May 22, 1962 S. R. WHEATON ETAL 3,036,147

CONNECTOR

Filed Aug. 21, 1959

FIG. 1

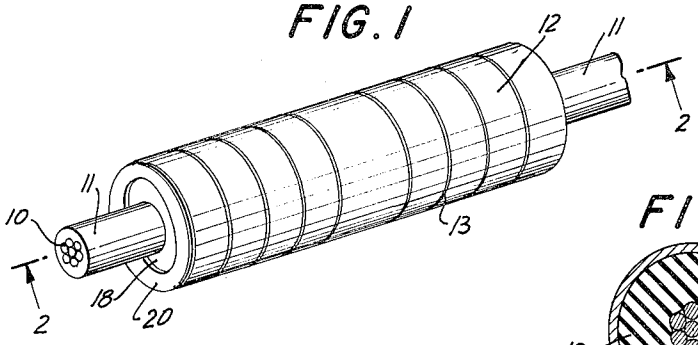


FIG. 4

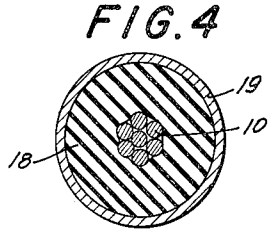


FIG. 2

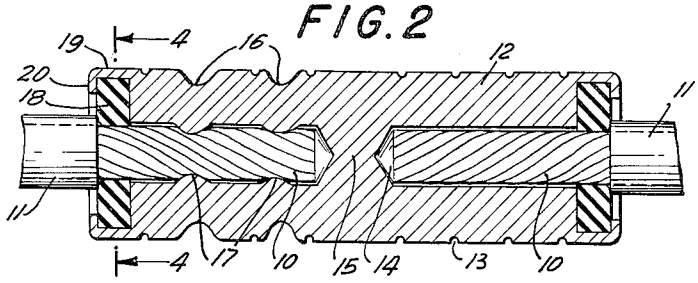
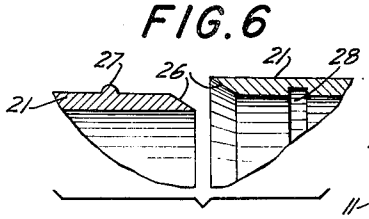


FIG. 6



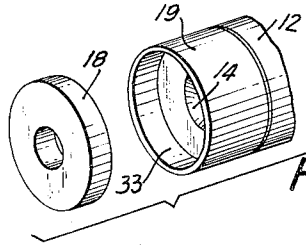


FIG. 3

FIG. 7

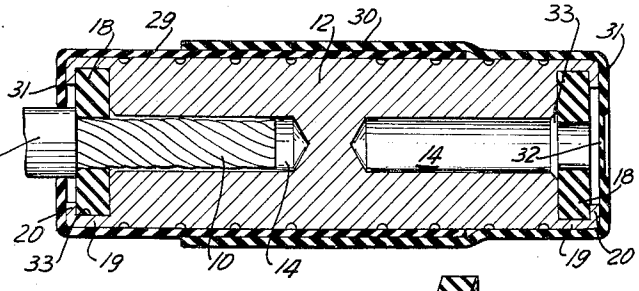


FIG. 8

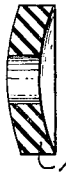
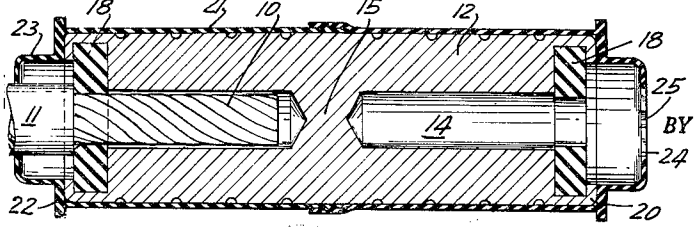


FIG. 5



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CONNECTOR

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1 Claim. (Cl. 174—84)

This invention relates to a structurally and functionally improved connector which will permanently couple the ends of conductors such as cables against separation from each other, to thus physically and electrically connect the same.

