June 23, 1959 G. N. HARRIS 2,892,178

BUTTON CONTACT

Filed Oct. 26, 1956

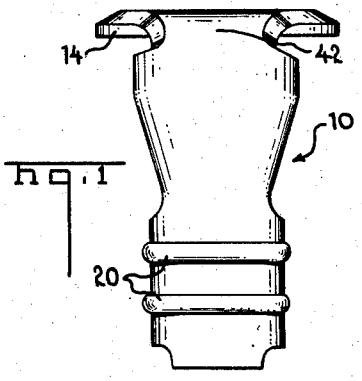


Fig. 1

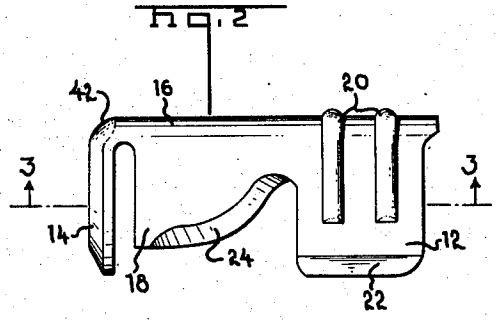


Fig. 2

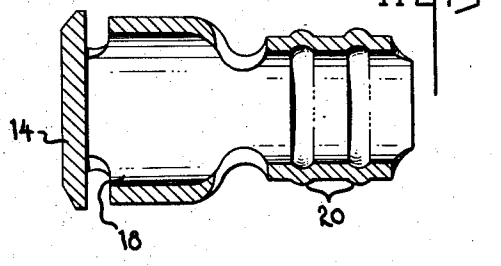


Fig. 3

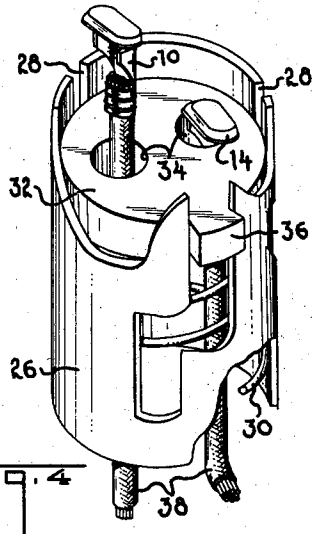


Fig. 4

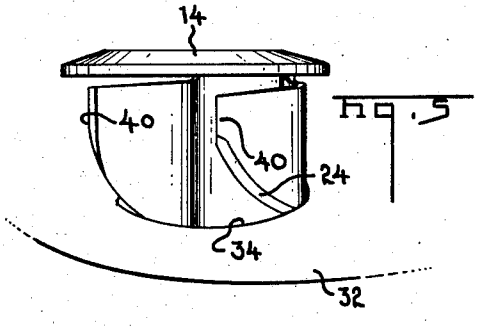


Fig. 5

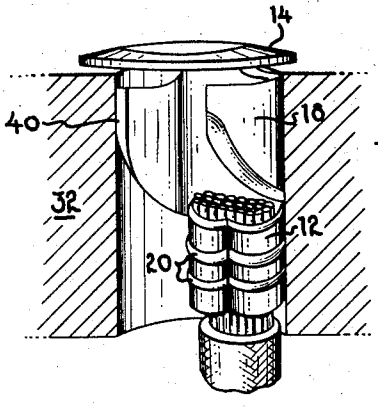


Fig. 6

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BUTTON CONTACT

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2 Claims. (Cl. 339—221)

This invention relates to electrical connectors and more particularly to electrical connectors of the button contact type for use in bayonet sockets or other fixtures employing non-conducting button inserts.

In the electrical industry there are many instances where it is desirable to detachably join together two wires to provide a socket for a light, fuse, and the like, where the end of the conductor to the receptacle is terminated in a contact area suitable for contact with the article inserted therein. These have generally taken the form of metal contacts with a binding post or screw at the other end for attaching thereto electrical conductors or in the simpler and cheaper type of construction simply the end of the conductor put through an eyelet in a non-conducting insert and bent over with a drop of solder applied thereto. These, particularly the latter, have proved rather unsatisfactory for many applications, particularly where good contact is desired. The solder being soft deforms readily and corrodes making poor contact and also gives poor wear resistance so that the life of the device is limited. It is also a well-known fact that in most of these applications the longitudinal length of the device is limited by severe outer shell requirements and the like.

