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CONNECTOR FOR ELECTRIC CABLES

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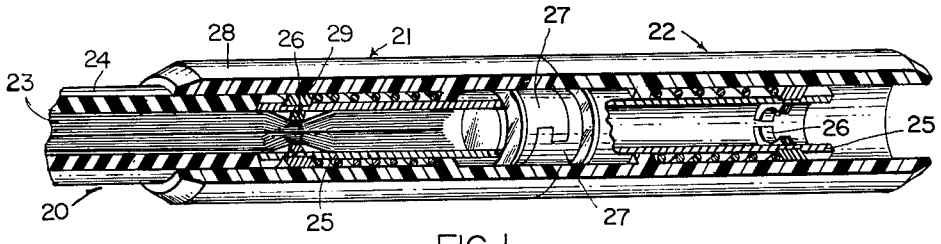

FIG. 1

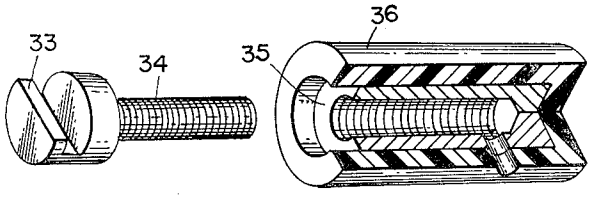

FIG. 3

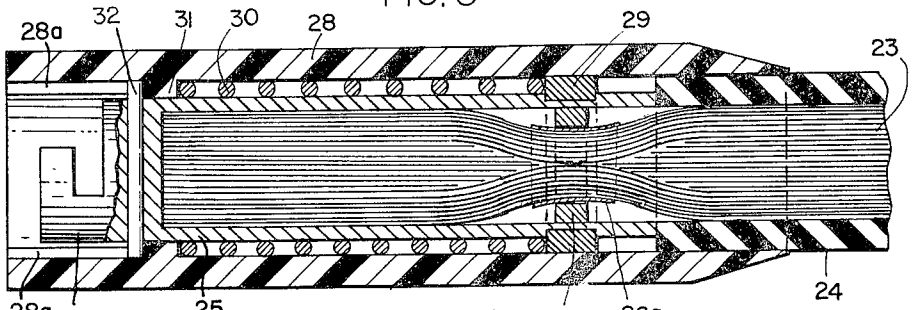

FIG. 2

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CONNECTOR FOR ELECTRIC CABLES

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The present invention relates to connectors. More particularly this invention relates to connectors for high current carrying capacity electric cables such as the cables used in electric welding equipment.

Although there are a multitude of various connector types and configurations, very few of these are useful for connecting cables of high current carrying capacity due to the heat generated in connections where the resistance is not extremely low. In the past it has been the practice to braze or weld such cable junctions to keep the resistance within reasonable limits. An operation of this sort, however, is both expensive and time consuming.

Another disadvantage to prior art connectors is that most are manufactured as "male" and "female" mating pairs. Since the male and female members are specifically adapted for engagement with the opposite variety, and generally do not mate with members of the same variety, it frequently becomes necessary to change varieties on a given cable end in order to make the desired interconnections.

It is an object of this invention, therefore, to provide an improved connector which avoids one or more of the disadvantages of the prior art connectors.

It is a further object of this invention to provide an improved, high current carrying capacity connector capable of mating with connectors of similar kind.

Yet another object of the present invention is to provide an improved connector which maintains a low contact resistance after repeated usage.

An additional object of the present invention is to provide an improved connector which is not readily subject to short circuiting when not in use.

In accordance with the inventon, the connector comprises a conductive sleeve adapted for engagement with a cable end and terminated in a predetermined configuration. A means is provided for electrically and mechanically securing the sleeve to the cable end. A retractable, spring biased jacket surrounds the sleeve and is adapted simultaneously to provide insulation of and tension on a connection formed between the connector and one of similar kind.

For a better understanding of the present invention, together with other and further objects thereof, reference is made to the following description taken in connection with the accompanying drawings and its scope will be pointed out in the appended claims.

In the drawings:

FIGURE 1 is a perspective view, partly in section, of an embodiment of the present invention illustrating a connection formed therewith.