It is an object of the invention to furnish an improved connector with which cables may be associated to retain them against accidental separation from the connector; the latter being thereupon permanently connected to the cables in a manner such that corrosion and electrolysis will in effect be eliminated.

A further object is that of providing a connector which may be ideally combined with an enveloping structure in the form of a covering serving to insulate the parts against exposure to corrosive action, so that a splice is furnished between the cables which will be effective for the life of the latter.

Still another object is that of designing a connector assembly the several parts of which may be economically manufactured and assembled to provide a unit which may be stored for indefinite periods without deterioration, and which in use may readily be applied by a person of ordinary skills to furnish a permanent connection between cables.

With these and other objects in mind, reference is had to the attached sheet of drawings illustrating practical embodiments of the invention, and in which:

FIG. 1 is a perspective view of one form of connector coupling the ends of cables;

FIG. 2 is a sectional side view thereof taken along the line 2—2 and in the direction of the arrows as indicated in FIG. 1;

FIG. 3 is a fragmentary perspective view showing parts of the connector in process of assembly;

FIG. 4 is a transverse sectional view taken along the line 4—4 in the direction of the arrows as indicated in FIG. 2;

FIG.. 5 is a view similar to FIG. 2, but showing a covering in association with the parts;

FIG. 6 is an enlarged fragmentary sectional view of a detail of the covering as illustrated in FIG. 5;

FIG. 7 corresponds to FIGS. 2 and 5, but shows an alternative form of assembly; and

FIG. 8 is a sectional side view of a form of washer which may be included as part of the assembly.

The word "cable" as used throughout this specification is employed in its generic sense to designate an electrical conductor including either a single wire or a multiplicity of strands. In use the cable will ordinarily be of the latter type, and has been illustrated accordingly in the drawings. This is not to be construed, however, as a limitation, in that the cable may include any desired type of conductor.

Thus, as in FIG. 1 and subsequent views, cables have been shown including a plurality of conductive strands 10 surrounded by a sheath 11 of insulation. The ends of the two cables are stripped of insulation and mechanically and electrically coupled by a sleeve 12 of conductive material. That sleeve may, if desired, be formed with a series of grooves 13 upon its outer face, so that the sleeve may readily be grasped and retained. Also, this structure will serve to maintain a covering material which may be associated with the sleeve against detachment therefrom.

The sleeve is provided with bores 14 extending through

to its outer ends and of diameters slightly larger than the diameter of the bared end portions of the cables to be received within those bores. The bores are separated at their inner ends by a partition 15 provided of sleeve material, and which partition, as illustrated, is conveniently solid. It is apparent that the partition will limit the entrance of the cable ends into the sleeve. As will be appreciated, in accordance with conventional technique, after a cable end has been inserted to extend properly within a bore portion of the sleeve, the exterior of the latter is subjected to pressure by a suitable crimping tool. That sleeve being formed of a somewhat ductile material, it follows that this pressure will result in grooves 16 being indented on its outer face; the pressure being transmitted in line with these grooves to cause the bores 14 to be constricted, as at 17, to diameters less than those of the cable parts, so that the sleeve material in effect merges with the cable and locks the same against separation from the sleeve.

To provide cable-retaining means which will function to isolate the bared cable ends from moisture and other factors leading to the danger of electrolysis and corrosion, washers 18 are associated with the ends of the sleeve at points beyond the cable-receiving bores 14. Those washers may be formed of natural or synthetic rubber, a suitable plastic material, leather, felt, etc. They should incorporate flexibility and at least limited resiliency. The diameter defined by the aperture of a washer should be less than that of a cable to be passed through that aperture. The axes of a bore and the adjacent washer aperture should be aligned. Thus, in the initial condition of the parts prior to the association of a cable with a sleeve bore, the inner edge of the washer will provide a membrane extending slightly beyond the side face of the bore toward the axis of the latter.