According to the present invention I have overcome these various disadvantages and provide an improved integral button contact and barrel that may be used in the conventional receptacles but provides improved contact, wear resistance and performance all within the space limitations of the conventional receptacle.

Accordingly it is an object of the present invention to provide an improved button contact electrical connector. It is another object of the present invention to provide an electrical connector having integral button contact and barrel portion for joining the conductor thereto in a small space. It is another object of the present invention to provide an electrical connector having a small barrel portion for pressure forming about an electrical conductor without sacrifice of good electrical contact and mechanical strength. It is another object of the present invention to provide an improved button contact electrical connector that will automatically seat itself properly in the button insert and will securely hold itself therein. It is a further object of the present invention to provide a button contact electrical connector of improved strength and rigidity whereby the contact surface cannot be readily broken from the connector portions thereof. These and other and further objects will be in part apparent and in part pointed out as the specification proceeds.

In the drawings:

Figure 1 is a plan view of the electrical connector according to the present invention before connection to a conductor;

Figure 2 is a side elevation of the connector of Figure 1;

Figure 3 is a cross-sectional view on line III—III of Figure 2;

Figure 4 is a perspective view partially broken away of a pair of button contact connectors according to the present invention installed in a bayonet socket;

Figure 5 is an enlarged detailed view of a connector according to the present invention being inserted in a hole in a button insert;

Figure 6 is a view similar to Figure 5 partially broken away showing the connector in a fully-inserted position.

Referring now to Figures 1 through 3 the connector **10** comprises generally a barrel portion **12**, and a button contact **14** integrally joined together by throat **42** and web portion **16**. The barrel portion **12** is of a generally U shaped cross-section and has therein a pair of ribs **20** extending transversely of the barrel from adjacent one edge to adjacent the other edge on the outer surface of the barrel **12**. On the inner surface the ribs take the form of grooves. The upper edges of the barrel portion **12** are swaged at **22** to assist in the crimping of the barrel about the end of an electrical conductor. The basic crimp shown in Figure 6 is a well-known crimp in the art and the modifications will be described in detail herein.

It can be noted in Figure 2 that the edges of the barrel **12** are tapered upwardly from adjacent the web portion **16** toward the open end thereof. This taper provides a gradually reduced crimping effect on the conductor end so that good electrical contact is maintained at the inner end and good mechanical strength is maintained at the outer end. This is particularly important in a connector of this type where the barrel is of such narrow dimensions that a very small amount of wire is engaged therein. In one embodiment a taper of between .01 and .02 inch has been found satisfactory.

It will also be noted that the throat portion **42** of the connector **10** is quite wide and curved to provide maximum rigidity for the button contact **14**. With the smoothly curved configuration shown and with the broad area of web **16** a rigid construction is obtained that is rugged and long lasting. These features are all important in maintaining a high quality, low resistance connection in such a small length of space.

As may be seen in Figures 2 and 4 web section **16** has extending outwardly therefrom a pair of ears **18** in an expanded U shaped cross-section. The edges of the ears are tapered from adjacent the button contact toward the barrel portion for a purpose as will be described herein. The ears **18** of web section **16** are also swaged at **24** throughout the tapered portion of their edges.

The button contact member **14** is bent over at substantially right angles to the axis of the web and the barrel portions to provide a flat, broad area contact surface for the light or other object placed in the socket. Since the button contact is integrally connected to the web and the barrel **22** by a large cross-section of metal a very low resistance contact is made between the button contact and the electrical conductor crimped in the barrel **12**. This provides a greatly increased electrical conductivity from the conductor to the lamp or other receptacle inserted in the socket. The top edges of the button contact **14** are swaged so as to round them off to facilitate the passage thereover of the contact on the lamp base or other device to be inserted in the socket.

The ribs **20** (Figure 3) are formed in the outer surface of the barrel **22** by coining grooves or impressions on the inner surface thereof. These inner grooves aid in the electrical connection within the barrel in a fashion similar to that set forth and claimed in the copending application of Kemper M. Hammell, Serial No. 604,544, filed August 16, 1956. The ribs **20** are also of importance in this very small width barrel portion in that they

give added strength to the crimp and also prevent distortion thereof during the forming stages of the connector.

