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ELASTIC STRAND

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Fig. 1.

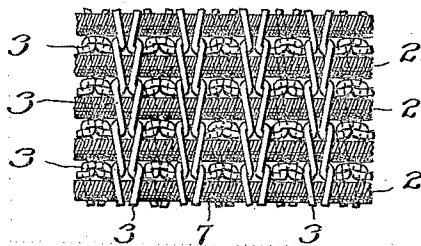


Fig. 2.

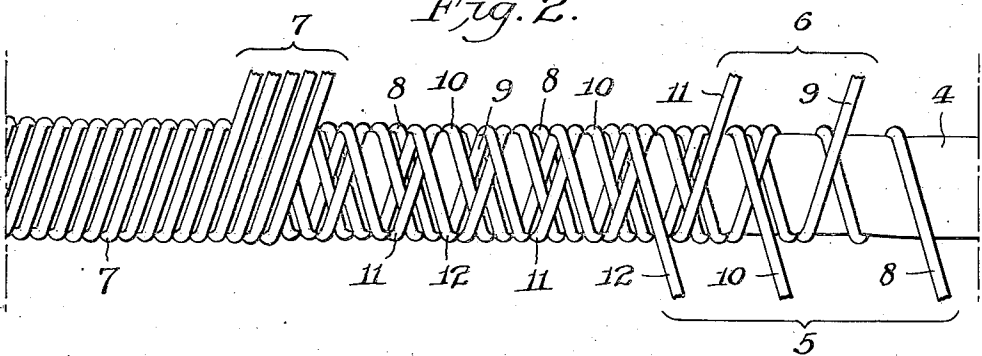
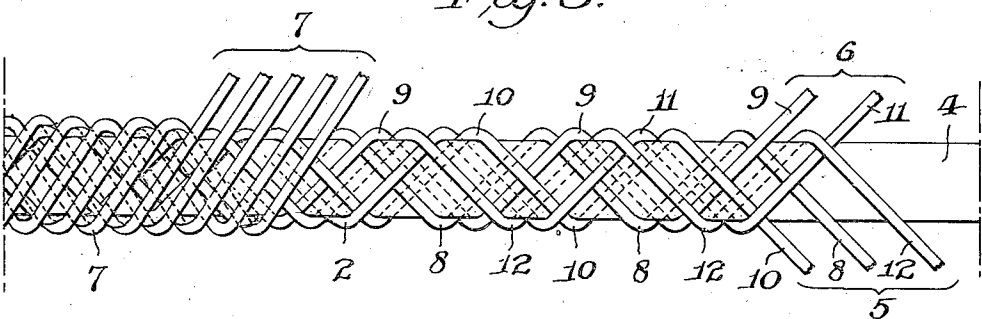


Fig. 3.



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ELASTIC STRAND

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This invention relates to improvements in elastic fabrics of the character employed in the manufacture of wearing apparel and surgical appliances and comprising elastic strands formed of covered rubber and arranged side by side and held in place by cooperating binding threads, the elastic strands being enclosed in pockets formed between adjacent binding threads in a manner to permit the fabrics in their entireties to be stretched in directions longitudinally of their elastic strands.

The rubber cores of the elastic strands employed in such fabrics have been retained therein in a condition stretched longitudinally from their normal lengths before being covered and they have been held in such stretched condition by the coverings enclosing the same independently of the binding threads of the fabric. Even though the coverings of the rubber cores hold them in a stretched condition in the fabric of which they form a part the stretched condition in which they are thus held is far from the limit to which they may be stretched when the elastic fabric is stretched from its normal condition, and the limit to which the elastic fabric as a whole may be stretched is well within the limit to which the elastic strands could be stretched in the absence of the binding threads.

When pieces of fabrics of the character above described are sewed together or sewed to pieces of other materials, it frequently happens that the needle used in the sewing operation penetrates some of the rubber cores of the elastic strands, sometimes leaving the sewing thread extending through the cores and sometimes merely leaving holes or broken edge portions in the cores; and the frequent stretching and release of the elastic fabric of the article of wearing apparel or the surgical appliance containing the rubber cores thus impaired causes them to break. After the cores have been thus broken the character of the coverings thereof has been such as to permit the tendency of the cores to resume their normal lengths and to cause them to readily recede from the points of breakage not only through the pockets containing them and

formed by the binding threads but also through the coverings of the cores, during the continued stretching and release of the elastic fabric; and this continued stretching and release of the fabric has caused the end portions of the cores resulting from the breaking thereof to protrude from within the main body of the fabric, thereby not only impairing the efficiency of the article or appliance, but also rendering it rough and unsightly.

The object of my invention is to overcome the aforesaid objection, by the provision of an elastic strand provided with a rubber core having a novel covering and by combining the core and the novel covering thereof with other elements of the fabric to form a product in which the extent of the recession of the covered rubber cores from the points of breakage will be greatly reduced or entirely eliminated, thereby greatly reducing the number and size of the protruding end portions of broken rubber cores, or eliminating them entirely from the fabric.

The invention resides in the novel fabric and in the novel elements thereof hereinafter described and claimed.

In the accompanying drawing, illustrating my invention,

Figure 1 is a front view of a piece of elastic fabric, enlarged, embodying my invention.

Figure 2 is a side view of a part of one of the elastic strands of the fabric, greatly enlarged, showing certain portions of the covering threads unwrapped from the core and broken.

Figure 3 is a side view of a part of one of the elastic strands, greatly enlarged, showing the core thereof stretched to the condition thereof when the covering threads are applied thereto and showing certain portions of the covering strands applied thereto unwrapped therefrom and broken.