Various types of structure may be employed to permanently retain washers or membranes 18 against detachment from a sleeve. Adhesive could be used for this purpose. However, it is preferred, as shown in FIG. 2, that the sleeve material be extended, as at 19, beyond the end of the sleeve body to thus provide a recess or compartment to receive a washer 18. This extended portion may be peened inwardly or otherwise distorted, as at 20, to overlap the exterior face of the contained washer. This will definitely prevent a separation of the latter from the sleeve. Also, if desired, the diameter of the compartment receiving the washer may be slightly less than the exterior diameter of the washer. Therefore, as the latter is inserted in the compartment in the manner shown in FIG. 3, that washer will be subjected to a slight degree of compression.

In this manner, the diameter of the washer aperture will be slightly constricted. Also, and as shown in FIG. 8, the washer body may be slightly dished. If the latter result is to obtain, then the adjacent sleeve surface may be correspondingly modified to accommodate the concave-convex configuration of the washer. Whether the washer be flat or of other configuration, it is apparent that as a cable is forced through the aperture, the material of the washer will grip against the exterior cable surface, as in FIG. 4. Consequently, a "drag" action will be set up which will resist accidental movement of the cable outwardly and axially of the sleeve under normal handling conditions. Especially if the washer be of dished shape, this drag will be increased and in the nature of a pawl action restraining separation of the cable from the sleeve as these parts are handled after proper introduction of the cable but prior to the sleeve being crimped as at 16 and 17. Accordingly, a linesman providing a splice between cables 10 may bare the ends of the cables, if they be insulated, insert them into the bores in proper positions, and then grip the sleeve while using the crimping

tool, without fear that the cables will tend to slip out of position within the bores. Most important is the additional fact that the washers will seal against the cables and prevent the entrance of moisture and air into spaces between the sleeve bores and the cables, thus precluding difficulties which otherwise would subsequently arise.

A connector of this type may, if desired, be ideally combined with a covering or enclosure portion, as shown in FIG. 5. That portion will include a pair of tubes, each conveniently of a length slightly in excess of one-half that of a sleeve **12**. The outer ends of these tubes will be closed by flange portions **22** continued in the form of caps **23**. Those caps or cup portions may have their bodies radially slitted, as at **24**, and define relatively small apertures **25** of a diameter less than that of the cable or its covering.

Jackets thus furnished are conveniently formed of a material such as neoprene. If desired, in lieu of apertures **25**, frangible portions might exist which would be pierced upon the end of a cable being inserted through the cap. As shown in FIG. 5, it is preferred with this construction that the flange portions **22** abut the inwardly projecting parts **20** of the sleeve and that the cups or caps extend outwardly a distance such that they enclose the adjacent end of the insulating covering **11**. Thus, again a membrane structure is furnished at this zone which will prevent moisture and air from moving inwardly of the assembly beyond the base zones of the caps. The inner edges of the latter are disposed in telescopic relationship, and as illustrated in detail in FIG. 6, the edge zone of one jacket portion may be beveled, while the other is undercut, as at **26**. This will furnish surfaces which will cam against one another as the tube portions are forced into telescopic relationship. One of these tube portions will have an outwardly extending bead **27** adjacent its end, while the other will be conveniently formed with a groove **28**. The surface **26** of the right-hand jacket portion in FIG. 6 will override the bead, and upon continued movement of the parts toward each other, groove **28** will receive that bead, thus furnishing a locking or detent structure guarding against separation of the jacket portions, as shown in FIG. 5.

Again, as in FIG. 7, an alternative form of encasing or jacket structure may be furnished. This will include a pair of tubular members **29** and **30**; the latter having a diameter adjacent its inner edge zone greater than that of tube **29**. The outer ends of these tubes will be closed by base portions **31**, each of which is conveniently furnished with a center zone **32** of relatively thin gauge material. Accordingly, at these points rupturable diaphragm parts are furnished. When the assembly is stored prior to use, it will be completely protected by the jacket structure, but at the same time will be ready for instant use by a linesman when desired.

