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2,683,095

METHOD OF MAKING A CONNECTOR WITH A HARD PARTICLE LINING

Filed June 23, 1950

FIG. 1.

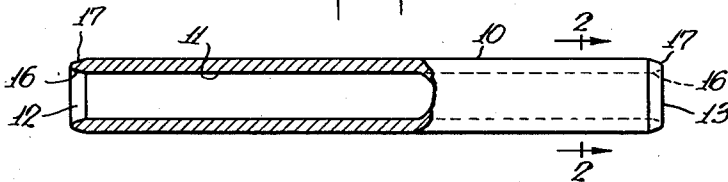


FIG. 2.

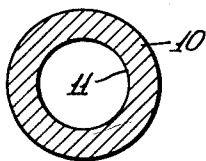


FIG. 3.

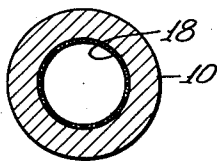


FIG. 5.

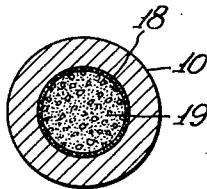


FIG. 6.

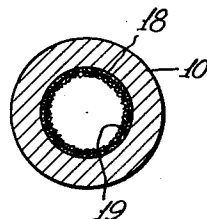


FIG. 4.

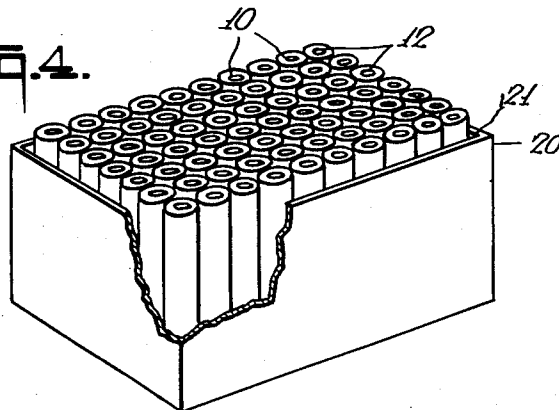
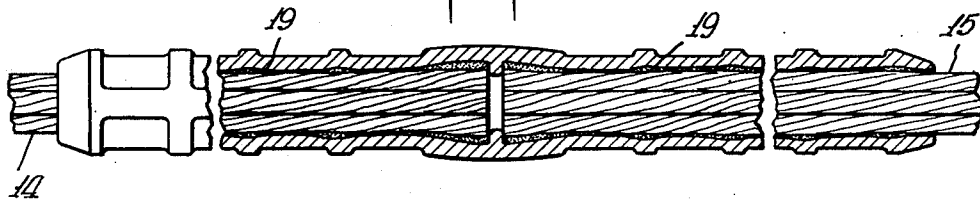


FIG. 7.



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METHOD OF MAKING A CONNECTOR WITH
A HARD PARTICLE LININGAndrew J. Paucek, Flushing, N. Y., assignor to
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2 Claims. (Cl. 117-18)

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My invention relates to a method for making tubular connectors for splicing cables and the like provided with a lining of hard particles that key the connector to the cables when indented.

In Patent 1,827,297, issued on October 13, 1931, there is disclosed the method of treating the inner surface of a connector sleeve with an adhesive, and applying an abrasive material, such as emery dust, within the connector while the adhesive is still moist in such a manner that the entire inner surface is covered with the abrasive material which adheres to the coating. The wires to be joined are inserted into the connector sleeve and the sleeve compressed into intimate contact with the wire by any suitable tool.

In this method it is necessary to maintain the adhesive in a tacky condition until the abrasive material is applied. As the drying time of adhesives will vary according to the particular adhesive employed it is necessary to strictly regulate the method accordingly. If the adhesive is too dry an insufficient amount of keying material remains on the inner surface of the connector sleeve. If the adhesive is too tacky the abrasive material cannot be applied uniformly. A defective connection results in both instances. The drying time of the adhesive is thus a critical consideration in carrying out this method. The thickness of the layer of keying material cannot be varied in accordance with the diameters of the wires or cables to be joined for there is no adequate control over the thickness of the adhesive to be applied. A thick layer of adhesive would run and ball-up causing lumpiness and an unsatisfactory connection.

I have discovered a method of using adhesives for maintaining keying material within a connector for joining wires that avoids the above limitations. Accordingly it is a principal object of my invention to provide a method of making a connector of this type in which the keying material may be inserted within the connector sleeve at any time after the adhesive has been applied.

A further object of my invention is to provide a method for controlling the thickness of the adhesive to be applied.

Still another object is to provide a method for varying the thickness of the keying material in accordance with the amount required for the diameter of the wire or cables that the connector is to accommodate.

Other objects of my invention are to provide a method wherein the keying material may be applied when the adhesive is in a dry condition; to provide a method wherein the finished con-

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nectors may be stored without being affected by aging of the adhesive; to provide a method where the hard particles may be uniformly applied to the connector; to provide a connector which will have superior mechanical characteristics; and to provide a method that is simple, inexpensive, and particularly suitable for mass production.

I accomplish these and other objects and obtain my new results as will be apparent from the device described in the following specification, particularly pointed out in the claims, and illustrated in the accompanying drawing, in which—

Fig. 1 is a side elevation, partly in section, of a connector sleeve on which my method may be applied,

Fig. 2 an enlarged cross-sectional view taken in plane 2—2 of Fig. 1,

Fig. 3 an enlarged cross-sectional view of the sleeve in Fig. 2 with a coating of adhesive applied on the inner surface,

Fig. 4 a box into which the sleeves of Fig. 3 are placed on end to be filled with a keying material and then heated,

Fig. 5 an enlarged cross-sectional view of the sleeve with the coating of adhesive applied on the inner surface and the bore filled with a keying material,

Fig. 6 an enlarged cross-sectional view of the sleeve after the sleeve of Fig. 5 has been heated and the excess keying material removed, and

Fig. 7 a side elevation, partly in section, of the connector sleeve secured to a conductor.

