Nov. 7, 1944. C. H. JUDISCH 2,362,074

CONNECTOR PLUG

Filed Aug. 30, 1941

Fig. 1

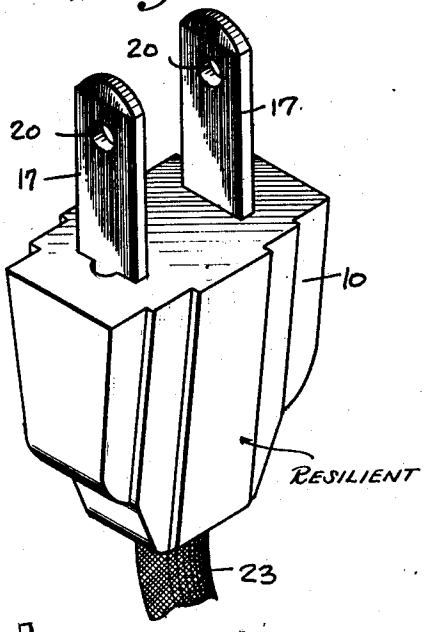


Fig. 2

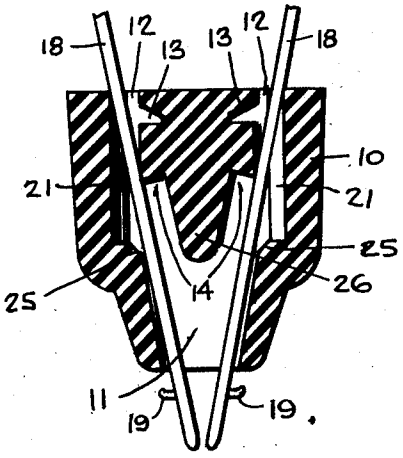


Fig. 3

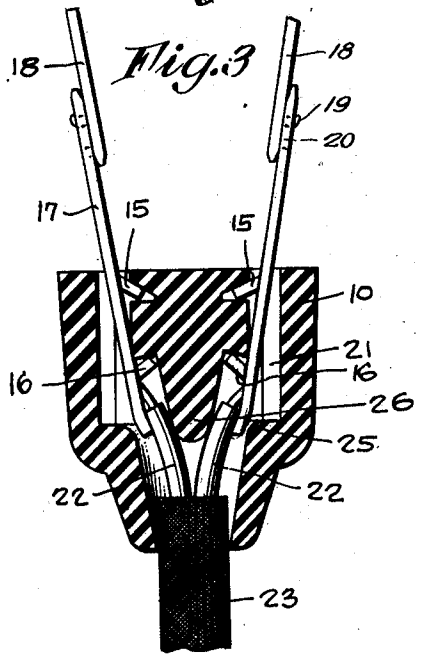
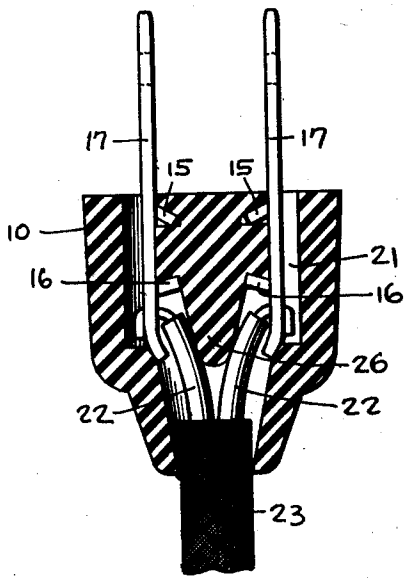


Fig. 4



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CONNECTOR PLUG

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Application August 30, 1941, Serial No. 408,976

2 Claims. (Cl. 173—361)

This invention relates to connector plugs, and is a continuation in part of my copending application, Serial No. 363,996, filed November 2, 1940.

Until recently, connector plugs have been generally formed of some hard insulating material such as "Bakelite." The contact prongs were fixed to the body of the plug by rivets or the like and carried some securing means, such as screws, by means of which conductors were attached to the prongs, generally after the latter were secured to the plug body. This type of connector plug, as it was easily broken and for other reasons, has more or less fallen into disuse since the advent of the soft rubber or flexible type of connector plug.

The flexible or soft rubber connector plug is generally formed with a pair of passages for receiving and holding the contact prongs and a conductor cord-receiving cavity. In these plugs, means are formed within the passages, generally on the walls of the same, for engaging means carried by the prongs to hold the latter in their proper positions within the passages when mounted therein.

The means within the passages often restricted the same making it difficult to insert the prongs within the passages, or the passages themselves were so formed relative to the plug body that it was difficult to mount the prongs properly within the same. This increased assembly costs, for it was necessary to employ in the assembly operation costly machines having a complicated cycle of operations for inserting the contact prongs within the passages.