FIGURE 2 is an enlarged elevational section of the embodiment of FIGURE 1, and,

FIGURE 3 is a perspective view, exploded and partly in section, of another aspect of the embodiment of FIGURE 1.

Referring to FIG. 1 of the drawing there is shown an electric cable 20 and a pair of similar connectors 21 and 22 embodying the invention. The electric cable 20 comprises a stranded conductor 23 and insulation 24. The insulation 24 is bared from the cable end which is enclosed by the sleeve 25. The sleeve 25 is adapted for engagement with the bared cable end by means of the split ring 26 carried within the sleeve 25. At this point the cable end is surrounded by a band of foil 26*a* to

prevent the split ring 26 from cutting the cable strands. At one end, the sleeve 25 is terminated in a predetermined configuration as, for example, the terminal 27. Encasing the sleeve 25 and part of the cable 20 is a retractable, spring biased insulating jacket 28. Illustrated more in detail in FIG. 2 is the insulating jacket 28 and its relation to the cable 20 and the sleeve 25. From this figure it may be seen that the sleeve 25 is firmly secured to the cable end by means of the outer ring 29 which is concentric with the inner ring 26. This ring 29 also acts as a shoulder against which the bias spring 30 is urged when the jacket 28 is pulled back to expose the terminal 27. The other end of the bias spring 30 is restrained by means of the shoulder or offset 31 in the jacket 28. Disposed radially through the terminal 27 is a knockout pin 32 against which the shoulder or offset 31 rests when the bias spring 30 is fully expanded. Knockout pin 32 is, for example, longer than the diameter of the terminal 27. This not only enables it to prevent undesired removal of the jacket 28, but also provides a means for selectively restraining the jacket 28 in a retracted position compressing the bias spring 30 and exposing the terminal 27. To perform this latter function the jacket 28 is provided with axial grooves 28*a* extending from the shoulder 31 to the opening of the jacket 28. The pin 32 is, therefore, restricted to axial motion in the grooves. If the jacket 28 is pulled back sufficiently far, the pin 32 will be exposed. When the pin 32 is thus exposed, the jacket 28 may be rotated so the pin 32 can no longer engage the grooves and the jacket 28 will be restrained in this retracted position. It is to be particularly noted that the terminal 27 is of a configuration that facilitates its engagement with a terminal of similar kind. Male and female terminal variations are not used, nor are they ever needed.

The installation and operation of the connector of the present invention are simply performed without the use of special tools. The sleeve 25 is for example, split so that it may be opened slightly to receive the bared end of the cable 20. When the bared cable end is inserted into the sleeve 25, the outer ring 29 is slipped over the terminal 27 and forced down the sleeve 25 until it is in register with the inner ring 26. This causes the inner ring 26 to bite down into the cable end simultaneously to provide a secure mechanical and electrical connection of the sleeve 25 to the bared cable end. Since the resistance of the connection depends upon the surface area of contact and the quality of the contact, the arrangement just described provides an excellent connection of low resistance without the need of welding or brazing. Tremendous contact forces are achieved by the outer and inner ring arrangement illustrated.

As previously pointed out, the jacket 28 may be pulled back to expose the terminal 27. When this is done, the terminal 27 may be placed into engagement with the terminal of a connector of similar kind. Upon release of the jacket 28, it will spring back and simultaneously provide insulation of and tension on the connection thus formed.

Release of the connection, accomplished in the manner just described, is likewise effected by retracting the jacket 28 to expose the terminals 27. The tension on the joint may be relieved by rotating the jacket 28 and restraining it against the pin 32. Rotation of the jacket 28 once again after separation of the connection permits the pin 32 to engage the grooves and the jacket 28 to spring back beyond the terminal 27. This latter position of the jacket 28 has the additional unique feature of preventing inadvertent short circuiting of the cable.

Another aspect of the embodiment of FIG. 1 is shown in FIG. 3. Here there is illustrated a connector of similar kind comprising a terminal 33, corresponding in configura-

tion to the terminal 27 of FIGS. 1 and 2. Extending from the terminal 33 is a threaded stud 34. The threaded stud 34 into the sleeve 35 until sufficient pressure is brought to in the insulating jacket 36. The jacket 36 may, for example, have a radial hole disposed therein suitable for the insertion of a welding rod, not shown. The welding rod, not shown, is then secured by means of screwing the stud 34 into the sleeve 35 until sufficient pressure is brought to bear upon the welding rod to establish good electrical contact as well as firm mechanical engagement.