Referring to the drawing, the elastic fabric comprises elastic strands 2, arranged side by side, and cooperating binding threads 3. The strands 2 are bound within the fabric and held in place in their side by side relationship therein by the binding threads 3 which, as herein illustrated, are knitted together, forming a network extending

throughout the fabric and enclosing the strands 2 in pockets formed by and between the loops of the adjacent binding threads.

The fabric as thus far described may be produced by the aid of either a straight knitting machine or a circular knitting machine in the usual manner well known in this art.

Each elastic strand 2 comprises a central strand or core 4 of rubber, a set of threads 5 wrapped spirally around the core, a set of threads 6 wrapped spirally around the core reversely of the threads of the first named set and in alternate succession with relation thereto, and a plurality of other threads 7 wrapped spirally in the same direction around the core 4 and the two sets of threads 5 and 6 thereon.

In the present embodiment of my invention there are three threads in the set 5, two threads in the set 6 and five threads in the plurality of outer threads.

The core 4 of each strand 2 is stretched longitudinally beyond the normal length thereof before the application of the sets of threads 5, 6 and 7 thereto, and it is prevented from returning to such normal length by said threads and particularly by the two sets of threads 5 and 6.

In producing each elastic strand 2, the rubber core 4 thereof is stretched longitudinally to a length equal to about five times its normal length, and while it is held in this stretched condition the sets of threads 5, 6 and 7 are applied thereto as shown in Fig. 3. When the core 4 is released from the stretched condition shown in Fig. 3, after the application of the threads, the core 4 contracts longitudinally and expands transversely and returns to a length which is equal to somewhat less than three times its normal length as shown in Fig. 2, and, in this condition, its further return to its normal length is prevented by the sets of threads 5, 6 and 7 but almost wholly by the two sets of threads 5 and 6.

In applying the three sets of threads 5, 6 and 7 to the rubber core 4 of each strand 2, while the core is held in a condition stretched to about five times its normal length as shown in Fig. 3, the innermost thread 8 of the set of threads 5 is first wrapped spirally around the bare core 4, the innermost thread 9 of the other set of threads 6 is then wrapped around the core 4 and the innermost thread 8 thereon reversely of the last named thread, the thread 10 next to the innermost thread 8 of the same set 5 thereof is then wrapped spirally around the core 4 and the innermost threads 8 and 9 of the two sets of threads 5 and 6, reversely of the thread 9 immediately preceding it, the thread 11 next to the innermost thread 9 of the same set 6 thereof is then wrapped spirally around the core 4 and the threads previously wrapped

thereon, reversely of the thread 10 immediately preceding it, and thereafter the thread 12 of the set 6 is wrapped spirally around the core 4 and the threads previously wrapped thereon reversely of the thread 11 immediately preceding it; and finally the plurality of threads 7 are, in parallel relationship, wrapped spirally around the core and the threads of the two sets of threads 5 and 6 previously wrapped thereon, reversely of the last preceding thread 12.

After the three sets of threads 5, 6 and 7, have been applied to the core 4, as above described, for the production of each strand 2, the entire strand is released and permitted to contract longitudinally to the condition shown in Figs. 1 and 2.

In effect the set of threads 6 contains three threads, because it will be understood that one of the threads of the set 7 may be regarded as belonging to the set 6, following the outermost thread 12 of the set 5 in being wrapped around the core 4 and the threads previously wrapped around the same and reversely of the thread 12.

The threads of the three sets 5, 6 and 7 may be formed of cotton or other suitable material.

The threads of the set 7, five in number as herein illustrated, of each elastic strand 2, are wrapped around the core 4 and the set of threads 5 and 6 thereon in the same direction, and, in the normal condition of the entire elastic strand 2, the convolutions of the threads of the set 7 are held in close relationship and provide a relatively smooth and even exterior surface for the elastic strand.

I have discovered that when pieces of fabric made in accordance with my invention, as hereinbefore described, are sewed together or to pieces of other fabric in the manufacture of articles of wearing apparel and surgical appliances, and such articles and appliances are in service, and one or more of the rubber cores of the elastic strands of the fabric are broken, the extent of the recession of the end portions of the broken cores from the points of breakage will be greatly reduced as compared with elastic strands having covered rubber cores as now generally employed in elastic fabrics, and consequently the number and size of the objectionable end portions of the rubber cores of the elastic strands of the fabric which protrude therefrom as a result of broken cores will be greatly reduced.

I have also discovered that the sets of covering threads for the cores of the elastic strands related as hereinbefore described, will prevent the end portions of the cores from receding through the covering threads and the covering threads from being easily disturbed from their binding positions on the cores when either the cores or threads or both are cut or broken.

I claim—

1. An elastic strand comprising a rubber core and two sets of covering threads thereon, the threads of each set being wrapped spirally around the core in alternatesuccession with and reversely of the threads of the other set, said threads having been applied to said core when it was stretched to at least four times its normal length when uncovered, and said threads maintaining said core stretched to at least two times said normal length.

2. An elastic strand comprising a rubber core, an outer covering therefor, and a plurality of threads inwardly of said covering and wrapped spirally around said core in alternately reversed directions, said threads having been applied to said core when it was stretched to at least four times its normal length when uncovered, and said threads maintaining said core stretched to at least two times said normal length.

3. An elastic strand comprising a rubber core, an outer covering therefor, and a plurality of threads inwardly of said covering and wrapped spirally around said core in alternately reversed directions, said threads having been applied to said core when it was stretched to at least four times its normal length when uncovered, and each convolution of each of said threads extending longitudinally of said core a distance less than the diameter of the core when the strand is in normal condition and preventing the return of the core to its normal length when uncovered and unstretched.

In testimony whereof I affix my signature.
WILLIAM J. FOX.