be connected to a thin strip of metal. A slotted opening is first formed adjacent one end of the strip and then a tab is lanced out of the strip to serve later as the latching member. In actual practice, the tab is formed from material adjacent the opening so that when it is folded back it enlarges the opening. The adjacent end of the strip containing the slotted opening is likewise preformed outwardly to lie parallel with the beforementioned tab to form a receiving section for a wire conductor. Such a conductor is placed crosswise of the opening and the end of the strip is rolled over the conductor to produce a tight grip. Finally, the tab is

folded in the opposite direction to engage over the said end and latch into the slotted opening. There is a problem in making a flag-type crimp with the relatively thin material used for the contacts of attachment plugs. It is necessary to roll the contact material tightly around the conductor and to remove the tendency of the material to spring back to its original shape and release the wire conductor. This condition may not be serious on a small size conductor but becomes quite important on the large size wires required in heavy duty application such as room air conditioners.

Our invention will be better understood from the following description taken in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

Figure 1 is a plan view of an electrical contact embodying our invention taken before the crimping operation.

Figure 2 is a right end view of the contact of Figure 1 showing the terminal end.

Figure 3 is a side elevational view of the contact of Figure 1.

Figure 4 is a partial view showing a blank of the material from which the contact is formed.

Figure 5 is an isometric view of the contact embodying our invention before the crimping operation takes place.

Figure 6 is an isometric view similar to that of Figure 5 with the wire crimped firmly to the contact.

Referring in detail to the drawing and in particular to Figure 5, **10** represents an electrical contact of thin metal strip material which is doubled over to form a two-ply blade construction with a short leg **11** and a long leg **12**. The folded end of the contact has an anchor loop **13** for making good mechanical connection with the contacts (not shown) of a convenience outlet. A circular aperture **14** through the contact adjacent the anchor loop **13** is also provided for increasing the mechanical holding force between the contact and a receptacle. The free end **15** of the short leg **11** is bent outwardly at a right angle to the main portion of the contact so that when a plug is molded over the end of the contact, the portion **15** will serve to anchor the contact and prevent displacement and withdrawal.

The novel portion of our invention may be seen at the free or terminal end **16** of the long leg **12** of the contact. A slotted opening **17** is made in the terminal end, and a tab **18** is lanced out of the material forming one edge of the opening. This opening **17** is spaced from the edges of terminal end **16**, with a transverse rib spacing it from the outer transverse edge of the terminal end **16**. (See Fig. 5.) This tab **18** is bent at a right angle, and in so doing the slotted opening **17** is enlarged to the dimensions as shown. Figure 4 shows a blank of the portion of the long leg **12** of the contact where the tab **18** is situated in the plane of the leg. It should be understood, however, that the tab **18** is not cut as shown in Figure 4 and then folded, but that it is lanced or struck out of the material of the contact in one operation.

Looking at Figure 3, the terminal end **16** is made with a partial loop **20** that is open upwardly and an upstanding portion that lies parallel with the lanced tab **18**. This is the condition of the contact just prior to the assembly of the wire conductor **21** of Figure 6. The conductor is placed in the loop portion **20** across the slotted opening **17** and between the terminal end **16** and the tab **18**. Then the terminal end **16** is rolled over the conductor so that the free edge of the terminal end **16** lies adjacent the base of the tab **18**. This type of connection would be satisfactory in many situations, but the tab **18** is an additional precaution that will prevent

the terminal end **16** from springing back and releasing its grip on the conductor. Tab **18** is formed over the terminal end where it latches into the slotted opening **17** as shown in Figure 6. The tab **18** is not actually crimped over the conductor, but it is crimped over the terminal end of the contact.

Having described above our invention of a novel flag-type crimp for an electrical connector, it should be clear to those skilled in this art that the resulting product is both simple to manufacture and reliable in operation. It is so designed that it is well adapted to mass production methods of stamping by progressive dies, and it represents a decided improvement in angle plugs over previous methods of crimping the contacts where the contacts extended longitudinally of the conductors.

Modifications of our invention will occur to those skilled in this art, and it is to be understood, therefore, that this invention is not limited to the particular embodiments disclosed, but that it is intended to cover all modifications which are within the true spirit and scope of this inventon.

What we claim is new and desire to secure by Letters Patent of the United States is:

1. An electrical connector of thin metal strip having a terminal end that is to be crimped over a bare conductor, a lanced tab struck out of one side of the terminal end of said stirp to establish an opening in the end that is spaced from the edges of the strip, a bare wire lying across the terminal end and over the opening, the terminal end being rolled over the wire on said side of said strip to hold the wire firmly in place, the tab also being rolled over the crimped portion of the terminal end to restrain the terminal end from releasing its grip on the wire.

2. An electrical connector of thin metal strip of doubled-over construction comprising a long and a short leg, the free end of the long leg having a slotted opening that is spaced from the edges of the strip, said opening being spaced from the outer transverse edge of the free end by a transverse rib, a lanced tab struck from said strip and projecting outwardly from one side of said strip, a wire conductor extending across said strip and lying over said opening, said free end of said strip being folded over said conductor with the transverse rib of said strip adjacent said side of said strip, said tab formed over the free end and latched into the opening to engage said rib and hold the free end of the strip from releasing its grip on the conductor.

3. An electrical connector of thin metal material comprising a slotted opening adjacent one end, said opening spaced from the outer transverse edge of said end by a transverse rib, a wire conductor lying across the end of the connector and over the opening, said end of the material being folded over the conductor to hold it in a tight grip, said transverse rib disposed on one side of said strip, and a tab extending outwardly from said side of said strip and folded over said rib and latched into the opening to hold the end from releasing its grip on the conductor.

References Cited in the file of this patent

UNITED STATES PATENTS

445,491	Biesen	Jan. 27, 1891
2,445,537	Schaeffer	July 20, 1948
2,659,871	Berg	Nov. 17, 1953
2,765,454	Long	Oct. 2, 1956
2,845,108	Hammell et al.	July 29, 1958