June 27, 1939. M. ALDEN 2,163,771

ELECTRICAL CONNECTOR

Filed June 11, 1937

Fig. 2.

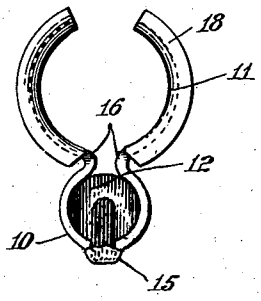


Fig. 1.

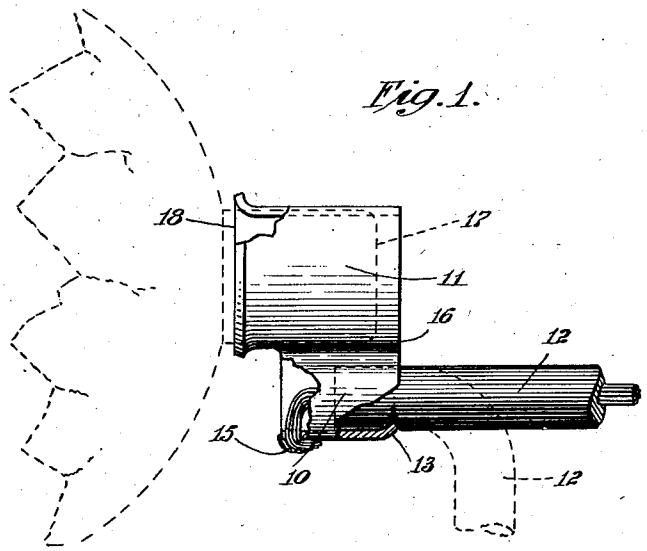


Fig. 3.

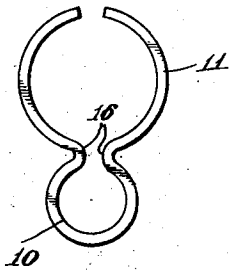


Fig. 4.

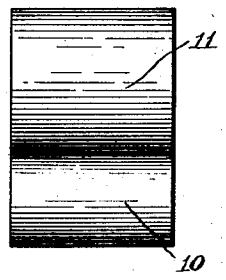


Fig. 5.

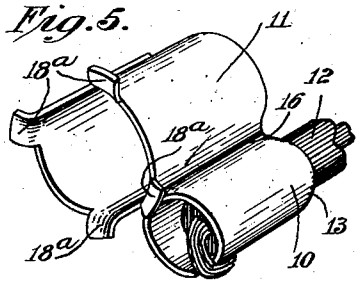


Fig. 6.

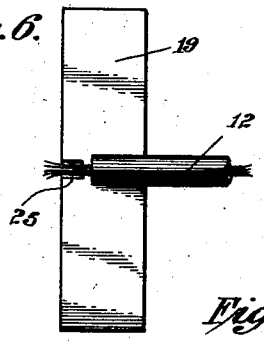


Fig. 7.

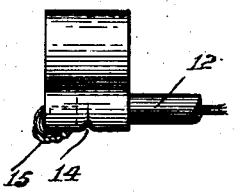


Fig. 8.

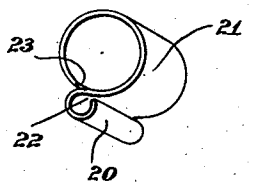
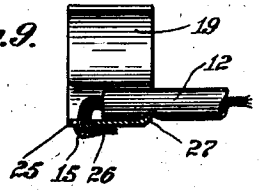


Fig. 9.



INVENTOR
Milton Alden
BY
ATTORNEY

Patented June 27, 1939 2,163,771

UNITED STATES PATENT OFFICE

2,163,771

ELECTRICAL CONNECTOR

Milton Alden, Brockton, Mass.

Application June 11, 1937, Serial No. 147,640

2 Claims. (Cl. 173—269)

My invention relates especially to devices useful as grid caps used to make connection with the terminal tips of radio valves or "tubes".

One object is to provide a satisfactory device which can be easily and cheaply made. Another object is to provide a device which can be readily applied and which will stay on, that is—will not jar or work off.

Another object is to provide a device which is rugged and not easily damaged.

Another object is to provide a connector to which the conductor can be effectively secured.

A further object is to provide a device of this type in which expansive flexure is widely distributed throughout the connector rather than localized, whereby the connector may function satisfactorily with larger oversize conductors.

Yet another object is to provide a connector which is compact and economical of space both longitudinally and laterally and in which a protecting portion is provided for some of the insulation around the connecting wire.

An objection to connectors which are substantially triangular in cross section has been the confined or localized flexure at the ends of the central side.

In automobile radios and elsewhere shocks have tended to objectionably loosen the connector. Another cause of complaint has been due to the widely different sizes of conductors with which a connector is expected to be capable of functioning without taking a permanent set.

According to this invention these difficulties have been eliminated by widely distributing the expansive flexure.

Fig. 1 is a side view of a grid cap or tube connector embodying one form of my invention, the end of a tube and its tip being shown dotted.

Fig. 2 is an end view of the connector of Fig. 1.

Fig. 3 is an end view of a slightly modified form of connector.

Fig. 4 is a side view of the same.

Fig. 5 is a perspective view of a modified type of connector with its terminal wire attached.

Fig. 6 is a view of a blank showing how the end of a conductor may be attached.

Fig. 7 is a side view showing a connection attached to a conductor but with a different form of crimping.

Fig. 8 is a perspective view of a modified form of the connector.

Fig. 9 shows a longitudinal sectional view of one form of connector.

