

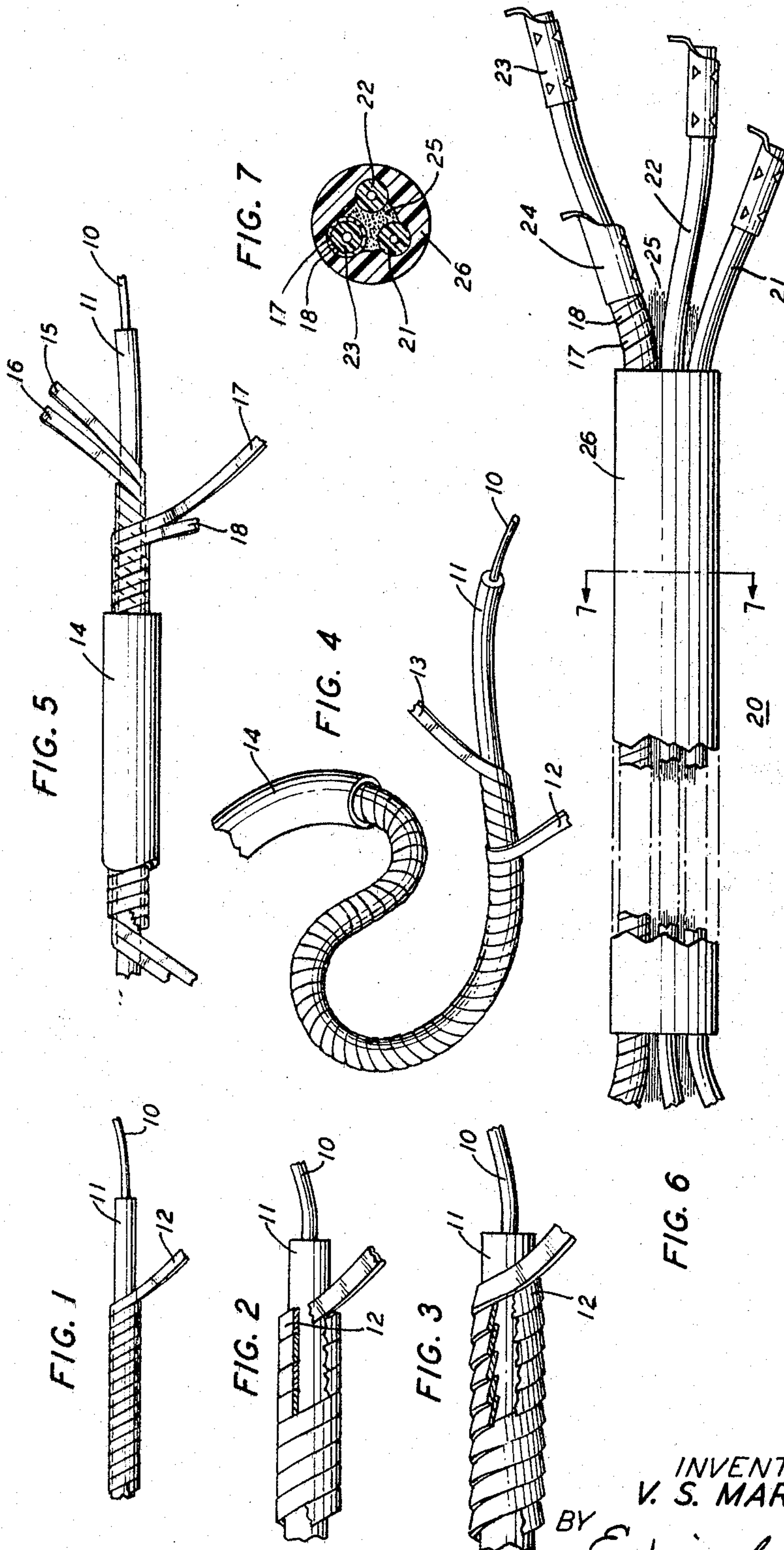
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TELEPHONE STATION CORD USING A TINSEL RIBBON SHIELD

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TELEPHONE STATION CORD USING A TINSEL RIBBON SHIELD

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This invention relates to electrical cord and particularly to lightweight shielded conductor cords.

Two-conductor cords in which one of the conductors is an overlay of woven or served wire upon an insulated second conductor are routinely employed whenever shielded cord is required. While adequate in strength, durability and shielding capacity for many applications, this type of shielding has certain intrinsic drawbacks which make it unsuitable for some purposes.

