

April 6, 1943.

C. H. JUDISCH

2,316,072

CONNECTOR PLUG

Filed Dec. 23, 1940

2 Sheets-Sheet 1

Fig. 1

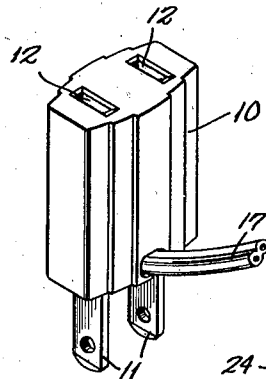


Fig. 2

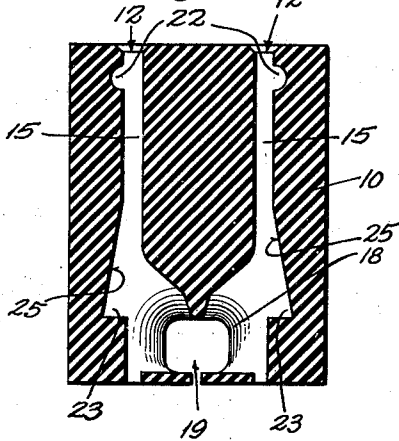


Fig. 3

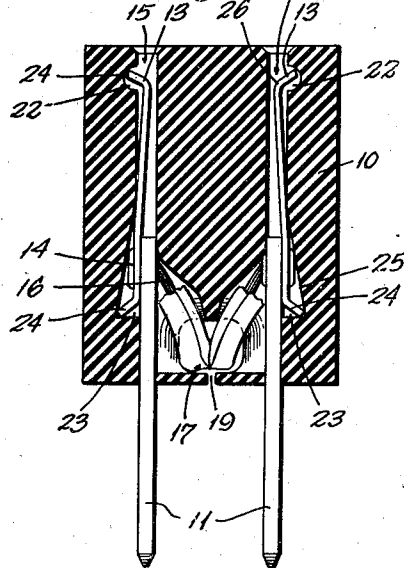


Fig. 4

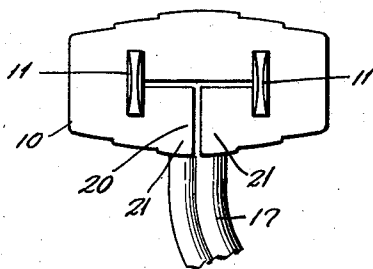
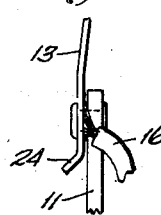


