May 11, 1943. J. M. WHITE 2,318,647

CONNECTING SLEEVE

Filed April 2, 1938

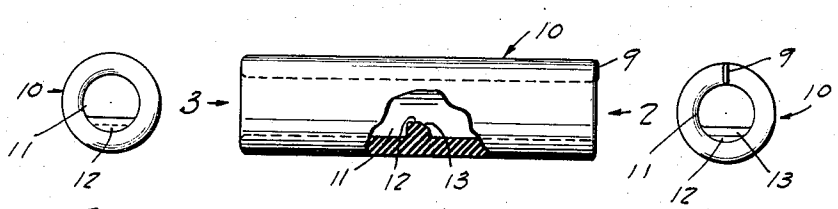


FIG. 3 FIG. 1 FIG. 2

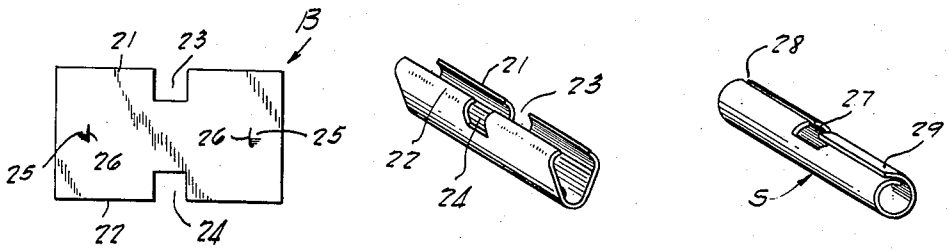


FIG. 4 FIG. 5 FIG. 6

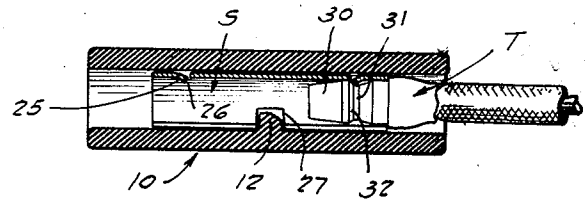


FIG. 7

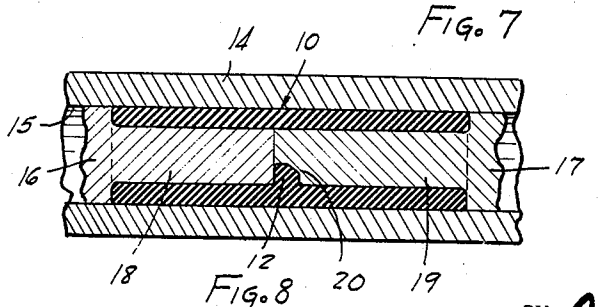


FIG. 8

INVENTOR.
JESSE M. WHITE.
BY Joshua R. H. Potts
ATTORNEY.

Patented May 11, 1943 2,318,647

UNITED STATES PATENT OFFICE

2,318,647

CONNECTING SLEEVE

Jesse M. White, Philadelphia, Pa., assignor to H. A. Douglas Mfg. Co., Bronson, Mich., a corporation of Michigan

Application April 2, 1938, Serial No. 199,579

19 Claims. (Cl. 173—328)

This invention relates to harnesses such as are employed in conjunction with the wiring of motor vehicles and is concerned primarily with the construction and assembly of the connecting sleeves included in such harnesses.

At the present time it is common practice in this art to utilize a connecting sleeve which comprises an outer sleeve member of appropriate insulating material, and within which is assembled an inner sleeve of conducting material. This inner sleeve carries, adjacent each extremity, an inwardly extending protuberance designed for cooperation with a groove on a terminal which may be inserted into the sleeve, and the inner sleeve is anchored to the outer insulating sleeve in a manner which is not meeting with complete satisfaction in this art, and which is intended to be improved by the present invention.

Accordingly, this invention has in view, as its foremost objective, the provision of a connecting sleeve of the character above noted which embodies improved means for assembling the inner conducting sleeve with the outer insulating sleeve.

More in detail this invention contemplates an arrangement wherein the insulating sleeve is maintained uniform and even so far as the outer cylindrical walls thereof are concerned, but which includes on the wall of the bore extending therethrough an inwardly projecting lug. The inner conducting sleeve is of a split construction, and intermediate its extremities is cut away to provide a recess for receiving the lug.

A particularly important object of the invention is the provision of a novel method of assembling an inner conducting sleeve of the character above noted with the outer insulating sleeve. This method essentially involves the formation of the split sleeve construction with the edge at each side of the split notched to ultimately provide a recess for receiving the lug. The blank or metal from which the sleeve is formed is then deformed into a sleevelike formation, with one end compressed to a greater degree than the other end, to cause the edges of the split to overlap, whereupon the sleeve may be inserted with the constricted portion riding over the lug in the outer insulating sleeve. Subsequent expansion of the split sleeve by an appropriate tool insures of a firm anchorage of the inner sleeve within the outer insulating sleeve.

