

[54] **COMPRESSION SPLICE FOR
ELECTRICALLY COUPLING ELECTRICAL
CONDUCTORS**

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[51] **Int. Cl.**..... **H01r 7/08**

[58] **Field of Search** 339/267, 268, 270, 276;
174/84 C; 287/20.3, 52.04, 116; 24/126 C,
136 B, 263 DD

References Cited

UNITED STATES PATENTS

3,041,575	6/1962	Schneider	339/268 R
1,941,915	1/1934	Pfisterer	339/268 S
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FOREIGN PATENTS OR APPLICATIONS

852,184 10/1939 France 339/270 R

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[57] **ABSTRACT**

A compression splice for electrically coupling electrical conductors which includes a compressive coupling sleeve adapted to receive the ends of the conductors to be connected. The coupling sleeve is formed of a suitable electrical conducting material with deformation grooves formed therein which causes the coupling sleeve to deform upon the application of a compressive force. Complementary housing sleeve and compression nut having complementary mating portions are adapted to be received on the ends of the conductors to encase therebetween the compression sleeve which when mated imparts the requisite compressive force onto the coupling sleeve to secure the conductors in electrical connection.

8 Claims, 4 Drawing Figures

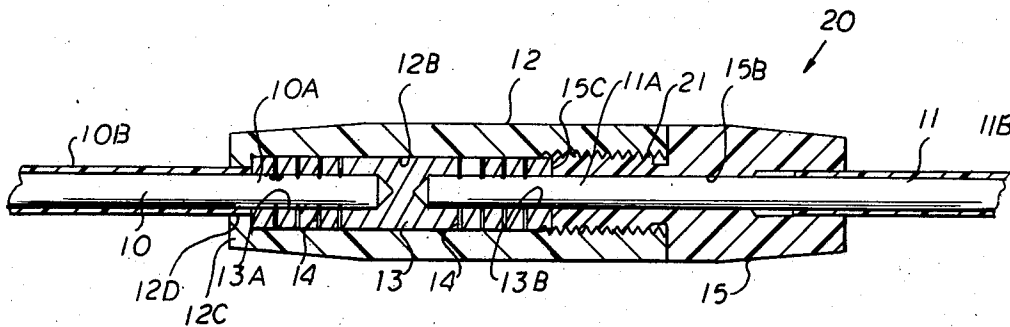


FIG 2

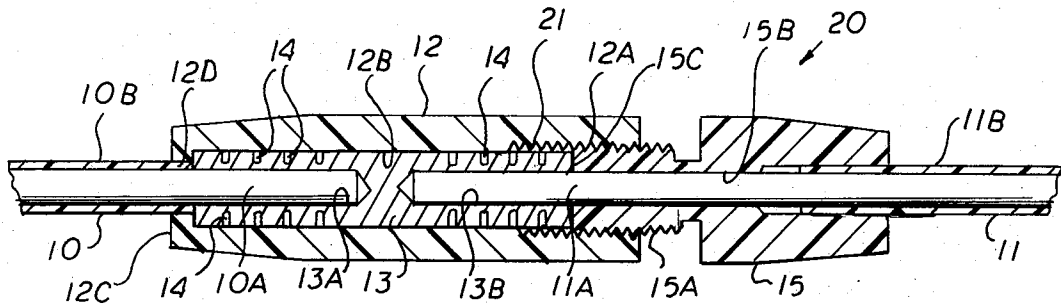
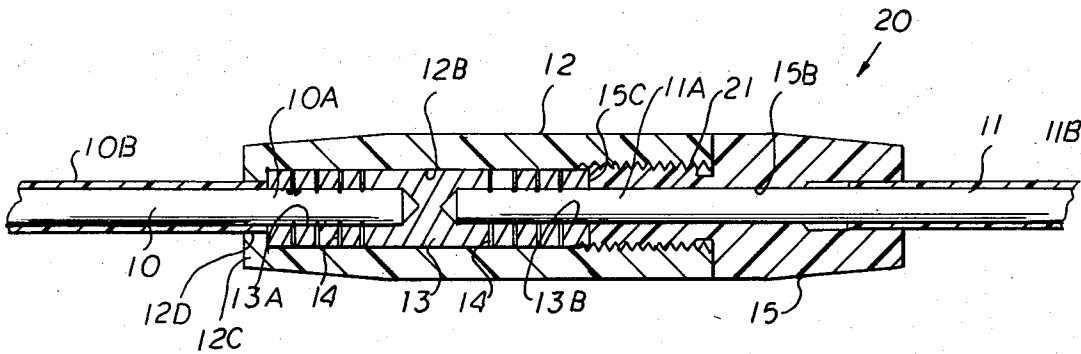


