July 9, 1946. G. H. FULLERTON ET AL 2,403,652

CORD-LIKE PRODUCT

Filed March 8, 1943

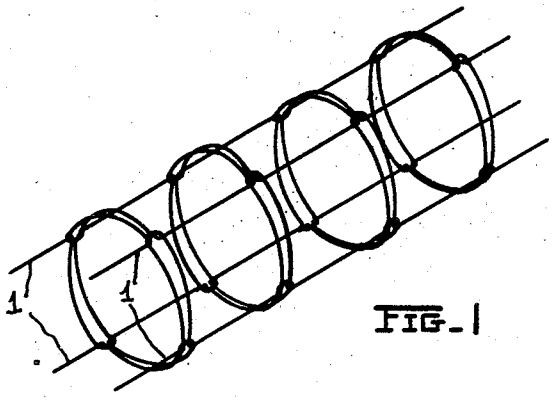


FIG. 1

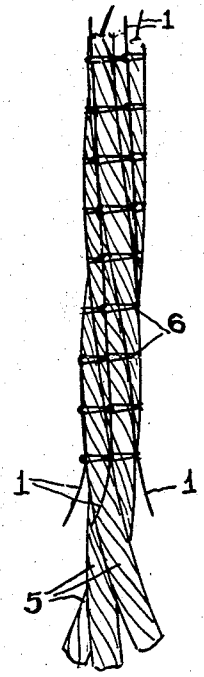


FIG. 4

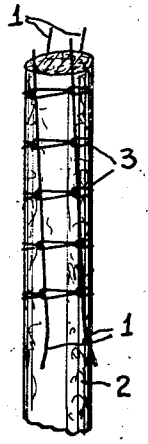


FIG. 3

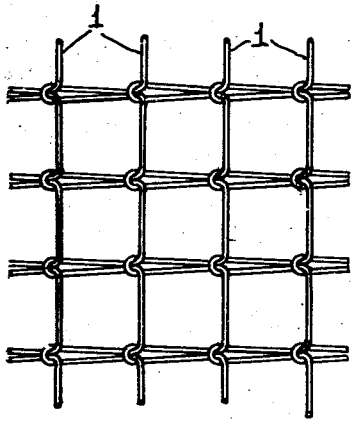


FIG. 2

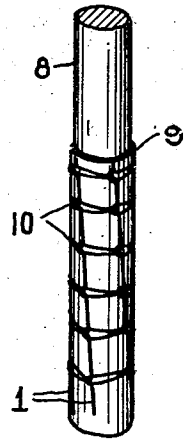


FIG. 5

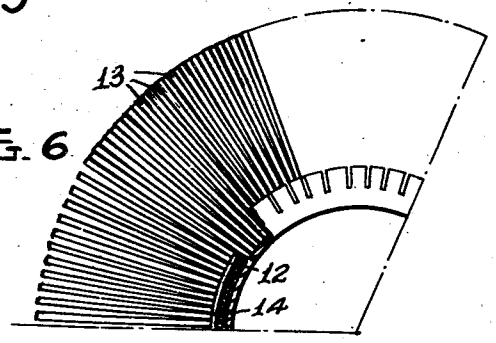


FIG. 6

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CORDLIKE PRODUCT

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6 Claims. (Cl. 66—190)

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The present invention in certain aspects may be regarded as an improvement on the cord-like product which forms the subject matter of our co-pending application Serial No. 412,008, filed September 23, 1941 (now Patent No. 2,316,060, dated April 6, 1943). In such previous product the individual cords comprised plural strands interlocked by stitching in free run-off condition, one such strand with each of the others, whereby the cords were rendered capable of longitudinal stretching and at the same time were non-ravelling at their ends. Such product is particularly adapted for and has found use as a material for brushes, such, for example, as rotary brushes. As described, cord of the type in question may be made by knitting the separate strands together or by using an overstitching or overcasting sewing machine such as is ordinarily employed in binding or selvaging the raw edge of a fabric. Stated in other words, the cord may be made by freely running off such stitching and this of course can be done quite expeditiously and inexpensively.

We have now discovered that by the same procedure cord of the type in question can be formed as a reticulated envelope around a longitudinally extending core and thus provide not only an improved cord-like product but a variety of other similar products capable of use in a number of different fields. Where, for example, it is desired to produce a material suitable for use in brushes, the core may consist of one or more ordinary twisted cords of fibrous or other material; these when enclosed in such an envelope, and particularly following impregnation of the whole by a suitable binder, will provide a highly useful and superior material for the indicated purpose.

To the accomplishment of the foregoing and related ends said invention then consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail several methods and products exemplifying our invention, such disclosed procedure and products constituting, however, but several of various applications of the principle of our invention.