The assembly operation of the previously proposed resilient plugs generally distorted the material of the plug body so that the material necessarily had to be formed of a relatively expensive grade rubber which is readily distensible. Accordingly, not only were assembly costs relatively high but the manufacturing costs as well.

The plug of the present invention, although it is formed with passages for receiving the contact prongs and the wall of the passages formed with means to cooperate with the contact prongs to position and lock the same in the passages, is one which can be more easily assembled than those previously proposed.

In the preferred embodiment of the present invention, the prong-receiving passages are of such a size and shape relative to the size and shape of the cord-receiving cavity that a pair of rigid pull arms may be simultaneously passed through the plug body in converging straight line paths of movement without distending the material of the body to pick up and pull back into the passages on their return movement a pair of contact prongs.

One wall of each passage, in the preferred form of the present invention, is formed with a pair of spaced notches for taking tangs projecting from one face of each contact prong. The passages are not restricted, for the notches form recessed seats on the walls of the passage and the prongs are readily mounted therein. The tangs, as they engage the recessed seats formed by the notches prevent longitudinal movement of the prongs in the passages and anchor the same therein.

It is preferred to assemble the plug of the present invention with the prongs attached to conductors by a machine such as disclosed and claimed in my copending application, Serial No. 340,951, filed June 17, 1940, although the plug may be assembled by other machines or even by hand.

The machine of my copending application comprises a pair of pull arms moving in converging but straight line paths of movement through the plug body to a position wherein the free ends are exposed at the rear of the plug so that the contact prongs may be mounted to hooks formed thereon and pulled back in diverging paths into proper position in the passages.

To permit the hooks of the pull arms to pass through the plug of the present invention, the wall of each passage is formed with a longitudinally extending groove coextensive therewith. The grooves preferably are substantially as wide as the pull arms and permit the arms to enter and move freely through the plug body without distorting the material of the same.

As the prongs can be readily mounted within the passages of the plug in a minimum of assembly operations, the assembly costs of the plug of the present invention are relatively low and as the plug body is but little distorted during the assembly operation, it can be formed of a cheaper grade of rubber than heretofore possible.

Other features and advantages will hereinafter appear.

In the accompanying drawing:

Figure 1 is a perspective view showing the connector plug of the present invention with the contact prongs mounted therein.

Fig. 2 is a sectional view showing a fragmentary part of the pull arms after the same have been passed through the plug.

Fig. 3 is a sectional view of the connector plug showing the position of the contact prongs just

prior to their disengagement from the pull arms which have now been retracted from the plug.

Fig. 4 is a sectional view of the assembled plug illustrated in Fig. 1 showing the contact prongs seated in their passages.

The connector plug of the present invention comprises a body 10 of resilient insulating material such as rubber or the like. The plug is formed during its molding operation with a conductor cord-receiving cavity 11 opening onto one face of the plug and a pair of spaced contact prong-receiving passages 12 leading from the cavity 11 to the opposite face of the plug.

The one wall of each passage 12 is provided with a pair of notches 13 and 14 respectively forming recessed seats spaced longitudinally of the passages and adapted to receive spaced tangs 15 and 16 projecting from the one face of the contact prongs 17 to lock the contact prongs in their proper position within the passages 12 after they have been inserted therein.

The notches 13 and 14 do not restrict the passages which are of such size and shape relative to the size and shape of the conductor-receiving cavity 11, referring now to Fig. 2, that a pair of rigid pull arms, such as disclosed in my above-identified copending application, may be simultaneously passed through the plug body in converging straight line paths of movement with little, if any, distention of the material of the body.

The pull arms 18 are formed adjacent the free ends thereof with hooks 19 to permit the contact prongs 17 to be mounted to the same through eyes 20 formed adjacent the one end of the contact prongs.

To permit the hooks 19 of the pull arms to pass through the plug without gouging the walls of the passages, the wall of each passage opposite the wall provided with the recessed seats is formed with a longitudinally extending groove 21 coextensive therewith. The grooves 21, preferably, are substantially as wide as the pull arms 18 and permit the arms to move freely through the plug body without marring the walls of the passages or distorting the material of the body.

When the pull arms 18 have been moved to the position shown in Fig. 2, an operator mounts to the exposed end of each pull arm a contact prong 17 to which has been secured a conductor 22 of a twin conductor cord 23, whereupon the pull arms are then retracted in diverging paths to pull the contact prongs into proper position in the prong-receiving passages.

The tangs 15 and 16 of the contact prongs 17, as the latter are pulled into the passages, enter the notches 13 and 14 and seat therein. The plug body is somewhat distended by the movement of the contact prongs through the passages but this may be reduced by forming the tangs to project toward one another.