FIG. 1

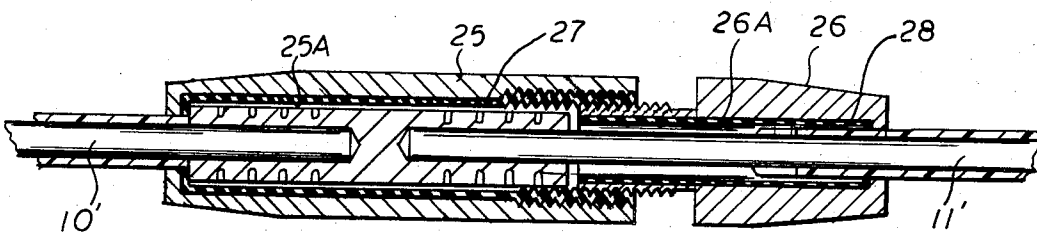


FIG. 4

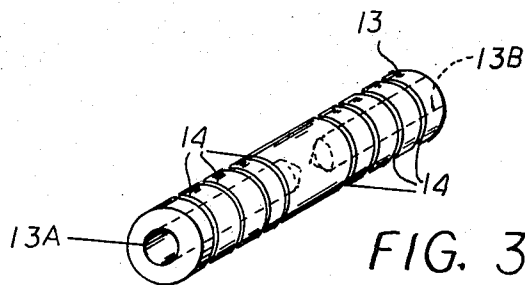


FIG. 3

COMPRESSION SPLICE FOR ELECTRICALLY COUPLING ELECTRICAL CONDUCTORS

PROBLEM AND PRIOR ART

Heretofore, various efforts have been made to electrically couple electrically conducting members. As evidenced by the prior known structures as disclosed in U.S. Pat. Nos. 743,346; 1,975,244 and 2,958,723 it was heretofore necessary to crimp or otherwise secure a terminal to the end of the electrical conductor prior to making the splice. To effect the crimping of the terminal to the end of the electrical conductor generally required the need of a relatively complex crimping tool. Such tools are heavy and frequently may not be readily available. Also nonstrip connectors of the type disclosed by U.S. Pat. No. 3,553,631 are known. However, connectors of this type utilized a camming arrangement to effect penetration of a projection through the insulation of a conductor. With this type of splice, the projection must make contact with the conductor wire. Unless such contact is effected, an electrical contact can not be made. Therefore a noted disadvantage with such camming type connector is that the electrical coupling of a pair of conductors is not completely positive or assured. Also this type of splice is not practical when splicing heavy duty cables.

OBJECTS

An object of this invention is to provide a compression splice for electrically connecting electrical conductors without the need of crimping an end terminal to the conductors.

Another object is to provide a compression splice which insures positive electrical contact between the coupled conductors.

Another object is to provide an improved splice arrangement for electrical conductors wherein the splice is electrically insulated.

Another object is to provide a compression splice for electrically coupling heavy duty conductors.

Another object is to provide a compression splice for electrically coupling cables which is relatively simple in construction, positive in operation and which can be readily applied with a minimum of effort.

BRIEF SUMMARY OF THE INVENTION

The foregoing objects are attained by a compression splice comprising a compression sleeve or coupler adapted to receive and secure the ends of the electrical conductors to be electrically coupled, and a means to effect the compression of the compression sleeve. The compression sleeve is formed with a plurality of grooves which when subjected to compression causes the coupler to be frictionally secured in a positive manner to the ends of the conductors received therein. A means for effecting the compression of the compression sleeve into securing relationship onto the ends of the conductors to be connected comprises complementary housing members which are fitted onto the ends of the respective conductors. One of the housing members comprises a housing sleeve which is provided with an internal bore adapted to encase the compression sleeve therein. The other complementary member comprises a compression nut adapted to be fitted onto the end of the other conductor to be joined. The respective housing sections are provided with comple-

mentary threaded portions whereby the housing members can be drawn toward one another to impart a compressive force on the compression sleeve. The application of the compressive force imparted to the sleeve causes the compression sleeve to deform so that the base or root of the grooves bite into the conductors to electrically and mechanically secure the compressive sleeve to the respective conductors.

