

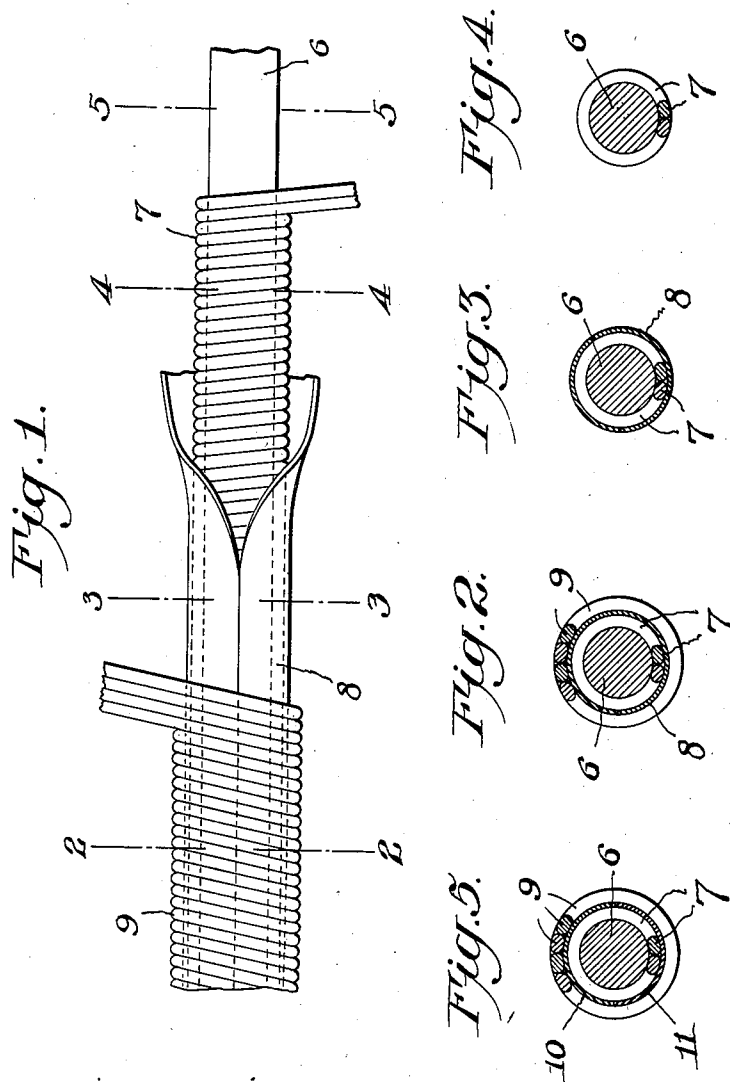
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ELASTIC STRAND

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ELASTIC STRAND

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This invention relates to improvements in elastic strands for use in the manufacture of elastic fabrics of the character employed in the manufacture of articles of wearing apparel and surgical appliances.

Such strands comprise elastic, stretchable rubber confined within surrounding covering threads which extend spirally around the rubber in a manner to permit the strand as a whole to be stretched longitudinally and to return to its condition before it was stretched.

The elastic fabrics in which such strands are used comprise the strands and binding threads therefor, the strands being arranged side by side and the binding threads cooperating with the strands to form the fabrics and retain the strands therein in a manner to permit the fabrics in their entireties to be stretched in directions longitudinally of the strands.

When the elastic fabrics are subjected to sewing operations it frequently happens that the sewing needle penetrates the rubber of some of the strands, leaving holes or broken edges therein, and, at times, leaving the sewing thread extending through the rubber; and when any or all of these things occur they often cause breakage in the impaired rubber of the strands, under the frequent stretching and releasing of the fabric, and thereby cause impairment and deterioration in the fabric.

The object of the invention is to provide an elastic strand of novel and advantageous construction wherein low manufacturing costs are combined with efficiency in the normal operations of the strands, and wherein the impairment of the strands and the fabrics, from the causes above referred to, and the detrimental effects resulting therefrom, are reduced to a minimum.

The invention resides in the elements and the combinations of them in the improved strand, as will be hereinafter described and claimed.

In the accompanying drawing, illustrating the invention,

Figure 1 is a side view of an elastic strand, greatly enlarged, constructed in accordance with the invention, showing at the line 2-2 the appearance of the complete strand, showing at the line 3-3 the appearance of the strand, exposing one of the rubber elements, after the removal of the outer covering threads therefrom, showing at the line 4-4 the appearance of the strand, exposing the inner covering threads, after the removal of the outer covering threads and the rubber element exposed at the line 3-3, and showing at the line 5-5 the inner rubber element after the

removal therefrom of the threads and rubber element previously referred to.

