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W. A. HEINRICH

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CONNECTOR FOR ELECTRICAL CONDUCTORS

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Fig. 1

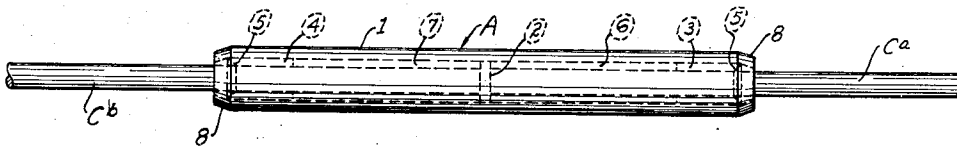


Fig. 2

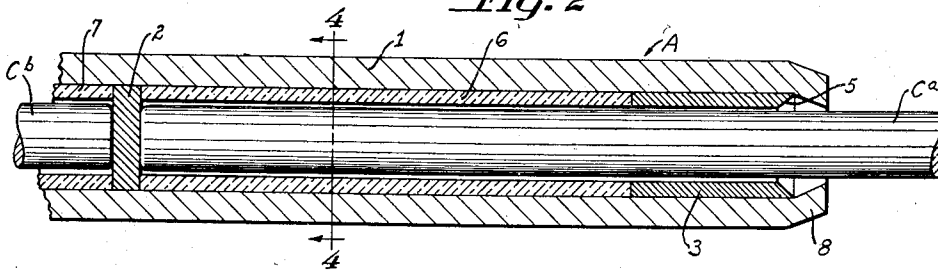


Fig. 3

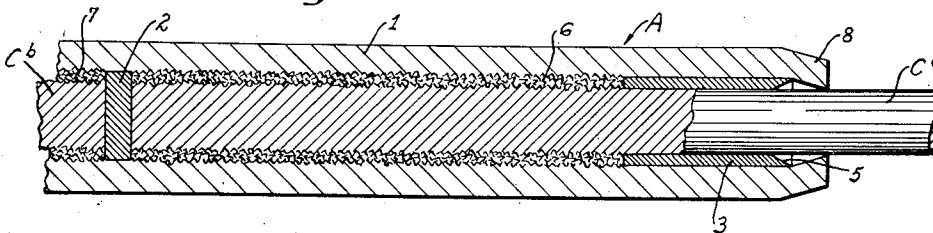
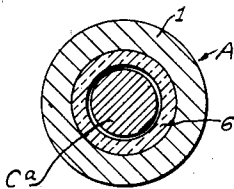


Fig. 4



INVENTOR
WALTER A. HEINRICH

BY *E. W. Harrington,*
ATTORNEY

UNITED STATES PATENT OFFICE

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CONNECTOR FOR ELECTRICAL CONDUCTORS

Walter A. Heinrich, Richmond Heights, Mo., assignor to James R. Kearney Corporation, St. Louis, Mo., a corporation of Missouri

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6 Claims. (Cl. 173—324)

This invention relates generally to connectors for mechanically attaching and electrically connecting electrical conductors, and more specifically to connectors adapted for those purposes which are of the sleeve type into opposite end portions of which end portions of the conductors to be connected are extended after which the sleeves are compressed on the inserted conductor portions, the predominant object of the invention being to provide an improved sleeve-type connector which because of its unique and improved construction and arrangement is capable of performing its intended functions in an improved and highly efficient manner.

Connectors of the type to which the present invention relates must, if they are to be entirely successful in use, be capable of performing two extremely important functions, one of these functions being to provide secure mechanical attachment between the connected conductors so that said connected conductors will not be accidentally separated at the splice therebetween by the strains to which overhead conductors are subjected, and the other function being to provide good electrical contact between the connected conductors so that no interference will be set up at the splice between the connected conductors with relation to passage of electrical energy from one to the other connected conductor. The connector of the present invention, because of its unique and improved construction, is characterized by the ability to perform in a most efficient manner both of the functions mentioned above, in that it is provided with an inner frangible element which is broken and shattered when the sleeve is compressed on the adjacent end portions of the connected conductors to provide numerous abrasive keys which are embedded in the material of the sleeve and of the inserted portions of the connected conductors to very securely lock the inserted end portions of the connected conductors within the sleeve against accidental displacement therefrom. Also the connector of the present invention includes means which provides direct and positive electrical contact between the sleeve and the inserted portions of the connected conductors so that maximum electrical conductivity through the splice provided by the connector is assured.

Fig. 1 is a side elevation of the improved connector showing same in use connecting a pair of electrical conductors.

Fig. 2 is an enlarged, fragmentary longitudinal section taken through one of the improved connectors showing same as it appears in association

with a pair of electrical conductors before the connector has been compressed on the inserted end portions of the electrical conductors.