In said annexed drawing:

Fig. 1 illustrates schematically one form of stitching adapted for use in making our present improved cord-like products;

Fig. 2 is a plan view of such stitching laid open to illustrate its reticulated character and the mutually interlocking relation of the component strands;

Fig. 3 illustrates one cord-like product which

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comprises a core made up of longitudinally extending fibrous material surrounded and bound together by a stitched envelope of the type illustrated in Fig. 1;

Fig. 4 illustrates another such product which comprises a core made up of a plurality of ordinary twisted cords surrounded and bound together by a stitched envelope of the type illustrated in Fig. 1;

Fig. 5 illustrates still another such product in which the core consists of a solid strand, for example a metal wire which is surrounded by stitching of the type illustrated in Fig. 1 in association with a coating of more or less plastic material; and

Fig. 6 is a partial elevation and partial section of a rotary brush wherein our improved cordlike product is utilized as the brush material.

It will be understood that the scale of the products and component parts shown in the foregoing figures has been somewhat exaggerated over the normal size thereof in order more clearly to illustrate the construction involved.

While, as indicated, the stitching employed in making the several forms of our improved cordlike product may be formed by knitting the component strands together or by using a sewing machine, it has been deemed sufficient for the present purpose to illustrate only one such form of stitching thus capable of being run off on a sewing machine. A number of such machine made stitches or stitchings suitable for the purpose in hand will be found in the U. S. Government Master Specifications of Stitches, Seams and Stitching, DDD–S–751. The principal characteristic which adapts such stitching for our present use is that it should comprise plural strands secured in mutually interlocking relation, and most, if not all, of the over edging style of stitches found in such government specifications will be suitable. The number of threads or strands thus interlocked together will desirably be more than two, four strands 1 being illustrated in Figs. 1 and 2. The particular type of interlock illustrated in said figure is that designated as stitch type 505 in the aforesaid government specifications.

However, it will be understood that the number of component threads or strands may be varied depending upon the diameter of the reticulated envelope desired, and other forms of interlock between such threads or strands may be employed so long as the envelope is rendered non-ravelling at its ends.

The particular product illustrated in Fig. 3 is a

cord of more or less soft and compressible nature such as is used in upholstery. The core 2 comprises a mass of loosely compacted longitudinally extending fibers which are enclosed and bound together into general cylindrical form by having stitching of the type described above directly applied therearound. This is accomplished by passing such core through a sewing, or equivalent machine designed to make the particular type of stitching, such machine being modified as required to adapt the same to the size of the core being operated upon; also, so that the component loops comprising the stitching will be balanced. As a result a reticulated envelope 3 is formed which will fit the core more or less tightly depending upon the tension at which the component threads or strands are held in the stitching operation. The resulting product is a so-called binding cord which will serve the same purpose as the present type of cord in which fibrous material is enclosed in a braided envelope. The stitching operation, however, will obviously be much more rapid and inexpensive than braiding, and this will be equally true where the strands are interlocked by any non-ravelling kind of knitting around the core. Moreover, with either such form of envelope, a non-ravelling product is obtained.

The particular product illustrated in Fig. 4 is designed more particularly for use as a brush material, i. e. as a substitute for twisted or braided cords and various naturally occurring materials such as tampico, for use in the manufacture of mops and brushes, including brushes designed for industrial purposes such as cleaning, polishing, and the like. For this product the core comprises one or more (three as illustrated) ordinary twisted cords 5 of fibrous other material which are laid alongside each other and then enclosed in a directly applied stitched envelope 6 similar to envelope 3 in the first described product. As a result of being thus bound together the normal tendency of the twisted cords 5 to unravel at their exposed ends will be greatly reduced owing to the non-raveling characteristic of such envelope. In other words, as shown at the upper end of Fig. 4, the ends of said cords 5 will be free to untwist only as the envelope is worn down in use. Actually there will be no consequential untwisting whatever of the cords 5 either as among themselves or as to the twisted strands whereof they are independently composed. The appearance of the wearing ends of our improved cord-like product where they constitute the elements of a brush body will be substantially as shown at the upper end of Fig. 4 rather than at the lower end where for the purpose of better showing the construction a section of the reticulated envelope has been removed and the cords 5 untwisted from the position which they would normally occupy if encased by such envelope with nonravelling end.

Where designed for use as a brush material, this cord-like product will be desirably impregnated as a whole with a binding material such as glue or the like, carrying a finely ground abrasive material, for example emery dust. To insure uniform dissemination of such binder and abrading material, if the latter is used, the component cords 5 may be separately impregnated before they are brought together and enclosed in the envelope 6; then the completely assembled cord may be subjected to a further impregnation or at least coated with such binding material. It has been noted that a binder such as glue thus applied to the assembled cord tends to collect along the individual strands or threads comprised in the stitched-on reticulated envelope so that the latter is not only firmly bound to the core but is itself indurated to a high degree.