Fig. 5



INVENTOR
Carl H. Judisch
BY *Johnson, Klein & Smyth*
ATTORNEYS

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Fig. 6

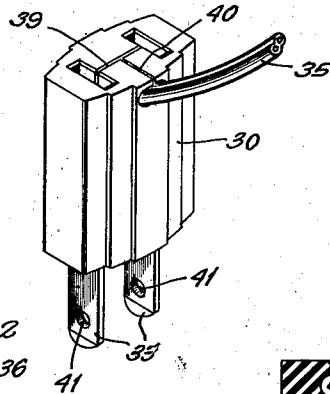


Fig. 7

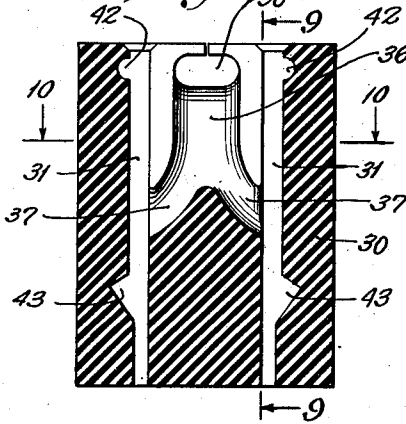


Fig. 8

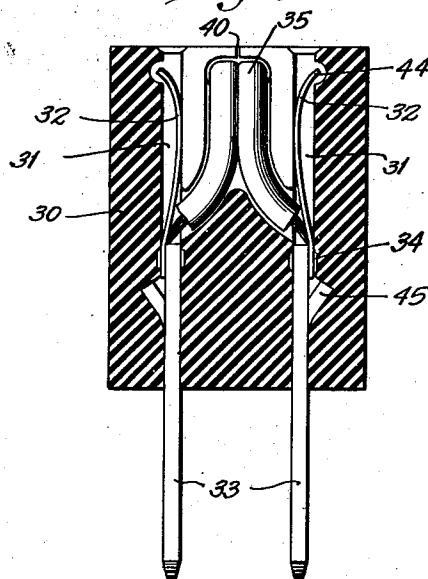


Fig. 9

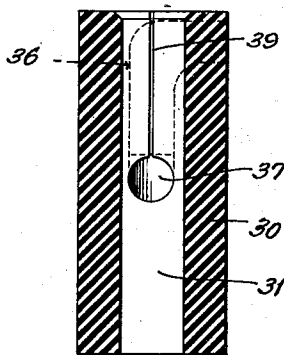
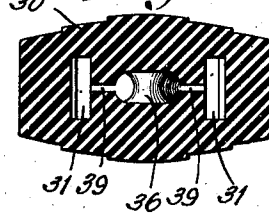


Fig. 10



INVENTOR
Carl H. Judisch
BY *Johnson, Kline & Smythe*
ATTORNEYS

UNITED STATES PATENT OFFICE

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CONNECTOR PLUG

Carl H. Judisch, New Haven, Conn., assignor to
The Whitney Blake Company, New Haven,
Conn., a corporation of Connecticut

Application December 23, 1940, Serial No. 371,220

12 Claims. (Cl. 173—334)

This invention relates to connector plugs, and, more particularly, to one having an outlet or receptacle portion for receiving the contact blades of another connector plug.

It has been previously proposed to form with a conventional connector plug a receptacle for taking the contact blades of another connector plug so that two independent electrical circuits may be connected to a power supply circuit through a single outlet box. These prior devices have been expensive to manufacture and have been generally unsightly for they have been constructed of a plurality of pieces of hard insulating material requiring many assembly operations.

The plug of the present invention obviates the disadvantages and difficulties found in prior constructions for it is of pleasing design comprising a one-piece soft resilient body assembled with its contact members in a minimum of operations.

The body of the plug in one form of the invention is provided with a pair of preformed passages extending therethrough and communicating with a cavity, provided adjacent the one end face of the body, forming a cord-receiving channel extending substantially normal to the longitudinal axis of the passages and opening into one side face of the plug.

In a modified form of the invention, each preformed passage communicates intermediate its ends with a conductor-receiving channel, which channels merge to form a twin conductor cord-receiving cavity opening onto a side face of the plug body.

In both forms of the invention, a pair of contact members, each having a conductor of a twin conductor cord secured thereto, are simultaneously insertable into the passages and each member is formed at one end with a blade contact while the other end is formed with a receptacle contact.

To permit the cord to be received within the cord-receiving channel of the plug body during the assembling operation, the one end face and side wall of the plug body, in one form of the invention, is provided with a narrow aperture forming a pair of resilient lips which permit the cord, as the contact members are being inserted into the passages, to enter the plug body and be received within the cord-receiving cavity formed adjacent the one end face of the body.

In the other form of the invention, the plug body is formed with an elongate narrow aperture joining the passages, the conductor-receiving channels and cord-receiving cavities, and this aperture communicates with the opening in the

side face of the body. The aperture permits the cord to enter the cavity and the conductors thereof to seat within the channels as the contact members are moved to their proper position in the passageways.

To hold the contact members within the plug body, each contact member is provided with a plurality of laterally offset tangs which ride into and lockingly engage with a plurality of notches formed on the wall of each passage, at least some of which tangs are held in engagement with the notches by the resiliency of the material of the body.

The interlocking engagement between the tangs and the notches of the passageway holds the contact members against movement in either direction longitudinally of the passages and prevents their removal from the plug body once they are properly seated therein.

As the plug body in both forms of the invention is formed in one piece and the contact members are simultaneously assembled with the cord attached, the assembly operation of the plug is a simple one and the cost of manufacture substantially low in comparison with the heretofore proposed plugs all formed of a plurality of pieces of hard insulating material.

The contact members may be formed of integral pieces but preferably are formed of two contact pieces, one forming the receptacle contact while the other forms the blade contact. The adjacent end of the two contact pieces are secured together by a rivet or the like, and, if desired, this rivet may also be used to secure the bared end of the conductor cord to the contact member.

Other features and advantages will hereinafter appear.

In the accompanying drawings:

Figure 1 is a perspective view of the assembled plug of the present invention.