Another highly important object of the present invention is to provide, in a connecting sleeve of the character above noted, an inner conducting sleeve which includes novel and improved projections designed to cooperate with terminals which may be inserted thereinto.

More in detail this invention has as an object the provision of an inner conducting sleeve which is formed at each end with a projection extending into the bore thereof, and which projection is characterized as including a gradually inclined surface extending towards the open end of the sleeve, and which terminates in a sharp shoulder. These protuberances may be formed by being struck from the blank of metal prior to the latter being deformed into the sleeve formation.

Various other more detailed objects and advantages such as arise in connection with forming the outer insulating and inner conducting sleeves respectively, and assembling the same in accordance with this invention, will in part become apparent and in part be hereinafter stated.

The invention, therefore, comprises a connecting sleeve which consists of an outer insulating sleeve having a bore which is interrupted by an inwardly extending lug. Received within the bore is an inner conducting sleeve of a split construction, and having a recess for receiving the said lug. The inner conducting sleeve is also formed adjacent each extremity with an inwardly extending protuberance which presents a gradually inclined surface extending towards the open end of the sleeve, and which terminates in an abrupt shoulder. A particularly important part of the invention is the method of assembling the inner conducting sleeve with the outer insulated sleeve.

For a full and more complete understanding of the invention reference may be had to the following description and accompanying drawing, wherein

Figure 1 is a side view of an outer insulating sleeve made in accordance with the precepts of this invention. In this view a part of the sleeve has been broken away to bring out the construction of the inwardly extending lug,

Figure 2 is a view in end elevation of the sleeve shown in Figure 1, and is taken in the direction indicated by the arrow 2 of Figure 1,

Figure 3 is a similar view taken from the other end looking in the direction of the arrow 3,

Figure 4 is a plan view of a blank of metal prior to being deformed into the sleeve-like formation,

Figure 5 shows the blank of metal after it has been partially deformed, while

Figure 6 develops the inner sleeve in condition for being inserted into the outer sleeve,

Figure 7 is an elevational showing through the

connecting sleeve as an entirety developing a terminal as assembled therewithin, and

Figure 8 is a sectional view of certain die pressing apparatus which may be employed in the manufacture of the outer insulating sleeve.

Referring now to the drawing, wherein like reference characters denote corresponding parts, and more particularly to Figures 1, 2 and 3, an outer insulating sleeve intended to constitute an essential part of the connecting sleeve of this invention is identified by the reference character 10, and is shown as having a substantially smooth even outer cylindrical wall. This sleeve 10 may be made from any appropriate insulating material, but the invention has particularly in mind a phenol condensation product which is susceptible, while in a plastic state, to being formed by die pressing operations into the construction hereinafter described in detail.

The sleeve 10 has an inner cylindrical bore 11 which is interrupted by a lug designated 12. The lug 12 is formed in the bore 11 substantially equi-distant the ends thereof, and one edge thereof is cut away to provide a bevel designated 13, this for a purpose to be hereinafter described.

The end of the sleeve 10 towards which the beveled edge 13 is disposed is provided with suitable indicia, such as the rib shown at 9 in Figure 2, this for the purpose of indicating which end is to be used in inserting the inner connecting sleeve into this outer insulating sleeve.

It is particularly notable that the lug 12 extends only a short distance into the bore 11, as depicted in Figures 2 and 3, leaving sufficient room for the insertion of the inner sleeve, as will be hereinafter pointed out.

Inasmuch as the invention has in view the formation of the outer insulating sleeve 10 by a die pressing operation, reference is now made to Figure 8 which shows an outer containing mold element 14 formed with a bore 15 in which operate dies 16 and 17. The die 16 carries a core 18 of cylindrical formation, while the die 17 carries a core 19, one end of which is cut away, as shown at 20, to define a space in which the lug 12 is formed. It is evident that when the dies 16 and 17 are brought towards each other, and with the insulating material in a plastic state positioned about the cores 18 and 19, the insulating material will be worked into the sleeve-like formation illustrated.

Referring now more particularly to Figure 4, a blank of metal from which the inner conducting sleeve is formed is identified in its entirety by the reference character B. The metal employed in the manufacture of the inner conducting sleeve should obviously be a good conducting material such as an appropriate copper alloy which has the desired properties of springiness and resiliency.

The blank B is of a general rectangular formation presenting edges 21 and 22 which are formed substantially equi-distantly between their extremities with notches 23 and 24. At one end the blank B is formed with a projection defined by a gradually inclined wall 25, and a sharp abrupt shoulder 26, and this projection is duplicated at the other extremity of the blank. It will be noted that the inclined walls 25 extend towards the free edge of the blank B, while the abrupt shoulder 26 is disposed towards the central portion of the blank B.