Fig. 3 is a view similar to Fig. 2 but illustrating the connector after it has been compressed on the inserted end portions of the associated electrical conductors.

Fig. 4 is a cross-section taken on line 4—4 of Fig. 2.

In the drawing, wherein is shown for the purpose of illustration, merely, one embodiment of the invention, A designates the improved connector generally. The conductor A includes an outer sleeve 1 which is made of a material that is a good conductor of electrical energy, said sleeve preferably being of tubular formation. Located within the sleeve 1, at the approximate longitudinal center thereof, is a disk 2 whose peripheral edge contacts with the inner face of the sleeve 1, said disk preferably, though not necessarily, being formed of the same or approximately the same material of which the sleeve 1 is formed. At points adjacent to the opposite ends of the sleeve 1 said sleeve has located therein a pair of tubular elements 3 and 4, these tubular elements preferably being of such diameter that they fit closely within the sleeve as shown to good advantage in Fig. 2. The tubular elements 3 and 4, at their outer ends may, if desired, be provided with inclined faces 5 which are intended to serve a purpose to be hereinafter set forth. Preferably the tubular elements 3 are made from the same or approximately the same material as that material from which the sleeve 1 is made.

Located within the sleeve 1 and interposed between the disk 2 and the tubular element 3 is a tubular member 6, and located within said sleeve 1 and interposed between the disk 2 and the tubular element 4 is a similar tubular member 7, the circumferential faces of said members 6 and 7 being in contact with the inner face of the sleeve 1 and the opposite end faces of said members being in contact with the disk 2 and the tubular elements 3 and 4. The tubular members 6 and 7 are made from a readily frangible material of such character that when sufficient pressure is applied thereto said material will be shattered or broken into small irregular shaped particles, and preferably the material from which the tubular members 6 and 7 are formed is of greater hardness than the material from which the sleeve 1 is formed. While various materials may be employed in the production of the tubular members 6 and 7 which would

have the desired characteristics it has been found that glass serves the purpose very well.

In order to retain the disk 2, the tubular elements 3 and 4, and the tubular members 6 and 7 in place within the sleeve 1 the opposite end portions of the sleeve 1 are drawn or shaped inwardly to provide said sleeve with tapered end portions 8. By so shaping the opposite end portions of the sleeve the tapered inner faces of the tapered end portions 8 of the sleeve prevent outward movement of the tubular elements longitudinally of the sleeve, and because the disk 2, the tubular members 6 and 7, and the tubular elements 3 and 4 are in contact with each other the spacing of said parts is maintained.

In connecting a pair of electrical conductors with the aid of the improved connector disclosed herein adjacent end portions of the conductors are inserted into opposite ends of the connector A, the conductors being moved inwardly longitudinally of the connector until their inner ends abut against the disk 2 as shown in Figs. 1, 2, and 3, wherein the conductors are designated by the reference characters Ca and Cb. With regard to the introduction of the end portions of the conductors Ca and Cb into the connector A it is pointed out that the inclined faces 5 at the outer ends of the tubular elements 3 and 4 serve as tapered entering surfaces which facilitate ready insertion of the ends of the conductors into the end portions of the connector.

When the end portions of the conductors Ca and Cb have been introduced into the connector and the assembly is ready for final application of the connector to the inserted end portions of conductors, said assembly appears as shown in Fig. 2. The assembly is then subjected to compressive force applied to the outer face of the sleeve in any suitable manner, which reduces the diameter of the sleeve and forces its inner face toward the outer faces of the conductors. As a result of the compressive force to which the sleeve 1 is subjected the outer and inner faces of the tubular elements 3 and 4 are forced into intimate contact with the inner face of the sleeve 1 and the outer faces of the conductors Ca and Cb with the result that very good electrical contact is made between the conductors and the sleeve. Also, because of the compressive force to which the sleeve 1 is subjected the frangible, tubular members 6 and 7 are shattered and broken into small, sharp surfaced, irregularly shaped particles which provide abrasive keys, as shown in Fig. 3, and these abrasive keys, because of their relative hardness, are embedded in the material of the sleeve and of the conductors thereby keying or locking the conductors to the sleeve 1.

It is apparent, in view of the foregoing, that because the tubular elements 3 and 4 are forced into very intimate contact with conductors and the sleeve 1 that close metal to metal electrical contact is provided between the conductors and the sleeve which provides for maximum electrical conductivity through the connector and is not in any manner affected by the presence within the sleeve of the abrasive keys, and that these abrasive keys provide for secure and positive mechanical attachment between the conductors and the sleeve.