For example, if the shielded cord must be highly flexible, small in diameter and lightweight, a woven or braided shield structure is unsatisfactory because it is relatively stiff and bulky. When such a cord does undergo frequent flexing in use, the woven wire overlay becomes extremely self-abrasive. Eventually some of the wires shear apart reducing the shielding and conductor strength; and frequently after prolonged flexing the whole weave severs.

Additionally, where the shielding cover must be as near total as possible, woven shielding has the limitation that the interwire spaces cannot be entirely eliminated with even the tightest overlaying. The result is that some of the energy transmitted in the shielded wire is lost by radiation; and conversely radiant energy from without can enter.

One application requiring a light, flexible and durable small diameter totally shielded conductor cord is the connection between an operator's headset telephone and the line circuits. The operator headset described in the co-pending application of R. R. Kreisel-C. F. Mattke-R. E. Prescott, filed Nov. 18, 1965, Ser. No. 508,495 and assigned to applicant's assignee, for example, requires the lightest and most flexible cord possible, so as not to disturb the placement of the supportive insert in the operator's ear. This same cord, however, must include one shielded pair to transmit without degradation the weak signals from a miniature variable reluctance type microphone to a remote amplifier.

Accordingly, one object of the invention is to prolong the life of a shielded electric cord under conditions of repeated flexure.

A further object of the invention is to strengthen the electrical shielding qualities of shielded conductors and thereby substantially eliminate all stray electrostatic pick-up through the shielding.

A further object of the invention is to enhance the flexibility of electrical cords having shielded conductors, while at the same time lightening the cord.

These and other objects are achieved in accordance with the invention by a cord structure in which a helical serving of tinsel ribbon is used as a shield and conductor in place of the woven braided or served wire shield structure.

The tinsel ribbon employed normally is comprised of bronze, although other like materials are suitable; and advantageously is thoroughly tinned. Typically, the ribbon may be applied as one helical serving, two servings of opposite pitch overlaid one on the other, or two left-hand lays and two right-hand lays. Each tinned tinsel ribbon is normally about .0008" thick and .021" wide.

The invention finds application in a four-conductor telephone station cord in which one of three standard .042" O.D. polyvinyl chloride insulated conductors is shielded by a helical serving of four tinned bronze tinsel ribbons.

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Two of the ribbons are applied with a left-hand lay at 20 wraps per inch, and the other two ribbons are applied with a right-hand lay at 40 wraps per inch.

A prime feature of the invention, therefore, resides in the application of metallic tinsel ribbon serving over an insulated conductor for purposes of shielding and conduction.

In the drawing:

FIG. 1 shows schematically a single length of tinsel ribbon applied to an insulated conductor;

FIGS. 2 and 3 illustrate alternative tinsel ribbon wrappings;

FIG. 4 represents in perspective a double overlay of tinsel ribbon on an insulated conductor;

FIG. 5 shows a further form of ribbon overlay;

FIG. 6 is a schematic showing of a telephone station cord incorporating the invention; and

FIG. 7 is a cross-sectional view of the cord of FIG. 6.

In the several figures, like numerals designate the same elements.

FIG. 1 shows an electrical conductor 10 with an insulative jacket 11. Pursuant to the invention, an overlay 12 of tinsel ribbon conductor is applied around jacket 11. Adjacent turns of overlay 12 may be in edge contact with one another as shown in FIG. 2. Alternatively, adjacent turns of overlay 12 may be in partial overlapping relation as illustrated in FIG. 3. Optimum results have been achieved with tinsel ribbons with thickness not in excess of .001" and width not in excess of .025". The ribbon is formed advantageously of bronze, and the surface is tinned for the purpose of reducing tarnish and, thereby, improving surface contact between ribbons.

FIG. 4 shows an embodiment in which two separate overlays 12, 13, one atop the other, are applied in opposite directions to an insulated conductor. An extruded PVC jacket 14 is placed over the tinsel ribbon to assure the ribbons retain their alignment and for purposes of insulation.

A further embodiment of the inventive concept is depicted in FIG. 5. Here, a first pair 15, 16, of tinsel ribbons are applied in tandem with left-hand lay to jacket 11 of insulated conductor 10. A second pair 17, 18, of tinsel ribbons next are applied in tandem with a right-hand lay over the first pair 15, 16, of ribbons. An insulative jacket 14 normally is applied.