The blank B with the notches 23 and 24 and the projections defined by the surfaces 25 and 26 may be formed in a single stamping operation by employing appropriate dies in a well-known manner.

After the blank B has been fashioned, as shown in Figure 4, it is bent into the formation depicted in Figure 5, in which it will be noted that the edges 21 and 22 are spaced apart. This deforming of the blank B is continued further until the blank assumes the sleeve-like formation identified in Figure 6, and the inner connecting sleeve is now identified by the reference character S.

It will be noted that the notches 23 and 24 cooperate to define a recess designated 27, and that at one end the edges 21 and 22 are slightly spaced apart, as indicated at 28. At the other end, however, the deformation has been carried further to provide an overlap between the edges 21 and 22, as shown at 29. It is evident that the portion of the sleeve S formed with the overlap has a smaller diametrical dimension than the remainder of the sleeve.

With the sleeve S in the formation depicted in Figure 6 it is inserted into the outer sleeve 10 with the end carrying the overlap 29 being inserted into the end of the sleeve 10 which bears the indicating rib 9. The constricted diametrical dimension of the overlap portion 29 provides for the latter riding over the lug 12 with the bevel 13 cooperating in this action.

When the sleeve S has been inserted an appropriate distance the lug 12 will be received in the recess 27, and an appropriate tool may now be availed of to expand that portion of the sleeve carrying the overlap 29. The other extremity of the sleeve S may also be expanded by a tool to provide a noticeable advantage. This advantage is tied up with the fact that the material employed in the formation of the inner connecting sleeve S has the property of resiliency and springiness to a required extent. When once formed into the constricted formation shown, and later expanded, the metal always exerts a tendency to return to its constricted condition. Thus when a terminal such as shown at T is inserted into the bore of the sleeve S the conical formation of the nose of the terminal which is indicated at 30 will cause the terminals to ride past the inclined surfaces 25, exerting a slight expanding action on the sleeve S.

However, when the projection defined by the surfaces 25 and 26 is positioned in the groove 31 formed in the terminal T, the metal of the sleeve S will exert a marked tendency to grip the terminal T to insure of a firm anchorage of the terminal T in the connecting sleeve.

It is notable that the groove 31 may include a sharply inclined shoulder such as shown at 32, which is designed for cooperation with the abrupt shoulder 26, so as to more positively prevent withdrawal of the terminal T from the sleeve.

The above described method and construction of the parts provides a highly simplified construction of outer insulating sleeve and inner conducting sleeve respectively, together with a method for assembling these parts so as to positively insure of the parts maintaining their assembled position.

Obviously slight changes might be made in the several steps of the method and formation of the particular parts without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. A connecting sleeve of the character described comprising an outer insulating sleeve of

substantially uniform inside and outside diameters formed with a bore and carrying a lug extending into said bore, one edge of said lug being cut away to provide a bevel that is disposed towards one open end of said sleeve, indicia carried by the end wall of the sleeve for indicating the end towards which the bevel is disposed, and an inner conducting sleeve provided with a bore for slidably receiving and holding a terminal, said conducting sleeve being formed with a recess for receiving said lug.

2. An electrical connector comprising a single piece of insulating material provided with an aperture extending therethrough, said aperture being enlarged at its ends to form cylindrical recesses joined by the remaining intermediate restricted portion, the base of each recess forming with the restricted portion a shoulder, an insert of generally cylindrical tubular formation disposed in said aperture, said insert being formed with resilient portions adjacent each extremity providing a receptacle for receiving a plug conductor terminal having a groove therein, and a detent arranged in each receptacle opposite its resilient portions to cooperate with said terminal groove, a portion of said insert adjacent the inner extremity of each receptacle projecting into the adjacent recess and engaging the corresponding shoulder whereby to hold said piece and said insert in assembly.

3. A connecting sleeve of the character described comprising an outer insulating sleeve formed with a bore and carrying a lug of chordal shape projecting into said bore, an insert having a slot disposed in said sleeve, and notches intersecting said slot to provide an opening receiving said lug for locking the insert in place.

4. An electrical connector including, an insulator member having a hole therein, a portion of the insulator projecting into the hole, and a conducting member insertable into the hole and disposed in the hole providing means to which a conductor may be secured, said conducting member having a wall provided with at least a pair of longitudinally spaced apart independently operable resilient projections arranged in alignment with said wall engaging the sides of said portion for holding the members assembled.

5. The structure defined in claim 4 including: a second pair of longitudinally spaced apart independently operable projections engaging the sides of said portion and providing additional means for holding the members assembled.

6. An electrical connector comprising a single piece of insulating material provided with an aperture, a transverse recess extending inwardly from each end of said piece and connecting with said aperture, an insert of generally cylindrical tubular formation arranged substantially entirely within said aperture, said insert being formed with split resilient receptacle formations adjacent its extremities adapted to receive conductor terminals, and a resilient projection formed on and adjacent the inner extremity of each receptacle formation and projecting into its respective recess for positively and permanently holding said piece and said insert in assembly.