Fig. 2 is a longitudinal section showing the plug of the present invention with the contact members removed.

Fig. 3 is a view similar to Fig. 2, but showing the contact members with the cord attached mounted within the body.

Fig. 4 is an end view of the plug of the present invention.

Fig. 5 is a fragmentary view of the jointure between the two contact pieces of a contact member showing the end of the conductor cord secured between the two pieces.

Fig. 6 is a perspective view of a modified form of the plug of the present invention.

Fig. 7 is a longitudinal section showing the

modified form of the plug with the contact members removed.

Fig. 8 is a view similar to Fig. 7, but showing the contact members seated within the passages.

Fig. 9 is a section taken along line 9—9 of Fig. 7.

Fig. 10 is a section taken along line 10—10 of Fig. 7.

The plug of the present invention, referring now to Fig. 1, comprises a one-piece body 10 of soft resilient material having a pair of conventional contact blades 11 projecting from one end face thereof, the opposite end face being formed with a pair of openings 12 leading to receptacle contacts 13 seated within the plug. The contact blades 11 and receptacle contacts 13 may be formed, if desired, of an integral piece of conducting material, but preferably, referring now to Fig. 3, the contacts are formed separate and the overlapping adjacent ends secured together by means of a rivet 14.

The plug body 10 is provided during its forming operation with a pair of performed passages 15 to take the contact members. The passages extend through the body of the plug and open onto the opposite end faces of the body. The one end of each passage is flared to form the contact blade-receiving openings 12.

The passages 15 are to receive the contact members of the plug after the bared end of a conductor 16 of a twin conductor cord 17 is secured to the contact members at the jointure between the contact blades 11 and the receptacle contacts 13.

The bared end of the conductor 16 may be secured to the contact members by solder or the like, or, as shown in Fig. 5, the bared end of the conductor 16 may be secured to the contact members by clamping the same between the contact blades 11 and the receptacle contacts 13 during the operation which secures the two contact members together.

The plug body 10 is provided adjacent the one end thereof with a cavity 18, disposed intermediate the passages 11, which forms a cord-receiving channel 19 opening onto one side face of the plug body 10.

The contact members with the cord secured thereto in assembly operation are simultaneously inserted within the plug body by moving the secured together contacts in a straight-line motion coincident with the passages 15 until the contacts are properly seated within the plug body.

To permit the twin conductor cord 17 which, after its securance to the contact members, extends substantially normal thereto to be received within the plug body, the one end face and side wall of the plug body is provided with a narrow aperture communicating with the cord-receiving channel 19 as well as each passage 11.

The narrow aperture 20 forms a pair of flexible lips 21 which will flex inwardly during the assembly operation and allow the cord 17 to enter the plug body 10 and be received within the cord-receiving channel 19. The lips 21, as will be understood, will return to the normal position after the cord 17 has been received within the channel 19.

To hold the contact members within the passages 15, the one wall of each passage is formed with a pair of notches 22 and 23, each receiving laterally offset tangs 24 formed on the receptacle contacts 13.

To facilitate the assembly operation, each notch

23 is formed with an inclined wall 25 which permits the one tang 24 to guide smoothly thereover until it is received within the notch 22.

The blade contacts preferably are of such a size and shape relative to the size and shape of the passages 15 and the receptacle contacts 13 that the jointure between the contacts 13 and 15 slightly compresses the resilient material of the body adjacent the jointure. The compression of the resilient material of the body tends to hold the tangs 24 tightly seated within the notches 23 and effectively prevents movement of the contact members when the contact blades 11 are pulled from an outlet or receptacle into which they may have been inserted.

It will be seen that the blade contacts are not locked in the passages but rather are rigidly secured to the receptacle contacts which are, as explained, held against movement once they are properly seated.

To insure a good electrical contact between the contact blades of a connector plug and the receptacle contacts 13, when the former are inserted into the passages 15, each receptacle contact 13 is formed so as to seat within its passage 15 at an angle oblique to the longitudinal axis of the passage. Furthermore, as the receptacle contacts are formed of resilient stock they will tend to clamp the contact blades of the connector plug against the adjacent walls of the passages 15 when the contact blades are inserted therein. This, as will be clear, not only insures a good electrical engagement but also tends to hold the contact blades tightly in engagement with the receptacle contacts of the plug of the present invention.