The compressive force to which the sleeve 1 is subjected may be produced in various ways, such, for instance, as by a rolling operation, a swaging operation, by pinching operations performed with the aid of a tool such as has been employed

heretofore for compressing sleeves on conductors being connected by means of a sleeve-type connector, or by any other method which may be found suitable to the requirements of the present invention.

I claim:

1. A connector for electrical conductors comprising a hollow sleeve formed from electrical conducting material, tubular elements formed from electrical conducting material and located within said sleeve at points adjacent to opposite ends thereof, said tubular elements being adapted to make direct electrical contact with electrical conductors introduced into opposite end portions of said sleeve, a pair of tubular members formed from frangible material located within said sleeve in interposed relation with respect to said tubular elements, and an abutment located between said tubular members, said tubular members being in contact at their opposite ends with said abutment and said tubular elements.

2. A connector for electrical conductors comprising a hollow sleeve formed from electrical conducting material, tubular elements formed from electrical conducting material and located within said sleeve at points adjacent to opposite ends thereof, said tubular elements being adapted to make direct electrical contact with electrical conductors introduced into opposite end portions of said sleeve, a pair of tubular members formed from frangible material located within said sleeve in interposed relation with respect to said tubular elements, an abutment located between said tubular members, said tubular members being in contact at their opposite ends with said abutment and said tubular elements, and means at opposite ends of said sleeve for retaining said tubular elements and said tubular members within said sleeve.

3. A connector for electrical conductors comprising a hollow sleeve formed from electrical conducting material, tubular elements formed from electrical conducting material and located within said sleeve at points adjacent to opposite ends thereof, said tubular elements being adapted to make direct electrical contact with electrical conductors introduced into opposite end portions of said sleeve, a pair of tubular members formed from frangible material located within said sleeve in interposed relation with respect to said tubular elements, an abutment located between said tubular members, said tubular members being in contact at their opposite ends with said abutment and said tubular elements, and means comprising tapered portions at opposite ends of said sleeve for retaining said tubular elements and said tubular members within said sleeve.

4. A connector for electrical conductors comprising a hollow sleeve adapted to receive within its interior an end portion of an electrical conductor and adapted to be compressed by force applied thereto onto said end portion of said electrical conductor so as to be fixedly secured thereto, a unitary member disposed within said sleeve in such manner that the wall of said member is interposed between the wall of said sleeve and the outer surface of an electrical conductor inserted into the hollow sleeve, said member being formed from frangible material so that force applied to said sleeve to compress it onto the end portion of an electrical conductor disposed within the sleeve will break said member into pieces which will serve as keys that aid in securing said sleeve to the end portion of the

electrical conductor, and means comprising an element located at an end of said sleeve against which said member abuts so as to prevent outward movement of said member with respect to the sleeve at the end of the sleeve at which said means is located.

5. A connector for electrical conductors comprising a hollow sleeve adapted to receive within its interior an end portion of an electrical conductor and adapted to be compressed by force applied thereto onto said end portion of said electrical conductor so as to be fixedly secured thereto, a unitary member disposed within said sleeve in such manner that the wall of said member is interposed between the wall of said sleeve and the outer surface of an electrical conductor, inserted into the hollow sleeve, said member being formed from frangible material so that force applied to said sleeve to compress it onto the end portion of an electrical conductor disposed within the sleeve will break said member into pieces which will serve as keys that aid in securing said sleeve to the end portion of the electrical conductor, and means comprising an element of tubular formation located within and at an end of said sleeve against which said member abuts so as to prevent outward movement of said member with respect to the sleeve at the end of the sleeve at which said means is located.

6. A connector for electrical conductors com-

prising a hollow sleeve adapted to receive within its interior an end portion of an electrical conductor and adapted to be compressed by force applied thereto onto said end portion of said electrical conductor so as to be fixedly secured thereto, a unitary member disposed within said sleeve in such manner that the wall of said member is interposed between the wall of said sleeve and the outer surface of an electrical conductor inserted into the hollow sleeve, said member being formed from frangible material so that force applied to said sleeve to compress it onto the end portion of an electrical conductor disposed within the sleeve will break said member into pieces which will serve as keys that aid in securing said sleeve to the end portion of the electrical conductor, and means comprising an element of tubular formation located within and at an end of said sleeve against which said member abuts so as to prevent outward movement of said member with respect to the sleeve at the end of the sleeve at which said means is located, said means of tubular formation being formed of electrical conducting material and serving also to provide direct electrical connection between said sleeve and the end portion of an electrical conductor extended into the end of the sleeve at which said means of tubular formation is disposed.

WALTER A. HEINRICH.