

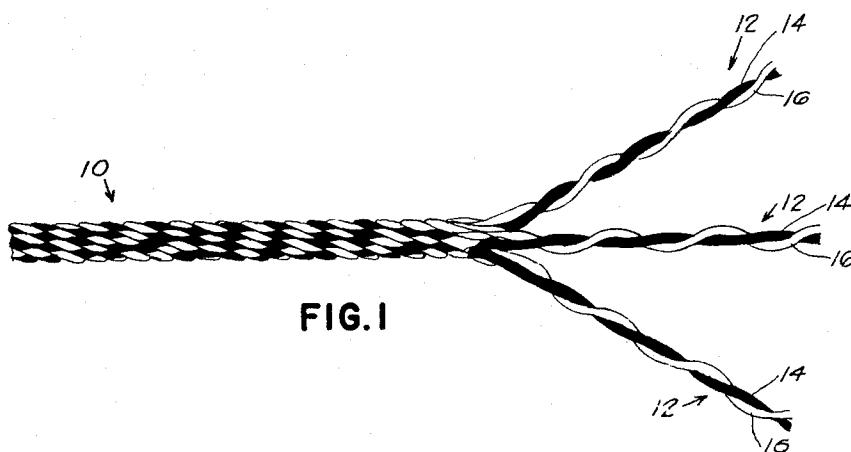
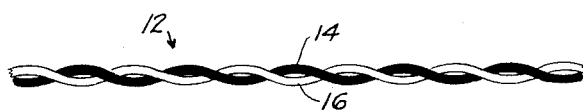
Sept. 21, 1965

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3,206,923

REINFORCED CONDUCTIVE YARN

Filed May 16, 1963



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3,206,923

REINFORCED CONDUCTIVE YARN

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Filed May 16, 1963, Ser. No. 280,915

1 Claim. (Cl. 57—140)

This invention relates to a conductive thread and more particularly to a reinforced conductive thread.

The invention has for an object to provide a novel and improved reinforced conductive thread having a tensile strength such as to be capable of being used in a sewing machine without breaking under longitudinal stress.

With this general object in view and such others as may hereinafter appear, the invention consists in the conductive thread as hereinafter described and particularly defined in the claim at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

FIG. 1 is an enlarged view of a reinforced conductive thread embodying the present invention; and

FIG. 2 is an enlarged view of a portion of the conductive thread shown in FIG. 1.

In general, the present invention contemplates a reinforced conductive thread having a tensile strength such as to be capable of being handled in a sewing machine without breaking and which is particularly adapted for sewing into fabric, leather or other non-conductive materials to provide a conductive path therein arranged to dissipate static electric charges. In practice the illustrated conductive thread may be used with particular advantage as an improved manner of providing a conductive path in footwear used in hazardous occupations, such as in hospital surgery, munitions factories, film processing or wherever explosive and inflammable products are made and which are subject to explosion or fire from static spark. In such hazardous occupation safety regulations require that the floors in the building be conductive and the occupants of the building are required to wear conductive footwear so that any charges of static electricity generated by friction by the occupant may pass harmlessly from his body through the conductive footwear and into the conductive floor.

Prior to the present invention the conductive materials generally used in such footwear comprised either a conductive rubber or a conductive vinyl material treated with carbon black. One disadvantage of such prior conductive materials for conductive footwear is that they have a tendency to leach or "bleed off" the carbon black in use. For example, such materials used in footwear would tend to soil the stockings of the wearer. Also, such materials tend to bleed off the carbon black when laundered.

In accordance with the present invention a conductive yarn, preferably a viscose rayon yarn treated with carbon black is used as the conducting element. In practice such treated material will not bleed off onto stockings or other wearing apparel, and will also retain safe conductivity after repeated launderings. However, it was found that such treated material is inherently of low tensile strength incapable of being handled in a sewing machine. In order to overcome this disadvantage such conductive strands of yarn are intertwined with non-conductive yarns, such as strands of cotton, nylon or other natural or synthetic fibers of a greater tensile strength than the treated viscose

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rayon so as to reinforce the latter to render it capable of being handled in a sewing machine.

Referring now to the drawings, 10 represents a preferred form of reinforced conductive thread prepared in accordance with the present invention and which is referred to in the art as "cabled thread." The illustrated cabled thread comprises three pairs of double strands of yarn twisted together, each pair of strands being indicated by the numeral 12. Each double strand of yarn includes a length of viscose rayon yarn 14 treated or impregnated with a carbon black to render it conductive and, further, includes a length of non-conductive yarn 16 comprising a reinforcing yarn having a relatively high tensile strength.

The conductive yarn 14 may be prepared by running a viscose rayon yarn through a vinyl carbon black solution. In practice it was found that a viscose rayon yarn appears to have an affinity for the carbon black solution so that the solution is readily absorbed by the viscose rayon yarn to an extent such that the carbon black becomes more or less fixed in the fibers whereby the carbon black will not rub off or bleed onto articles of clothing with which the yarn may come in contact. Further, it was found that such yarns treated with carbon black to render them conductive will withstand laundering without leaching or bleeding of the carbon black and without losing its conductive characteristics. The viscose rayon yarn thus treated is inherently of relatively low tensile strength.

The reinforcing yarn 16 may comprise any suitable untreated non-conductive yarn having a relatively high tensile strength. Such yarns may include relatively strong rayon, cotton, nylon and like yarns which may be twisted or intertwined with the carbon black conductive yarn to provide a two-thread reinforced conductive yarn 12 of relatively high tensile strength. Such two-thread yarn may then be twisted or spun with like two-thread yarns, as illustrated in FIG. 1, to provide a cabled thread capable of being handled in a sewing machine for the purpose of sewing a continuous conductive path or pattern into a fabric, leather or other non-conductive materials to render the same capable of dissipating static electric charges. It will be obvious that yarns of conductive and non-conductive fibers may be combined in other proportions to provide a conductive cabled thread of high tensile strength. The illustrated thread, for example, comprises a 2/3/300 denier yarn using 50% standard rayon and 50% carbon black yarn.

The use of conductive thread sewn into fabric or other material that can be sewn finds many advantages in the manufacture of conductive shoes, conductive shoe covers, conductive gowns for surgeons, draperies, mattress and pillow covers, machine covers and the like wherever it is desired to provide a conductive path for static electricity. It may be used with advantage in automobile seat covers to eliminate the static problem and as a conductor for electric circuits in radios and the like. In practice it has been found that high static producing materials, such as nylon and wool can be made safe to wear with no danger of static build-up when a conductive thread is sewn throughout the nylon or wool fabric and when such conductive thread is in contact with the body for safe dissipation of any static charge to a conductive floor.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood

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that the invention may be embodied in other forms within the scope of the following claim.

Having thus described the invention, what is claimed is:

A reinforced conductive thread for use in machine sewing comprising a plurality of double strand yarns twisted together to produce a cabled thread having a tensile strength such as to be capable of being handled in a sewing machine, each double strand yarn comprising a length of viscose rayon yarn treated with carbon black to render it conductive, and a length of reinforcing yarn, free of carbon black, twisted together with the conductive yarn.

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