It will be seen further that when the contact blades of the connector plug are inserted into the passages 11, the ends thereof will first engage the tangs 24, and, as the one wall of each tang forms a camming surface 26, the tangs 24 will be cammed against the bottom wall of the notches 22 and held in that position as long as the contact blades are in engagement with the receptacle contacts. This, as will be understood, will assist in tightly holding the receptacle contacts 13 against movement when the contact blades of the connector plug are pulled out of the passages 15.

There is shown in Figs. 6 to 10, inclusive, a modified form of the invention illustrated in the previously referred to figures.

In this form of the invention, the plug body 30 is also formed with a pair of spaced passages 31 for the reception of contact members. The contact members, like those shown in the previously referred to figures, comprise resilient strips of conducting material forming receptacle contacts 32, each having an end overlapping and secured to rigid strips of conducting material forming contact blades 33. The receptacle contacts 32 and the contact blades 33 may be formed, if desired, of integral pieces of conducting material, but preferably are formed of separate pieces, as shown in Fig. 8, secured together by means of a rivet 34 or the like.

A conductor of a twin conductor cord 35 is connected to the receptacle and blade contacts preferably at the jointure between the same by solder or the like, although the ends of the conductors may be secured at the point of jointure of the contacts by the rivet 34 somewhat as shown in Fig. 5.

To permit the contact members, with the conductors attached, to be simultaneously assembled

with the plug body 30, the latter, in this form of the invention, is provided with a cord-receiving cavity 36 provided with diverging conductor-receiving channels 37, each communicating with a passage 31. The opposite end of the cavity 36 opens onto a side face of the plug body 30 to form an aperture 38 through which the cord 35 may project.

The plug body 30 is formed with a narrow slot 39 which joins the passages 31, cavity 36 and channels 37. The slot 39 communicates with the aperture 38, through a slot 40 formed in the one end and side face of the plug body 30.

In the assembly operation, the contact members with the cord secured thereto are simultaneously inserted within the plug body by moving the contact members in a straight line motion coincident with the passages 31 until the contacts are properly seated within the plug body 30.

The contact members and the plug body may be assembled on a machine provided with a pair of pull fingers having means for engaging the apertures 41 of the blade contacts 33 after the pull fingers had been passed through the passages 31. The machine, as will now be understood, as the pull fingers are retracted through the body, will pull the contact members together with the cord 35 into the plug body. The narrow slots 39 and 40 will permit the cord 35 to enter the plug body, as the contact members are inserted, and be received within the cord-receiving cavity 36 and conductors thereof in the channels 37.

The slot 40, as in the previously described form of the invention, forms a pair of flexible lips which will open to allow the cord 35 to be received within the body, but which will return to their normal position to close the end face of the plug body after the cord has been properly seated within the cavity 36.

To hold the contact members within the passages 31, the wall of each passage is formed with a pair of notches 42 and 43 receiving tangs 44 and 45 formed respectively on the receptacle contacts 32 and the blade contacts 33. The contact members, once the tangs are properly seated within the notches, will, therefore, be held against movement longitudinally of the passages 31.

The receptacle contacts 32, like the receptacle contacts 13 of the earlier described form of the invention, are so formed that a good electrical engagement is insured when contact blades of another contact plug are inserted into the passages 31. The reception of contact blades within the passages 31 also will tend to hold the tangs 44 tightly against the bottom wall of the notch 42 so that the contacts are even more securely held against movement while the contact blades of the other connector plug are in engagement therewith. This insures against movement of the receptacle contacts during the period the contact blades are being withdrawn from the passages 31.

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. In a device of the type described, a one-piece body of soft resilient material having a pair of passages extending therethrough, the wall of each passage having a pair of notches formed thereon; a receptacle contact disposed within each passage; a pair of oppositely extend-

ing tangs formed on each contact, said tangs engaging the walls of said notches and holding the contacts in said passages against movement in either direction longitudinally of said passages; a twin conductor cord leading through an aperture formed in a side wall of said body, each conductor of said cord being secured to each contact; a blade contact seated within each passage and having a portion projecting from one face of the body; and means for mechanically and electrically connecting each blade contact to a receptacle contact.