As will be appreciated, at the time of their manufacture the units may have their bores coated or partially filled with a suitable compound which will assure a proper and substantially corrosion-proof coupling between the cables and the sleeve. If jackets are employed, and after the end zones of the cables have been stripped for a suitable distance (assuming them to be initially covered with insulation, as at **11**) the cable ends are inserted into the bores **14**. With that insertion, the apertures of the washers are expanded to frictionally grip the cables and retain them against accidental movements or detachment from the sleeve. That sleeve is now crimped into locking engagement with the cables, thus assuring a proper electrical and physical coupling with the latter. Under these circumstances, and as shown in FIG. 2, the ends of the cables are housed and sealed against exterior influences in a manner such that difficulties in connection with electrolysis and corrosion are substantially overcome.

This effect will be even more strongly emphasized if jackets of the nature shown in FIGS. 5 and 7 are employed. As afore brought out, those jackets will seal against the surfaces of the cables, or else against their insulation, as shown in both these views. No difficulty will be experienced in inserting the cable ends into the sleeve bores, in that those ends will either pass through openings **25** and spread the cap material incident to the slits **24**, or else will rupture the diaphragm portions **32**, with a similar end result. Of course, if desired, the jackets may be only loosely applied to the sleeves during the stored condition of the parts. This will permit a linesman to shift the jacket portions axially of the cable ends, so that he may apply a suitable crimping tool to the exterior face of sleeve **12** for the purpose of indenting the latter and locking it against movement with respect to the cables. Thereafter, the jacket portions may be ensleeved over each other and the body of unit **12**.

In conclusion, it will be observed, as in FIG. 7, that the recess accommodating the washer may be flared or counterbored to some extent, as indicated at **33**. This will permit washer material to flex and shift inwardly as the end of a cable is disposed within the bore. Accordingly, the drag or pawl action exerted by the washer will be enhanced, thus contributing to a retention of the cable against accidental displacement. It will be understood that this recess or bore structure may, if desired, be used in connection with the structures of the several connector assemblies as previously described.

Thus, among others, the several objects of the invention as specifically aforenoted are achieved. Obviously, numerous changes in construction and rearrangements of the parts may be resorted to without departing from the spirit of the invention as defined by the claim.

We claim:

A connector for coupling the ends of two cables to each other, said connector comprising a single sleeve of electrically conductive and ductile metal presenting bore openings at its ends, washers of flexible and resilient material disposed one adjacent each end of said sleeve, the apertures of said washers being aligned with and of less diameter than the bore openings, whereby with the insertion of a cable having a diameter less than such openings and greater than the aperture, the latter will be expanded to cause washer surfaces to grip the cable and retain it against withdrawal from said sleeve, said washers presenting outer faces extending in directions away from said sleeve, parts of said sleeve overlying the outer peripheral edge zones of said washers and extending inwardly beyond the same to overlap the outer faces thereof and thus secure said washers against bodily movements axially of said sleeve.

References Cited in the file of this patent

UNITED STATES PATENTS

2,037,895	Gugler	Apr. 21, 1936
2,279,677	Heinrich	Apr. 14, 1942
2,316,257	McLarn	Apr. 13, 1943
2,466,997	Morris	Apr. 12, 1949
2,648,883	Dupre	Aug. 18, 1953
2,688,651	Blake	Sept. 7, 1954
2,840,676	King	June 24, 1958
2,932,685	Raila et al.	Apr. 12, 1960

FOREIGN PATENTS

693,371	Great Britain	July 1, 1953

OTHER REFERENCES

Publication I, "Crimpit, Bulletin CR–57," published by Burndy Corporation, Norwalk, Conn., Aug. 1957 (page 12 relied on).