Figures 2, 3 and 4 are transverse sections through the strand and parts thereof, on lines 2-2, 3-3 and 4-4, respectively, of Fig. 1.

Figure 5 is transverse section through a modified form of the strand.

Referring to the drawing, the form of embodiment of the invention in the strand therein illustrated comprises an inner rubber element or core 6, inner covering threads 7 surrounding the core 6, a rubber element 8 outwardly of the threads 7, and outer covering threads 9 surrounding the element 8, the threads 7 and the core 6.

The inner rubber element or core 6 is characterized by being elastic and stretchable; it may be of any known and approved quality, manufactured in any approved manner; and it may be of any desired form in cross section. When the inner cores are manufactured by being cut from sheets of rubber, the cores will be normally square in cross section but they will be deformed into substantially round cross section by the covering threads which surround them.

The covering threads 7 may be of cotton or other suitable material employed in this art for covering purposes. Usually a plurality of threads is employed in a covering, and they are wrapped spirally around the core by the well known means employed in this art for the purpose. As herein illustrated, two threads are employed for the inner covering for the core 6, and these threads are wrapped around the core in close, laterally adjacent relationship.

The rubber element 8 has the characteristics of being elastic and stretchable, and, in its normal condition, it is in the form of a flat ribbon of a suitable width to enable it to be deformed transversely in a manner to cause it to embrace and substantially surround the inner core 6 and the covering threads 7 thereon, as clearly shown in Figs. 1, 2 and 3 of the drawing.

The outer covering threads 9 may be of the same material as the threads 7 or of other suitable material, and a plurality of these threads, four in number, is employed in the covering. These threads 9 are wrapped spirally around the rubber element or ribbon 8 in close, laterally adjacent relationship and reversely of the inner threads 7 and they bind and hold the element 8 in place between the inner and outer sets of threads 7 and 9, respectively.

In producing the strand herein illustrated, the threads 7 are applied to the core 6, the ribbon 8 is applied to the threads 7 and the threads 9 are

applied to the ribbon 8, in the order named, in a continuous operation, while the rubber elements are maintained in a stretched condition, in accordance with the character of the rubber elements, and in accordance with the result desired in the finished strand. The threads 7 and 9 are each applied by the usual means employed in this art for covering rubber; and, when the outer covering threads 9 are applied, they automatically form the normally flat ribbon 8 around the inner threads 7 previously applied to the core 6. After the application of the threads 7 and 9, and the release of the rubber elements 6 and 8, such elements contract longitudinally and expand transversely to some extent and until they are stopped by the surrounding threads 7 and 9 which then hold or retain them in a stretched condition; and, while the threads 7 and 9 hold the elements 6 and 8 in a stretched condition, such condition is far from the limit to which the elements may be stretched. The greater the extent to which the threads hold the enclosed rubber elements stretched, the greater will be the resistance of the elements to further stretching when the complete strand is stretched, and, therefore, it will be understood, that the stretch resisting characteristics of the rubber elements will determine the extent to which it will be necessary for the covering threads to maintain them stretched from their normal lengths, to provide the desired stretch resistance in the complete strand.

The development in the rubber art has been such that rubber elements for use in elastic strands in this art are now obtainable which have sufficient resistance to being stretched from the normal lengths thereof as not to be required to be held by the covering threads in a stretched condition at all or stretched only to a very little or limited extent, and one or more of the rubber elements of my improved strand may be formed of rubber having such or similar resistance.

The expense in obtaining rubber elements for use in elastic strands in this art varies with the form thereof and the resistance thereof to stretching, and, usually, the expense is greater in the flat or ribbon form and in the greater resistance to stretching regardless of the form.

My aim is to accomplish the object of my invention by obtaining the desired results in the strand, while keeping the expense of manufacturing the same well within the bounds of economy. To this end, I have obtained good results in the form of embodiment of the invention herein illustrated, and by the use therein of a rubber core 6, which may be formed by cutting it from a sheet of flat rubber, and which is of a character that requires it to be so stretched, when the covering threads 7 and 9 are applied, that the two threads, combinedly, will hold the core stretched to several times its normal length; and by the use therein of the rubber element 8 in ribbon form, which may be manufactured under the known methods in the rubber art, and which is of a character that requires it to be so stretched when the covering threads 9 are applied thereto that such threads will hold the element 8 stretched from its normal length, and that such normal length will be substantially equal to the length to which the inner covering threads 7 alone hold the core 6 stretched from its normal length. In other words, the covering threads 7 and 9 combinedly hold the core 6 stretched from its normal length, and, when the outer threads 9 are removed from the strand, the core 6 will contract or shorten to some extent

but not to its normal length, and the normal length of the rubber ribbon 8 will be substantially equal to the length of the core 6, after the removal of the outer threads 9 from the strand.