2. In a device of the type described, a one-piece body of soft resilient material having a pair of passages extending therethrough, the wall of each passage having a plurality of notches formed thereon; a receptacle contact disposed within each passage; a twin conductor cord leading through an aperture formed in said body, each conductor of said cord being secured to each contact; a blade contact seated within each passage and having a portion projecting from one face of the body; means for mechanically and electrically connecting each blade contact to a receptacle contact; and a plurality of tangs, at least some of which are carried by said blade contacts, said tangs seating in said notches and holding said contacts against movement.

3. In a device of the type described, a one-piece body of soft resilient material having a pair of passages extending therethrough, the wall of each passage having a notch formed adjacent the opposite ends of each passage; a receptacle contact disposed within each passage and extending substantially the length thereof; tangs formed adjacent the ends of each contact, said tangs projecting into said notches and preventing movement of the contacts longitudinally of the passages; a blade contact seated within each passage and projecting from one face of the body; a twin conductor wire leading through an aperture formed in said body and communicating with both of said passages; and means for mechanically and electrically connecting each blade contact to a receptacle contact and to one conductor of said cord.

4. In a device of the type described, a one-piece molded body of resilient material, said body being molded with a pair of passages extending therethrough and a channel opening onto a side face of said body, said channel extending substantially normal to said passages and communicating therewith, the one end face and side wall of said body provided with an elongate aperture communicating with said channel and passages; a pair of contact members, one end of each member being formed with a receptacle contact, the opposite end being formed with a blade contact; and a conductor cord secured to and normally projecting from each contact member, the members being simultaneously insertable into said passages with the cords attached, the elongate aperture permitting the entry of the contact member secured ends of the cords into said body through said aperture to be received within said channel.

5. In a device of the type described, a one-piece body of soft resilient material having a pair of passages extending therethrough and forming openings at the opposite end faces thereof, each passage having a seat formed adjacent the opposite ends thereof; a receptacle contact disposed within each passage and engageable through the openings at one end face of said body; tangs formed adjacent the ends of each

contact, said tangs projecting into said seats and preventing movement of the contacts longitudinally of the passages; a blade contact having an end thereof seated within each passage in overlapping relation with the adjacent end of a receptacle contact, the opposite end of the blade contact projecting from the end face of the body, each blade contact being of such a size and shape relative to the size and shape of each passageway and receptacle contact disposed therein that said blade contact holds at least some of the tangs of each receptacle contact tightly seated in the notches; a twin conductor cord leading through an aperture formed in said body and communicating with both of said passages, one conductor thereof being connected to a receptacle contact; and means for mechanically and electrically connecting each blade contact to a receptacle contact.

6. In a device of the type described, a one-piece molded body of resilient material, said body provided with a pair of passages extending longitudinally therethrough and a cavity communicating with both of said passages and forming a cord-receiving channel opening onto a side face of said body; a pair of flexible lips defining an elongate opening in an end and side face of said body intermediate said passages, said opening communicating with said cavity; a pair of receptacle contacts; a pair of blade contacts, each receptacle contact being electrically and mechanically connected to a blade contact; and a conductor electrically connected to each pair of contacts and extending substantially normal thereto, the secured together receptacle contacts and blade contacts being simultaneously insertable through said passages to seat the receptacle contacts within said body with the blade contacts projecting from the end face thereof, the lips flexing and permitting said conductor cord to enter said body through said elongate opening and to be received within said cord-receiving channel.

7. In a device of the type described, a one-piece molded body of resilient material, said body provided with a pair of passages extending longitudinally therethrough and a cavity communicating with both of said passages and forming a cord-receiving channel extending substantially normal to said passages opening onto a side face of said body, a pair of flexible lips defining an elongate opening in an end and side face of said body intermediate said passages, said opening communicating with said cavity; a pair of receptacle contacts; a pair of blade contacts, each receptacle contact being electrically and mechanically connected to a blade contact; a conductor cord secured to each blade contact and extending substantially normal thereto, the secured together receptacle contacts and blade contacts being simultaneously insertable through said passages to seat the receptacle contacts within said body with the blade contacts projecting from the end face thereof, the lips flexing and permitting said conductor cord to enter said body and be received within said cord-receiving channel; and means carried by each receptacle contact cooperable with means formed in said passages for preventing movement of the receptacle contacts longitudinally of said passages after said contacts are seated within said body.