The notches 14 are undercut relative to the walls of the passages 12 and tangs 16 will enter and seat therein as the tangs 15 are entering and seating in the notches 13, the seats of which are normal to the walls of the passages 12. It will be seen, referring now to Fig. 3, that tangs 16 will seat in their respective notches slightly in advance of the entrance of tangs 15 into the notches 13.

In the embodiment of the invention as now preferred, the tangs 15 are not moved into their proper position until after the prongs have been disengaged from the arms 18 after the latter have pulled the prongs to their position shown in Fig. 3.

As the prongs are disengaged from the arms 18, the resiliency of the body, which in this cycle of the assembly is slightly distended, is sufficient to move the prongs pivotally about the fulcrums established by the tangs 16 on their seats to bring the prongs into their position as shown in Fig. 4 with the tangs projected into their respective notches.

The inner ends of the prongs are offset slightly to allow the ends of the prongs to move past the corners 25 at the junctions of the passages 12 with the cavity 11. As the offset portions of the prongs engage the corners 25 when the prongs are in their proper position within the passages, any movement of the prongs which might tend to move the tangs 16 from the notches 14 is resisted. This brings about a firmer anchorage of the prongs within the passages.

In the particular embodiment of the present invention illustrated, the formation of the tangs not only reduces the distention of the plug body as the contact prongs are moved through the passages, but also results in a firmer anchorage of the contact prongs within the passages. This is brought about by the fact that the tangs are spaced apart a distance slightly less than the distance between the seats formed by the notches so that the material of the body intermediate the seats is somewhat compressed after the tangs have seated within the notches. This does not complicate assembly operations, for the tangs 16 will readily seat in the notches 14 as tangs 15 are entering the notches 13.

To prevent the inner ends of the contact prongs from coming into engagement with each other, the portion of the body intermediate the passages 12 is extended into the cavity 11 to form a separating finger 26. The finger 26 holds the inner ends of the contact prongs against accidental engagement and thus prevents the occurrence of short circuits within the plug.

The plug of the present invention is not difficult to mold, for as seen, no complicated shouldered formations are used for holding the contact prongs seated within the passages. This reduces manufacturing costs which are further reduced as the plug can be assembled with but little distortion and need not be formed of a relatively expensive grade of rubber sufficiently resilient to permit the distortion generally present during the assembly operation of the previously proposed plugs.

As movement of the pull arms through the plug is not hindered by any restrictions in the passages and as the pull arms move freely through the plug in straight line paths of movement, the plug of the present invention may be assembled in a minimum of assembly operations.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. A connector plug of the type described, comprising a one-piece body of resilient material having a pair of passages extending inwardly from one side thereof and converging to form a cavity open at the opposite side of said plug, the adjacent walls of said passages having spaced transversely extending notches formed therein, the opposite wall of each passage being formed with a longitudinally extending groove coextensive therewith; a pair of contact prongs each having a conductor secured thereto, said contact prongs

being simultaneously insertable through the cavity and into said passages; and tangs spaced longitudinally of the contact prongs fitting in said notches for locking the contact prongs in said passages when the same are in the proper assembled position in the body, the passages being of such size and shape relative to the size and shape of said cavity as to permit a pair of pulling members having prong mounting means on the outer faces thereof to enter the plug by said grooves and pass through the plug in converging straight line paths of movement without distorting the material thereof whereby said prongs may be mounted to said mounting means and pulled back into proper assembled position in said passages as the pulling members are retracted in diverging straight line paths of movement, the mounting means riding in said grooves during at least a portion of the movements of said pulling members.

2. In a connector plug of the type described, a one-piece body of resilient material having a pair of spaced passages extending inwardly from the front face thereof and merging to form a single cavity opening onto the rear face of said body, each passage having one wall thereof provided with a longitudinally extending groove coextensive therewith, the opposite wall of each passage formed with a pair of recessed seats spaced longitudinally thereof, the innermost seat being undercut relative to said wall of the passage, the other of said seats extending normal thereto; a pair of contact prongs each having one conductor of a twin conductor cord secured thereto, the passages including said grooves forming with said cavity a pair of converging unrestricted channels extending through said body whereby a pair of pull arms having prong mounting means on the opposite faces thereof may be freely passed through said body in converging straight line paths of movement to expose said mounting means at the rear of said body to permit said prongs to be secured thereto and pulled back through said cavity and into the passages, said grooves receiving the prong mounting means of said pull arms during at least a portion of the movements thereof to prevent the mounting means from gouging the walls of the passages; and a pair of tangs formed on each prong and adapted to engage said seat, said tangs angularly extending toward each other and being spaced apart a distance less than that between the seats, thereby compressing the material of said plug body intermediate the seats to lock the prongs against longitudinal movement in either direction relative to said passages after said prongs have been pulled therein.

CARL H. JUDISCH.