7. An electrical connector including, an outer housing having an opening therein, an abutment within said opening, an insert insertable into the opening and arranged in said opening having a portion to which a conductor may be connected, and said insert also having longitudinally spaced apart independently operable yieldable projections arranged within the confines of the insert engaging the sides of said abutment for holding the insert to the housing.

8. The structure set forth in claim 7 in which: the housing is provided with an aperture and the extremities of the aperture are enlarged to provide recesses whereby the aperture and recesses comprise the opening and the bases of the recesses form shoulders constituting the sides of said abutment; the portion to which the conductor is adapted to be connected is fashioned to accommodate a conductor; and the insert means is also provided with means to which a conductor may be resiliently connected.

9. An electrical connector comprising a single piece of insulating material provided with an aperture extending therethrough, said aperture having a lug extending into the aperture so that the extremities of the aperture are enlarged to provide recesses of a size greater than the size of the aperture opposite the lug and the sides of the lug constitute the bases of the recesses, an insert of generally tubular formation disposed in said aperture, said insert being provided with at least a resilient portion adjacent each extremity providing means for resiliently receiving a plug conductor terminal, detent means on the insert adapted to cooperate with the conductors assisting to hold the conductors in place, and a portion of said insert adjacent the inner extremity of each resilient receiving portion projecting into the adjacent recess and engaging the corresponding side of the lug whereby to hold said piece and said insert in assembly.

10. A connector including, a single piece housing of insulating material having an opening therein, a lug within the opening including a pair of spaced apart shoulders, an insert insertable into the opening and disposed substantially entirely within the confines of the opening, said insert having spaced apart individual means for receiving conductors, notches provided in said insert between said conductor receiving means receiving said lug, and said insert having a pair of spaced apart independently operable yieldable projections engaging the said shoulders for holding the insert in place.

11. The structure set forth in claim 10 in which: the housing is provided with an aperture and the extremities of the aperture are enlarged to provide recesses whereby the aperture and recesses comprise the opening and the bases of the recesses constitute the spaced apart shoulders; the insert means is disposed in the recesses as well as in the opening; and at least portions of the yieldable projections constitute certain marginal edges of the notches.

12. The structure defined in claim 10 in which: the housing is provided with an aperture and the extremities of the aperture are enlarged to provide recesses whereby the aperture and recesses comprise the opening and the bases of the recesses constitute the spaced apart shoulders; the insert means is disposed in the opening and recesses; and the independently operably yieldable projections are provided adjacent said conductor receiving means and project into the recesses.

13. A connector including, a single piece housing of insulating material having an opening therein, a lug within the opening including a pair of shoulders, an insert insertable into the opening and disposed substantially entirely within the confines of the opening, said insert having receptacle means at each extremity for receiving a conductor, said insert also having a recess between said conductor receiving means receiving

said lug in a manner whereby portions of said conductor receiving means engage said shoulders to hold the insert in place.

14. The structure as set forth in claim 13 in which: the housing is provided with an aperture and the aperture is enlarged adjacent its extremities to provide recesses whereby the aperture and recesses comprise the opening and the bases of the recesses constitute the shoulders of the lug; one of the receptacle means adjacent one extremity is comprised of spreadable portions between which conductor means is adapted to be gripped and the other receptacle at the other extremity is generally tubular in shape; and the said portions of the conductor receiving means are disposed in the recesses and engage the said shoulders formed by the bases of said recesses for holding the part assembled.

15. The structure set forth in claim 13 in which: the recess in the insert means is formed by a pair of spaced apart notches and certain of the marginal edges defining the notches engage the said shoulders for locking the parts assembled.

16. A connector including, a one piece housing of insulating material having an opening therein, a lug within the opening, an insert insertable into the opening and disposed substantially entirely within the confines of the opening, said insert having means at each extremity for clamping a conductor to the insert, and said clamping means engaging said lug whereby to lock the insert in place.

17. The structure set forth in claim 16 in which: the lug within the opening of the housing forms a recess on each side of the lug; and portions of the insert means adjacent the inner extremities of said clamping means project into the recesses in a manner whereby the portions engage the sides of the lug whereby to hold the insert means in place.

18. The structure set forth in claim 16 in which: the insert means is provided with opening means receiving the lug whereby portions of the insert means defining the opening means engage the sides of the lug to effect the locking of the insert in the housing.

19. The structure set forth in claim 16 in which: the lug within the opening of the housing forms a recess on each side of the lug and a portion of the insert means adjacent each of said clamping means projects into a recess in a manner whereby the portions engage the sides of the lug to hold the insert means in place.

JESSE M. WHITE.