8. In a device of the type described, a one-piece body of soft resilient material having a pair of passages extending therethrough, said passages opening onto opposite end faces of said

body; receptacle contacts in said passages and engageable through the openings in one end face of said body; means formed integral with said receptacle contacts cooperable with means formed on the walls of said passages for holding said receptacle contacts against movement longitudinally of said passages; blade contacts having end portions seated within said passages extending through the openings in the opposite face of said body; means formed integral with said blade contacts cooperable with means formed on the walls of said passages for holding said blade contacts against movement longitudinally of said passages; means for mechanically and electrically connecting said blade contacts to the receptacle contacts; and a twin conductor cord extending through a cavity communicating with said passages and forming an aperture in a side face of said body, said body being formed with narrow openings communicating with the openings through which the receptacle contacts are engageable and permitting the conductors of the cord to be attached to said contacts and to pass into said passages as the cord passes into said cavity during the assembly operation.

9. In a device of the type described, a one-piece body of soft resilient material having a pair of spaced passages extending therethrough and opening onto opposite end faces thereof, each passage communicating with a conductor-receiving channel formed internally of the body, the channels merging and forming a twin conductor cord-receiving cavity opening onto a side face of the body, said body being formed with an elongate narrow aperture joining said passages, channels and cavity; a pair of receptacle contacts; a pair of blade contacts; means for mechanically and electrically connecting an end of a receptacle contact to an end of a blade contact; and a twin conductor cord, each conductor of which is connected to a pair of connected receptacle and blade contacts, the pairs of connected contacts being simultaneously insertable within said passages to assemble the same with said body, the elongate aperture permitting said cord to enter said cavity and the conductors thereof to seat within said channels.

10. In a device of the type described, a one-piece body of soft resilient material having a pair of spaced passages extending therethrough and opening onto opposite end faces thereof, each passage communicating with a conductor-receiving channel formed internally of the body, the channels merging and forming a twin conductor cord-receiving cavity opening onto a side face of the body, said body being formed with an elongate narrow aperture joining said passages, channels and cavity; a pair of receptacle contacts; a pair of blade contacts; means for mechanically and electrically connecting an end of a receptacle contact to an end of a blade contact; a twin conductor cord, each conductor of which is connected to a pair of connected receptacle and blade contacts, the pairs of connected contacts being simultaneously insertable within said passages to assemble the same with said body, the elongate aperture permitting said cord to enter said cavity and the conductors thereof to seat within said channels; and a plurality of tangs, at least some of which are carried by said blade contacts for lockingly engaging the walls of said passages for holding the contacts properly seated within said passages and against movement longitudinally of the same.

11. In a device of the type described, a one-

piece body of resilient material having a pair of longitudinal passages having continuous walls extending therethrough; a receptacle contact disposed in each passage and extending substantially the length thereof; means formed on said contacts for interlockingly engaging with means carried by the walls of the passages for anchoring the contacts therein; a blade contact having one end thereof seated in each passage and in overlapping relation with an end of one of said receptacle contacts, the entire length of said blade contacts forming substantially straight line continuations of the receptacle contacts and projecting from one face of said body; a twin conductor cord projecting through a cavity formed in a side wall of said body and communicating with said passages; means for mechanically and electrically connecting the overlapping ends of said contacts; and means for connecting one conductor of the twin conductor cord to each pair of overlapping ends.

12. In a device of the type described, a one-piece body of resilient material having a pair of continuous straight passages longitudinally ex-

tending therethrough and forming spaced openings in the end faces thereof; a receptacle contact in each passage having a portion disposed at one end of said passage engageable through the opening formed thereby in one end face of said body; a blade contact having one end thereof seated in the opposite end of said passage, said end being in overlapping relation with an end of one of said receptacle contacts, the entire length of said blade contacts forming substantially straight line continuations of the receptacle contacts and projecting through the openings formed in the opposite end face of said body; a twin conductor cord projecting through a cavity formed in a side wall of said body and communicating with said passages; common means for mechanically and electrically connecting each pair of overlapping ends together and to one conductor of the twin conductor cord; and means carried by said contacts for interlockingly engaging with means formed on the walls of the passages for anchoring the contacts therein.

CARL H. JUDISCH.

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CARL H. JUDISCH.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 16, for "found" read --formed--; page 2, first column, line 24, for "performed" read --preformed--; and second column, line 2, for "guide" read --glide--; line 28, for "residient" read --resilient--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of June, A. D. 1943.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)