FEATURES

A feature of this invention resides in the provision of an improved compression splice which comprises a deformable compression sleeve formed of suitable electrical conducting material which can be readily fitted to the ends of the conductors to be coupled and deformed to electrically and mechanically connect the conductors.

Another feature of this invention resides in the provision wherein the complementary housing member effects an electrically insulated seal for the compression splice.

Another feature of this invention resides in the provision wherein a pair of electrical conductors can be spliced without the need for crimping an end terminal thereto.

Other features and advantages will become more readily apparent when considered in view of the drawings and specification in which:

FIG. 1 is a cross-sectional view illustrating the component parts of the compression splice in a non compressed state.

FIG. 2 illustrates a sectional view similar to that of FIG. 1, but illustrating the parts in the operative compressed state.

FIG. 3 is a detailed perspective view of the compression sleeve.

FIG. 4 illustrates a sectional view of a modified form of the invention.

Referring to the drawings there is shown in FIGS. 1 and 2 a compression splice embodying the present invention for electrically and mechanically securing together a pair of electrical conductors 10 and 11.

As best seen in FIGS. 1 and 2 the compression splice 20 comprises a compression sleeve 13 having a bore 13A and 13B formed in the opposed end portions thereof. While the bore of the sleeve 13 may be extended entirely through the length of the compression sleeve 13, the illustrated embodiment shows the sleeve 13 having end bores 13A and 13B extending into the sleeve an amount sufficient to insure positive securement of the ends 10A and 11A of the conductors adapted to be received therein, as will be hereinafter described. The compression sleeve 13 is formed of a suitable electrical conducting material which is sufficiently ductile so as to be subject to deformation when a compressive force is imparted thereto. Accordingly the material of the compression or coupling sleeve 13 may be formed of copper, aluminum, silver or of any other suitable electrical conducting material.

To facilitate a deformation of the compression or coupling sleeve 13, as will be hereinafter described, there are provided on the sleeve 13 a plurality of slots or grooves 14. In the illustrated form of the invention the slots or grooves 14 are defined as circumscribing annular grooves which extend into the thickness of the material from which the compression or coupler sleeve 13 is formed. As best seen in FIGS. 1 and 2, the depth

of the grooves 14 does not extend completely through the thickness of the material of the compression sleeve 13.

Fitted to the end of one of the conductors is a housing member 12 in the form of a sleeve having end wall 12C formed with an opening 12D for receiving the stripped end 10A of a conductor. The housing sleeve 12 is also provided with an internal bore 12B for encasing therein the compression sleeve 13. The other end portion of the housing sleeve 12 is internally threaded as at 21.

A complementary housing member comprises a compression nut 15 provided with a bore 15B extending therethrough for receiving the end 11A of the other conductor. In the illustrated form of the invention the compression nut 15 is provided with a projecting stem or boss 15A which is externally threaded and which is arranged to mate with the internal threads 21 of the housing sleeve 12. The end of the boss defines a compression face 15C for engaging one end of the compression sleeve 13. In the assembled position, as best seen in FIG. 1, the compression sleeve 13 is arranged to be engaged by the internal end wall 12C of the sleeve housing 12 and the compression face 15C of the compression nut 15. Upon threading the compression nut 15 to the sleeve housing 12, as indicated in FIGS. 1 and 2, it will be noted that a compression force is imparted to the compression sleeve 12 causing the same to be deformed by effecting the angular grooves to close or narrow as seen in FIG. 1. In closing the grooves 14 under a compressive stress the root or bottom portion of the groove is deformed inwardly of the end bores 13A and 13B to bite into the stripped ends 10A and 11A of the conductors received therein to form a strong mechanical coupling or bond between the respective conductor ends 10A, 11A and the compression sleeve 13. As the compression sleeve 13 is formed of suitable electrical conducting material, the stripped ends 10A and 11A of the conductors are electrically coupled.

The complementary housing members 12 and 15 are preferably formed of a suitable electrical insulating material, e.g. a suitable plastic, glass and the like; the arrangement being such that in the assembled position as shown in FIG. 2, the compression sleeve 13 and the stripped ends 10A, 11A of the conductors 10 and 11 are suitably encased and sealed within an electrically insulated housing assembly 12 and 15. With the arrangement described the ends of the conductors 10A, 11A can be electrically coupled without the need of crimping end terminals to the respective conductors and thereafter securing the end terminals in a suitable insular housing.