This relationship of the rubber elements and the covering threads of the strand prevents the formation of kinks in the complete strand by a greater pull of the rubber ribbon 8 on one side of the strand than on the opposite side thereof in the normal or unstretched condition of the strand.

In the modification shown in Fig. 5, I employ two rubber ribbons 10, 11 in lieu of the single ribbon 8, shown in the other figures of the drawing, and I arrange the two ribbons 10, 11 on opposite sides of the strand and deform them transversely so that they will embrace opposite sides of the covering threads 7 and the core 6 therein, and bring their longitudinal edges into close relationship so that together they will substantially surround the inner covering threads 7. In this construction the ribbons 10, 11 will exert the same pull on opposite sides of the strand, and there will be no tendency to kink the same even though the ribbons 10, 11 do not bear the same relation to the other parts of the strand as that borne by the single ribbon 8 to avoid kinking, as above pointed out.

While I have herein shown and described my invention in a desirable and practical form, I desire it to be understood that I do not limit myself to such form and that the same may be modified in many directions within the actual scope of the invention.

I claim:

1. An elastic fabric strand comprising a rubber core, inner covering threads surrounding the core, outer covering threads surrounding the inner threads, and a flat strip of rubber extending longitudinally of the strand between said inner threads and said outer threads, said strip being transversely deformed by said outer covering threads and embracing said core and said inner threads.

2. An elastic fabric strand comprising a rubber core, inner covering threads surrounding the core, outer covering threads surrounding the inner threads, and a flat strip of rubber extending longitudinally of the strand between said inner threads and said outer threads and substantially surrounding said core and said inner threads.

3. An elastic fabric strand comprising a rubber core, two sets of covering threads extending spirally around the core in reverse directions, and a flat strip of rubber extending longitudinally of the strand between said sets of threads and substantially surrounding the inner set and the core surrounded thereby.

4. An elastic fabric strand comprising a rubber core, inner covering threads surrounding the core, outer covering threads surrounding the inner threads, and a plurality of flat strips of rubber extending longitudinally of the strand between said inner threads and said outer threads, said strips being transversely deformed by said outer covering threads and embracing said core and said inner threads.

5. An elastic fabric strand comprising a rubber core, inner covering threads surrounding the core, outer covering threads surrounding the inner threads, a flat strip of rubber extending longitudinally of the strand between said inner threads and said outer threads at one side of said core, and a flat strip of rubber extending longitudinally of the strand between said inner threads

and said outer threads at the opposite side of said core.

6. An elastic fabric strand comprising a flat strip of rubber extending longitudinally of the strand, a companion rubber element extending longitudinally of the strand, and covering threads surrounding said strip and said element and transversely deforming said strip into embracing relation with said element.

7. An elastic fabric strand comprising a rubber core, inner covering threads surrounding the core, outer covering threads surrounding the inner threads, a flat strip of rubber extending longitudinally of the strand between said inner threads and said outer threads, said threads having been applied to said core when it was stretched beyond its normal length, said inner threads preventing the return of said core to its normal length, said outer threads having been applied to said strip when it was stretched beyond its normal length, and said outer threads preventing the return of said strip to its normal length.

8. An elastic fabric strand comprising two stretchable, elastic elements extending longitudinally of the strand; covering threads surrounding said elements and maintaining them each stretched longitudinally to a length greater than the normal length thereof; one of said elements being maintained by said threads stretched from its normal length to a greater extent than the other of said elements is so maintained.

9. An elastic fabric strand comprising a stretchable, elastic rubber core extending longitudinally of the strand; a stretchable, elastic rubber ribbon extending longitudinally of the strand; covering threads surrounding said core and said ribbon and transversely deforming the ribbon into embracing relation with said core and maintaining said core and said ribbon each stretched longitudinally to a length greater than the normal length thereof; said core being maintained by said threads stretched from its normal length to a greater extent than said ribbon is so maintained.

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