Where a cord product as just described is utilized as a brush material, a plurality of strands comprising a core of twisted fibrous material with reticulated envelope will be assembled in the usual manner depending upon the particular type of brush which is to be made therefrom. Thus, as illustrated in our aforesaid Patent No. 2,316,060, in the case of a rotary brush the cords which compose the brush material may be retained in place on a suitable annulus by means of a wire or the like around which lengths of such cord are looped or doubled. The particular manner in which the cord will be secured in a mop head or hand brush will be equally obvious to those familiar with the brush making art.

The remaining adapation of our invention illustrated in Fig. 5 comprises a solid core 8 which, for example, may be a wire designed for use as an electrical conductor where an insulating coating is required. Such coating 9, consisting of any of the well known plastic or semi-plastic materials suited to the purpose will be applied in the usual way either by dipping or by extrusion, and a reticulated envelope 10 then stitched over just as before. The component threads or strands of the envelope may be thus stitched on under conditions which will embed them more or less completely in the coating 9, and if desired a further protective coating (not shown) may be applied so as to completely cover such envelope. The manner in which a cord-like product as described above may be utilized in the construction of a brush, specifically a rotary brush, is illustrated in Fig. 6. It will be understood, however, that such product may be equally well utilized as brush material in other types of brushes. In the illustrative rotary brush an annulus 12 of metal is used as the seat for the separate cords 13 which may comprise doubled lengths of the cord-like product shown in any of the preceding figures, but particularly the product such as shown in Fig. 4, such doubled cord lengths being retained in place by a wire 14.

Various other adaptations of our improved cord-like product may be made by substituting still other core materials for those respectively illustrated in Figs. 3, 4 and 5 and by variously treating such materials. In all cases an envelope applied to the core by stitching or knitting in the manner explained presents the advantage over braided and other types of sheathing in that such envelope, composed of mutually interlocking strands, can be applied directly by a sewing machine of the type described, or by a knitting machine, which is much easier to operate than any braiding machine and is also comparatively rapid and inexpensive to operate.

As indicated above, the twisted cord or cords employed in the form of our improved product illustrated in Fig. 4 need not necessarily be of fibrous material; for example, they may be composed of fine metallic strands, i. e. be twisted wire cords. Likewise, the strands comprising the envelope may be of metal in this as well as the other illustrated forms of our product.

It will be understood that the term "stitching" as employed in the following claims connotes either of the several methods hereinbefore described for interlocking plural strands in free run-off condition, one such strand with each of

the others, to produce a cord-like product capable of longitudinal stretching and at the same time non-ravelling at its end.

Other modes of applying the principle of our invention may be employed instead of the one explained, change being made as regards the product and method herein disclosed, provided the step or steps stated by any of the following claims or the equivalent of such stated step or steps be employed.

We therefore particularly point out and distinctly claim as our invention:

1. In a brush component, the combination with a suitable base, of a plurality of cords secured thereto and having freely extending ends, the individual cords comprising a longitudinally extending core of fibrous material, and a reticulated envelope therefor, said envelope comprising plural strands stitched in mutually interlocking relation around said core and being non-ravelling at its ends.

2. In a brush component, the combination with a suitable base, of a plurality of cords secured thereto and having freely extending ends, the individual cords comprising a longitudinally extending core of twisted fibrous material and a reticulated envelope therefor, said envelope comprising plural strands stitched in mutually interlocking relation around said core and being non-ravelling at its ends.

3. In a brush component, the combination with a suitable base, of a plurality of cords secured thereto and having freely extending ends, the individual cords comprising a longitudinally extending core of fibrous material in the form of

plural, aligned twisted cords, and a reticulated envelope for said core, said envelope comprising plural strands stitched in mutually interlocking relation around said core and being non-ravelling at its ends.

4. In a brush component, the combination with a suitable base, of a plurality of cords secured thereto and having freely extending ends, the individual cords comprising a longitudinally extending core of fibrous material, and a reticulated envelope therefor, said envelope comprising plural strands stitched in mutually interlocking relation around said core, and said product as a whole being impregnated with a binding material.

5. In a product of the character described, the combination of a longitudinally extending core of fibrous material, and a reticulated envelope therefor, said envelope comprising plural strands stitched in mutually interlocking relation around said core, and said product as a whole being impregnated with a binding material carrying an abrasive material.

6. Material for brushes and the like made up of a body of cord-like elements, the individual elements comprising a longitudinally extending core of twisted fibrous material and a reticulated envelope therefor, said envelope comprising plural strands of stitching in mutually interlocking relation around said core and said element as a whole being impregnated with a binding material carrying an abrasive material.

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