FIG. 4 illustrates a modified form of the invention which is similar to that disclosed and described with respect to FIGS. 1-3, with the exception that the complementary housing members 25, 26 of the housing assembly may be formed of a metallic material for installations requiring extremely high compressive forces. However, to insure proper insulation so as to provide a shock free connection, the internal bore 25A of the housing sleeve 25 and the bore 26A of the complementary compression nut 26 are provided with a liner 27 and 28 respectively formed of suitable electrically insulating material. Therefore, as seen in FIG. 4, the 10' and 11' conductors in the assembled splice are electrically insulated from the metallic portions of the respec-

tive compression imparting housing components 25 and 26.

In all other respects the embodiment of FIG. 4 is similar in structure and operation to that described with respect to FIGS. 1 and 3.

From the foregoing description, it will be apparent that a positive mechanical and electrical connection can be formed between two conductors without the need of employing the use of crimpers for securing end terminals to the respective conductors. The splice can be simply formed by threading the mating housing sections together so that the compressive force generated thereby effects the mechanical and electrical bond between the coupling sleeve 12 and the respective stripped ends of the conductors 10 and 11.

While the instant invention has been disclosed with respect to particular embodiments thereof it will be readily appreciated and understood that variations and modifications may be made without departing from the spirit or scope of the invention.

What is claimed is:

1. A compression splice for electrically connecting and securing electrical conductors in end to end relationship comprising;
 - a compression coupler formed of an electrically conducting material,
 - means formed in said coupler for receiving the end of the conductors to be connected,
 - means formed on said coupler for permitting said coupler to deform when subject to a compressive force to positively grip the conductors thereto,
 - complementary housing members adapted to be fitted onto the ends of the conductors to be connected for encasing said coupler,
 - said complementary housing members having means for imparting a compressive force on said coupler whereby said coupler is deformed to positively secure said conductors into electrical contact,
 - said means formed in said coupler for receiving the ends of the conductor comprising a bore, and
 - wherein said means permitting deformation of said coupler comprises a series of slotted formations wherein the depth of the slotted formations is less than the thickness of the material of the coupler.
2. The invention as defined in claim 1 wherein said slotted formations comprise a series of annular grooves circumscribing the coupler in the vicinity of said bore for receiving the conductors.
3. The invention as defined in claim 1 wherein said complementary housing members comprise a housing sleeve and a compression screw,
 - said sleeve having an internal bore for accommodating said coupler therein, and
 - said housing sleeve and compression screw having complementary threaded portions whereby the mating of said threaded portions subjects said coupler to a compressive force to deform said coupler into positive frictional engagement with the conductors.
4. The invention as defined in claim 3 wherein said housing sleeve and compression screw are formed of an electrically insulating material.
5. The invention as defined in claim 3 wherein said housing sleeve and compression nut are formed of an electrically insulating material.
6. The invention as defined in claim 3 wherein said housing sleeve and compression nut include a liner of

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electrically insulating material to electrically insulate the coupling sleeve and conductor ends from said housing sleeve and compression nut.

7. A compression splice for connecting and securing a pair of electrical conductors into positive electrical contact comprising:

a coupling sleeve formed of an electrically conducting material,

said coupling sleeve having an end bore formed in the opposed ends thereof adapted for receiving the end portion of an electrical conductor to be connected,

and said coupling sleeve having a series of annular grooves extending into the thickness of the material of the coupling sleeve and circumscribing the respective end bores,

complementary housing members adapted to be fitted over the ends of the respective conductors for encasing said coupling sleeve,

said complementary housing members including a housing sleeve having an internal bore for receiving

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said coupler, and a compression nut, said housing sleeve and compression nut being fitted over the ends of the conductors to be joined, said housing sleeve and compression nut being formed of a nonelectrically conducting material, and

said housing sleeve and compression nut having complementary threaded portions so that when threaded they impart a compressive force on said coupler sleeve causing the coupler to deform and thereby positively securing said conductors into positive electrical contact.

8. The invention as defined in claim 7 wherein said housing sleeve is internally threaded adjacent one end thereof,

and said compression nut having an external boss adapted to engage one end of said coupling sleeve, and

said boss being externally threaded for mating with the internal threads of said housing sleeve.

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