In each embodiment, the shielding fill factor achieved with the tinsel ribbon is very high because there are substantially no spaces between adjacent ribbons. Particularly in the double overlay structure of FIG. 4 and FIG. 5, the incidence of interribbon gaps are virtually nonoccurrent; and even during severe bending show up as pinholes at worst. With the partial overlay wrapping shown in FIG. 3, even these may be eliminated.

At the same time, the structures are very flexible. The ribbon overlays 12, 13, of FIG. 4, for example, slide easily upon one another during flexure. In contrast, the woven wire braids typical of prior shield structure wear against each other; their structure does not permit of sliding.

FIG. 6 shows a four-conductor telephone station cord utilizing the present inventive concept. This cord, designated as 20, comprises three insulated conductors 21, 22, 23, each with a suitable connector, and a helical serving of tinsel ribbon applied to one of them, i.e., conductor 23. This serving may be any of the several described configurations, but in FIG. 6 is shown as the configuration of FIG. 5. A connector 24, similar to the connectors of the other conductors, terminates the ribbon shielding (ribbons 17, 18, are shown) so that the shielding may be used also as the fourth conductor of cord 20. A conventional fiber filler 25 is included, and a jacket 26 of PVC is placed around the conductors. FIG. 7 shows in cross-section the resultant cord. Since the package of the three conductors

plus tinsel ribbon is less in diameter than one with a braided or served wire shield, a thicker outer jacket may be applied if desired. Studies of this construction have shown it to have more than five times the test life than a similar cord structure using a served wire shield.

It is to be understood expressly that the embodiments described are purely illustrative of the inventive concept and are not to be construed as limiting the spirit and scope of the claims to follow.

What is claimed is:

1. An electrical wire comprising: a compliant insulated conductor; a first pair of tinned bronze tinsel ribbon shielding conductors applied in tandem and helically in a first direction upon said insulated conductor; a second pair of tinned bronze tinsel ribbon shielding conductors applied in tandem and helically in a second direction upon said first ribbon pair, the inner edges of each respective ribbon pair being in abutting relation and the adjacent outer edges of each respective ribbon pair also being in abutting relation, said ribbon having a thickness not in excess of .001 inch and a width not in excess of .025 inch; and an outer insulative jacket enveloping said second ribbon pair.

2. A telephone station cord comprising: not more than three compliant individually insulated electrical conductors; a shield and conductive path in coaxial relation with a selected one of said insulated conductors comprising a tinned bronze tinsel ribbon helically applied to said selected conductor, the edges of adjacent turns of said ribbon being in abutting relation, said ribbon having a thickness not in excess of .001 inch and a width not in excess of .025 inch; terminal means connected to the ends of each conductor and to said tinsel ribbon; and an outer insulative jacket applied over said tinsel ribbon.

3. A telephone station cord comprising: not more than three compliant, individually insulated electrical conductors; a shield and conductive path in coaxial relation with a selected one of said insulated conductors comprising at least one tinned bronze tinsel ribbon helically applied around said selected conductor and at least one tinned bronze tinsel ribbon helically applied around said first ribbon in a lay opposite thereto, the adjacent edges of successive turns of each respective said ribbon being in

abutting relation, each said ribbon having a thickness not in excess of .001 inch and a width not in excess of .025 inch; terminal means connected to the ends of each said conductor and to said shield and conductive path; and an outer insulative jacket applied around said second ribbon.

4. A telephone station cord comprising: not more than three compliant individually insulated electrical conductors; a shield and conductive path in coaxial relation with a selected one of said insulated conductors comprising a first group of from two to three tinned bronze tinsel ribbons applied in tandem and helically in a first lay to said selected conductor and a second group of from two to three tinned bronze tinsel ribbons applied in tandem and helically in an opposite lay around said first group, the inner edges of the ribbons in each respective group being in abutting relation and the adjacent outer edges of each respective group also being in abutting relation, each said ribbon having a thickness not in excess of .001 inch and a width not in excess of .025 inch; terminal means connected to the ends of each said electrical conductor and to said shield and conductive path; and an outer insulative jacket applied around said second ribbon group.

5. A telephone station cord in accordance with claim 4, wherein one of said first and second ribbon groups is applied at substantially 20 wraps per inch and the other of said groups is applied at substantially 40 wraps per inch.

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