In the drawing reference numeral 10 designates a tubular body or sleeve on which my invention may be practised, having a longitudinal internal bore 11 with end openings 12 and 13 to receive wires or cables 14 and 15 of a size which the sleeve is to accommodate. The sleeve 10 may be internally chamfered at 16 at the respective openings 12 and 13 to facilitate entrance of the cables and prevent nicking the cable and possible breakage; and chamfered on the outside as at 17 to prevent "snagging" when the connection is pulled over a cross arm of a pole.

The first step of my novel process is to coat the bore 11 with a suitable adhesive 18, such as shellac, as shown in Fig. 3. One formula for the composition of the shellac which I have found suitable for carrying out my invention is a 50-50 mixture by volume of 5 pound cut shellac and SDA #1 alcohol, with a specific gravity range of 0.885 to 0.895.

After the sleeve 10 has been internally coated with the adhesive 18 and while it is wet, the excess adhesive may be removed by directing a blast

of air into the sleeve. This action prevents the adhesive from "balling-up" and equalizes the thickness of the coating throughout the connector. The adhesively coated sleeve is then dried for a suitable period depending on the adhesive that is used, and in this condition the sleeve may be stored if the necessity arises.

When the adhesive 18 in the bore 11 of the sleeve is sufficiently dry, hard metal particles 19, hereinafter described, are applied to the adhesive, and the adhesive softened to cause the particles to adhere thereto. I have found it most suitable to fill the bore 11 with the hard particles 19 and then heat the connectors to soften the adhesive. In Fig. 4 I have illustrated a simple and convenient means of carrying out this process comprising a metal container 20 having an open top 21 into which a plurality of the dried adhesively coated sleeves 10 may be stacked end wise with one end opening 12 or 13 of the sleeve accessible through the top 21. The bores 11 of the sleeves are then completely filled with the hard particles 19, and the sleeves jarred to insure a firm packing.

The container and sleeves are placed into an oven and baked at a suitable temperature, depending on the adhesive used, until the adhesive softens and becomes tacky. With the above formula of shellac, a temperature of 220° was found to be satisfactory. The container and sleeves are removed from the oven and cooled and the excess particles removed by lifting the sleeves out of the container 20 leaving a predetermined evenly distributed coating of particles within the bore 11 retained by the adhesive as illustrated in Fig. 6. The excess hard particles accumulate on the bottom of the box and may be reused.

The finished sleeves may then be used in a splice type of connection as illustrated in Fig. 7, wherein the sleeve 10 is compressed to the cables 14 and 15, with the hardened particles 19 impressed or "keyed" into the softer surfaces of the sleeve and wires to prevent slippage of the cables relative to the sleeve when the wires are under tension.

The amount of hard particles retained by the adhesive will vary according to the thickness of the adhesive layer. Where it is desired to increase the thickness of the hard particles for use in larger sized connectors where greater pull-out values may be required, a plurality of coatings may be applied within the bore 11 to give the desired result. In this instance it is preferred that each adhesive coat be dried before the application of the next coat to insure an evenly distributed thickness of the adhesive coatings and prevent balling-up which would otherwise result.

The hard particles 19 may be of any hard metal or abrasive material which is harder than the material of the connector sleeve. Where the sleeve is made of copper to be used as an electrical connector, it is desirable to use hardened or heat treated particles made of copper containing 1% to 2¾% of beryllium, as is disclosed in the co-pending application of Irving F. Mat-

thysse, Serial No. 43,023, filed on August 7, 1948, now Patent 2,576,528. If desired the connector sleeve may be annealed prior to the application of the adhesive to make it more readily malleable.

By drying the adhesive prior to the application of the hard particles, I can thus accurately control the thickness of the adhesive, and where necessary, vary the thickness depending on the thickness of the hard particle lining that is needed for connectors of various sizes. The sleeves may be set aside or stored with the dried adhesive coating without affecting the remainder of the process. By packing the hard particles into the dry adhesively coated sleeve and then heating the sleeves, the hard particles are applied more effectively and efficiently, insuring an even distribution of particles throughout the connector providing a uniform keying action when the connection is made. The method is particularly suitable for economical mass production.

I have thus described my invention, but I desire it understood that it is not confined to the particular forms or uses shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of my invention, and, therefore, I claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claims, and by means of which, objects of my invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to attain these objects and accomplish these results.

I claim:

1. The method of manufacturing a connector having a metal tubular body which comprises the steps of applying an adhesive to the inner surface of the tubular body, drying the adhesive, filling the tubular body with a plurality of hard particles, softening the adhesive to retain a layer of hard particles in contact therewith, and thereafter removing the excess particles.

2. The method of manufacturing a connector having a metal tubular body which comprises the steps of applying a plurality of adhesive coatings to the inner surface of the tubular body, drying each coating to obtain an increased thickness of uniformly applied adhesive, applying a plurality of hard particles to the inner surface of the tubular body by filling the tubular body with hard particles, softening the adhesive coatings with the hard particles in contact therewith, hardening the adhesive to retain the hard particles, and thereafter removing the excess particles.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
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2,030,439	Fritze et al.	Feb. 11, 1936
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