Referring now to Figure 4 there is shown a socket **26** of the type in which the button contact connector **10** is utilized. These bayonet fixtures are used typically in automobile lighting fixtures and in various other connecting applications. They comprise generally an outer socket **26** which has therein a pair of slots **28** for receiving the bayonet catch of the lamp base or other device to be inserted therein to lock it in place in the socket. The socket also carries therein a button insert **32** which is of a non-conducting material and has therein a pair of holes **34** and a projecting lug or key **36**. A spring **30** is provided to maintain contact between a lamp base or other device and the button connectors **10** in the socket. The spring **30** bears against the underside of the insert **32** and tends to push it out of the socket. Upon installation of the lamp or other device in the socket **26** the spring **30** maintains good contact between the button contact and the lamp.

Fitted within the holes **34** of the button **32** are a pair of button contact connectors **10** according to the present invention. As may be seen these have a generally oval or elliptical shaped head **14** which is rounded off on all edges so that the contact portion of the lamp or other device can readily ride up the sloped surface to the flat contact area. The button contact member **14** is of greater dimensions than the diameter of the hole **34** so that it cannot fall through the hole but will always remain in fixed position on the top side therein.

In actual operation if both ends of the wires **38** are free the connector **10** is crimped on to one end of the wire and the wire inserted through the holes **34** therein as is being done in Figure 4. If the other end of wires **38** are already connected the wire is inserted through the socket and the connector **10** applied from on top.

Referring now to Figures 5 and 6 there is shown on an enlarged scale the insertion of the button contact connector **10** into a hole **34**. As may be seen in Figure 5 the ears **18** of the connector **10** act as a guide to assist in the insertion of the connector **10** into the holes **34** in properly oriented alignment. The swaged areas **24** on the lower portion of ears **18** are provided to assist in the curling in of the ears **18** as the connector is inserted in the hole. As may be clearly seen in Figure 5 the ears **18** have small areas **40** at each end thereof which are not swaged and which retain their sharp rectangular corner. As the connector **10** is pushed into the holes **30** the ears **18** are forced together slightly so that they are somewhat under compression as they enter into the holes **34**. This causes the edges of the surfaces **40** to dig into the inner sides of the holes **34** and to securely hold the button contact therein. This overcomes the annoying characteristic of some button contacts of always coming out of the holes upon removal of the lamp or other device therein. As may be seen in Figure 6 the entire assembly extends from just above the top surface of the button insert **32** almost to the lower surface of the button insert **32**. Thus unwanted contact cannot be made with the spring or socket when the device is compressed to insert the lamp or other object therein and a secure, low resistance contact is obtained when the lamp is inserted in the socket.

In addition to the ears **18** acting as guides and securing means for the button **14** they can also act as adjustable elements to compensate for various sized holes **34** so that a single connector **10** can be used for a wide range of wire sizes. For larger sized holes the ears are not bent up as far into a U shaped fashion during the forming operation as they are for the smaller sized holes.

While there is given above a certain specific example of this invention and its application in practical use, it should be understood that this is not intended to be exhaustive or to be limiting of the invention. On the contrary, this illustration and explanation herein are given in order to acquaint others skilled in the art with this invention and the principles thereof and a suitable manner of its application in practical use, so that others skilled in the art may be enabled to modify the invention and to adapt and apply it in numerous forms each as may be best suited to the requirements of a particular use.

I claim:

1. For use in an aperture in a block of insulating material to provide a contact surface on one face of the block, an electrical connector comprising a ferrule portion adapted to be pressure formed onto an electrical conductor, a generally planar contact member disposed substantially at right angles to the longitudinal axis of said ferrule portion, an intermediate web portion integrally joining said ferrule portion and said contact member, a pair of ears flaring outwardly from said web portion and defining therewith a channel section in alignment with said ferrule portion, said channel section smoothly tapering from adjacent said ferrule portion from a width and depth to pass within said aperture to dimensions exceeding that of said aperture, the tapered portion of said channel section having swaged free end edges for presenting a broad surface of engagement with the aperture sidewalls as said ears are cammed inwardly upon seating of the connector in said aperture.

2. For use in an aperture in a block of insulating material to provide a contact surface on one face of the block, an integral electrical connector comprising a first channel portion having a pair of ears adapted to form a ferrule of lesser dimensions than said aperture for connection to an electrical conductor, a second channel portion having outwardly flaring ears and a root which extends substantially as a continuation of the root of said first channel, said second channel smoothly tapering from adjacent said first channel from a width and depth to pass easily within said aperture to dimensions exceeding that of said aperture, the tapered portion of said second channel having swaged free end edges smoothly merging into channel edges of rectangular configuration extending substantially parallel to the longitudinal axes of said channel portions, and a generally planar contact member joined to the root of said second channel and disposed substantially at right angles to said axes.

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