The present invention provides a significant step forward in the electrical connector art by eliminating the use of male and female type connectors and providing a connector which has high current carrying capacity, is capable of mating with connectors of similar kind and which cannot be separated by axial movement.

While there have been described what are at present considered to be the preferred embodiments of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is, therefore, aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. In a connector for electric cables said connector having an insulating jacket, the improvement comprising a conductive sleeve disposed within said jacket and adapted to receive a cable end, a split in the wall of said sleeve enabling said sleeve to be compressed about the cable end, a split ring disposed within said sleeve in the region of the split, and an outer ring positioned concentrically about said sleeve in the region of the split for compressing said sleeve and split ring on said cable end to establish electrical contact therewith.

2. A connector for electrical cables comprising a conductive sleeve adapted for engagement with a cable end and terminating in a predetermined configuration; means for electrically and mechanically securing said sleeve to said cable end, including a split ring disposed within said sleeve, and means surrounding said sleeve and within the jacket recited below for compressing said split ring on the cable end; a spring biased retractable jacket surrounding said sleeve and adapted simultaneously to provide insulating of and tension on a connection formed between said connector and one of a similar kind, said retractable jacket extending normally beyond said cable end and sleeve and adapted upon retraction to expose the part of said sleeve terminated in the predetermined configurations; an axially directed groove in said jacket, a pin mounted on and extending radially from said sleeve and adapted to move in the groove upon retraction of said jacket and means for preventing said pin from entering said groove when said jacket is in its retracted position to restrain said jacket in said position.

3. A connector as defined in claim 2 further characterized by the means for compressing said split ring on the cable end including an outer ring positioned concentrically about said sleeve and aligned radially with the split ring.

4. A connector for electrical cables comprising a sleeve made of electrically conductive material adapted to receive the bared end of an eletcrical cable, a hook-like terminal formed at one end of the sleeve and adapted to mate

with an identical terminal, the other end of said sleeve being split so as to be compressible about a cable disposed within it, means disposed about the sleeve for compressing it on an electrical cable, means disposed in the sleeve at its split end for mechanically gripping the cable when the split end of the sleeve is compressed, an insulating jacket surrounding the sleeve and biased to a position wherein it extends over the terminal, and means including a pin and slot assembly formed on the sleeve and jacket for retaining the jacket in a retracted position wherein it exposes the terminal.

5. A connector as defined in claim 4 further characterized by said means disposed about the sleeve including a ring aligned with the means disposed in the sleeve.

6. A connector as defined in claim 5 further characterized by said ring providing a stop between the jacket and the sleeve, a shoulder formed on the inner surface of the jacket providing a second stop between the jacket and the sleeve, and a spring disposed between the jacket and the sleeve and engaging the ring and shoulder providing a biasing means for the jacket.

7. A connector as defined in claim 5 further characterized by a seat formed in the outer surface of the sleeve receiving the ring and restraining the ring against axial movement on the sleeve.

8. A connector for cables comprising a sleeve made of electrically conductive material and having splits therein to facilitate compression of the sleeve, a ring disposed within the sleeve at the location of the splits and adapted to engage and grip a bared cable when the sleeve is compressed about it, a second ring surrounding the first recited ring and disposed outside the sleeve, a generally hook shaped terminal at one end of the sleeve adapted to mate with an identical terminal, an insulating jacket surrounding the sleeve and having an inwardly extending shoulder in the vicinity of the terminal, and a coil spring disposed within the jacket and about the sleeve engaging the shoulder at one end and the second ring at the other, said spring biasing the jacket to a position wherein it surrounds the terminal.

9. A connector as defined in claim 8 further characterized by a pin carried by the sleeve and an axially directed groove in the jacket, said pin riding in the groove and restricting movement of the jacket to an axial direction on the sleeve when the pin is within the groove, said pin being disposed beyond the end of the jacket when the jacket is moved against the bias of the spring to expose the terminal and adapted to bear against the end of the jacket to hold it in a retracted position when the pin is displaced radially from the groove.

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