The connector has two parallel tubular parts 10 and 11 integrally connected. The smaller part 10 forms a housing for the end of the terminal conductor. The insulation 12 is preferably gripped in one end of the tube 10 and may be crimped at 13 at the end of the tube as shown in Fig. 1, or crimped or "staked" at 14 near the center as shown in Fig. 7. The tip of the wire (solid or stranded) is soldered at 15.

The spring clip part 11 has two jaws shaped to engage the opposite sides of the part to which it is to be applied such as a tube tip 17. The entrance or mouth 18 is preferably flared or bell shaped to facilitate applying the clip to the tube tip. The connector may be readily formed from a stamped plate or strip 19 on which is laid or placed the end of the conductor. The strip may be bent around the insulation and the tip of the wire and formed into the split tube clip. The wire may be soldered in its tube in any suitable manner. The construction is such as to make it possible to do the soldering very easily and cheaply.

The blank may be formed so as to produce two tubes of equal length as in Figs. 6, 7, 8 and 9 or the wire tube 10 may be shorter than the clip as shown in Figs. 1 and 5.

In the form of device shown in Fig. 8 the tubes 20 and 21 are integral and each is open along one edge at 22 and 23. The wire is laid in the open tube 22 which is then closed and the wire soldered in place. The other tube 23 is then ready to receive the tube tip.

In the form shown in Fig. 9 the end of the smaller tube 10 is notched, cut away, or slotted at 25 and the tip 26 of the wire is bent over into this slot where it is conveniently held while the slotted portion of the tube and the wire are dipped into the solder to fasten the wire in place. The tube 10 may also be crimped into the insulation of the wire at one or more places such as 27 to hold the conductor independently of the soldered joint. This ensures a strong connection even if the soldering should not be perfect. It is also possible to weld or braze the conductor wire into the smaller tubular portion of the device.

The wings of the socket part are preferably so hinged to the conductor clamping or holding portion as to provide a uniformly resilient gripping action so that the jaws or wings may snugly fit the part on which they are to be mounted.

The two cylindrical portions 10 and 11 are shaped to function as stated and distribute the expansive flexure widely throughout both of them rather than having them exactly cylindrical. The solder 15 as shown in Fig. 1 should not substantially impede expansive flexure of the cy-

lindrical portion 10. Where the conductor goes through the notch 25 and outside, it is necessary to use only a very small amount of solder so that by holding the wire 12 and the connector at about a 45° angle only the outside bent portion of the conductor 26 need be soldered.

In Fig. 5 the flanged or bell mouthed portion 18 is cut away to make the cylindrical part 11 more flexible in cases where the bell mouthed portion of Figs. 1 and 2 may tend to stiffen the jaws 11 to an undesirable extent. Only the lugs 18a in Fig. 5 serve as guides for the entering conductor tip 17. In all embodiments of this invention the conductor 12 extends longitudinally away from the connector. The distorted portion 13 is shown in Fig. 1 as being at the end of the cylindrical part 10 in order that it may not affect the flexure of the cylindrical portion 10 more than necessary. The central crimping 14 in Fig. 7 is shown for constructions in which expansive flexure in the part 10 is not so important.

Expansive flexure widely and substantially uniformly distributed throughout both cylindrical portions 10 and 11 is attained by having the curved connecting portions 16 free of sharp bends, having the metal of the desired thickness and satisfactory composition. Specifically what is known as quarter hard steel may be used, or six point hard bronze, or beryllium copper. Best results are believed to be obtained when the substantial circles of the cylindrical parts 10 and 11 are no closer than about tangent to one another and no further apart than about 150% of the thickness of the metal used. The radius of curvature in the connecting neck portion 16 is about one to two or three times the thickness of the metal.

The insulation around the wire 12 is preferably snugly gripped within the cylindrical portion 10 and the insulation ends or is spaced from the soldered part so that no fumes from the flux or solder may injure the insulation. In fact so small an amount of solder is necessary that solder which is slightly acid may be used, the acid fumes being volatilized quickly before they can do any harm.

The construction shown in Fig. 8 is not intended to be a full equivalent of that shown in the other figures.

While no bell mouthed portion is shown for the construction of Figs. 3, 4 and 6 to 9 inclusive, it will nevertheless be understood that the conductor receiving portion may be slightly bevelled to facilitate entry of the conductor.

I claim:

1. In combination, a connector of the socket type and an insulated terminal wire, said connector being adapted to receive axially therein a plug such as a radio tube tip and comprising a joined pair of jointly flexible tubular members positioned substantially mutually parallel, the first tubular member having a longitudinal slit extending for the entire length of one wall thereof and also having a second longitudinal slit extending for the entire length of the opposite wall thereof, the second tubular member having a longitudinal slit located at the point of juncture of the two tubular members and coincidental with the second slit of the first tubular member, whereby the insertion of a plug into said first tubular member will cause expansive flexure of both tubular members, said second tubular member being adapted to flexibly grip therein the insulation of said wire so as to locate said wire substantially parallel to the first tubular member, the insulation of said wire being removed from the portion thereof nearest to the free end of the wire up to a point located well within said second tubular member and the end of said wire being bent over the outer wall of the second tubular member and fastened thereto by molten metal at a point remote from the insulation of the wire and remote from said coincidental slit, whereby the joint flexibility of said tubular members and the properties of said insulation are both substantially unaffected by the fastening of said wire to said outer wall of said second tubular member.

2. A structure according to claim 1, wherein the second tubular member is provided with a recess for receiving and holding therein at least part of the bent over bare portion of the wire.

MILTON ALDEN.