

April 12, 1932.

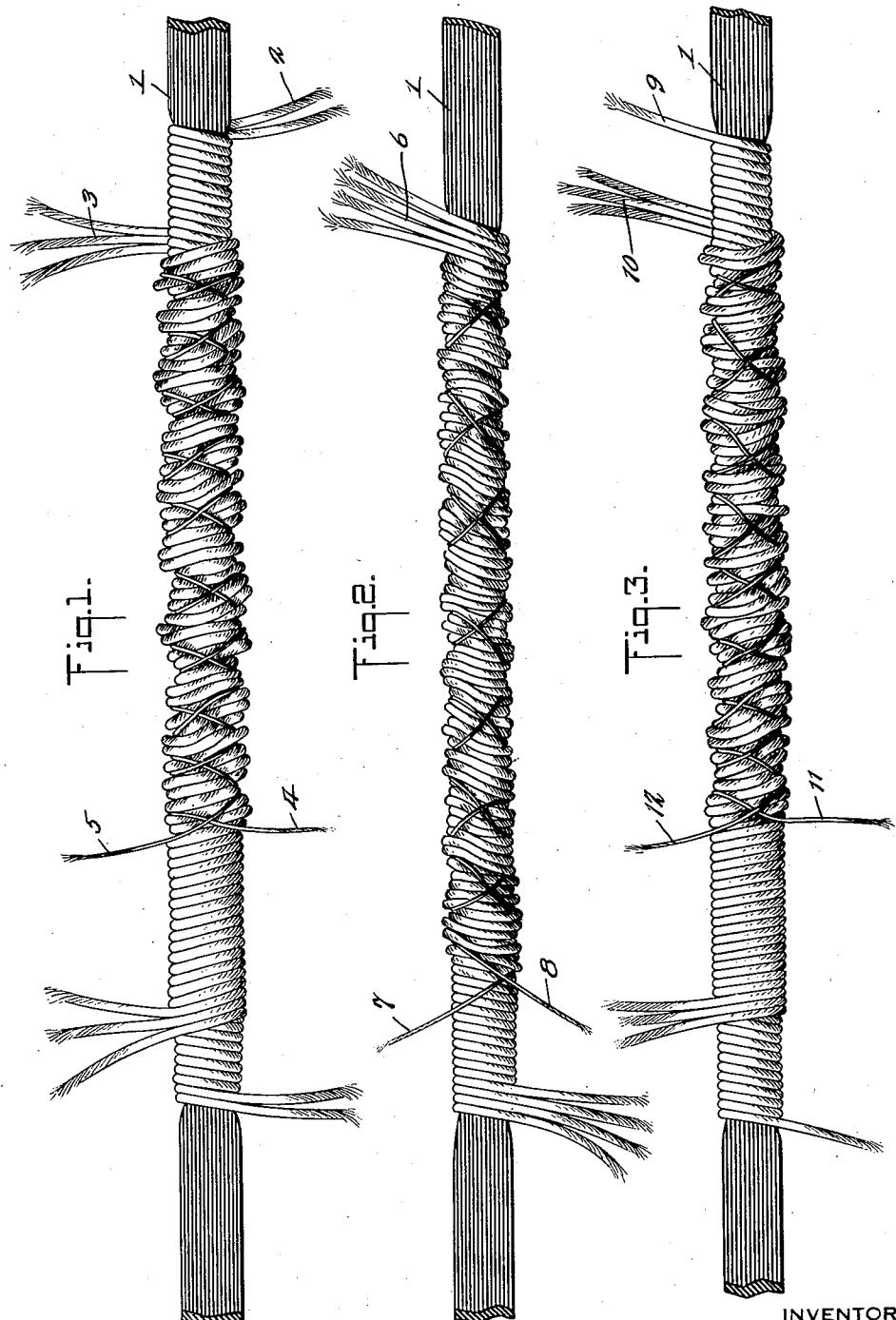
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ELASTIC FABRIC

Filed June 17, 1931

2 Sheets-Sheet 1



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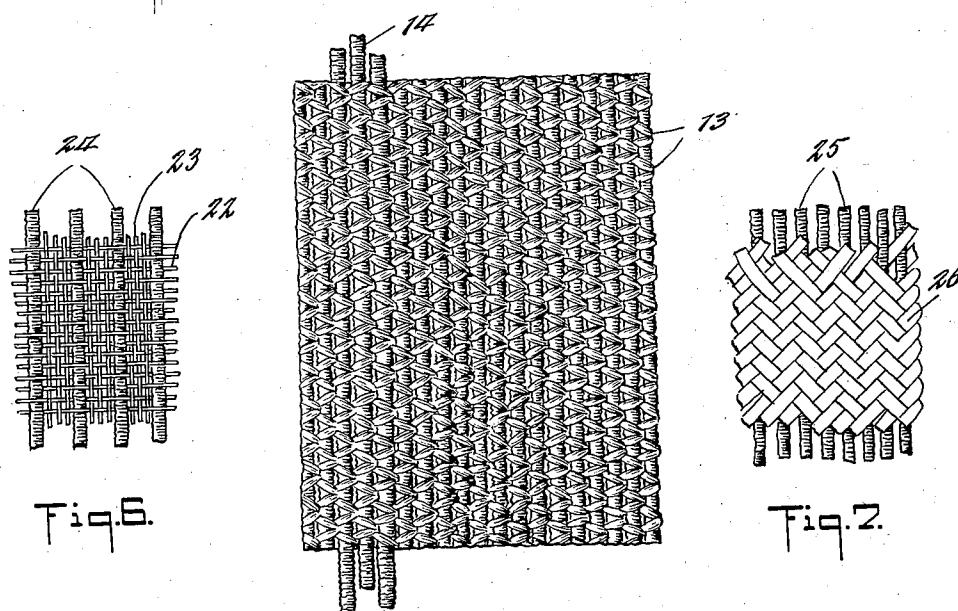
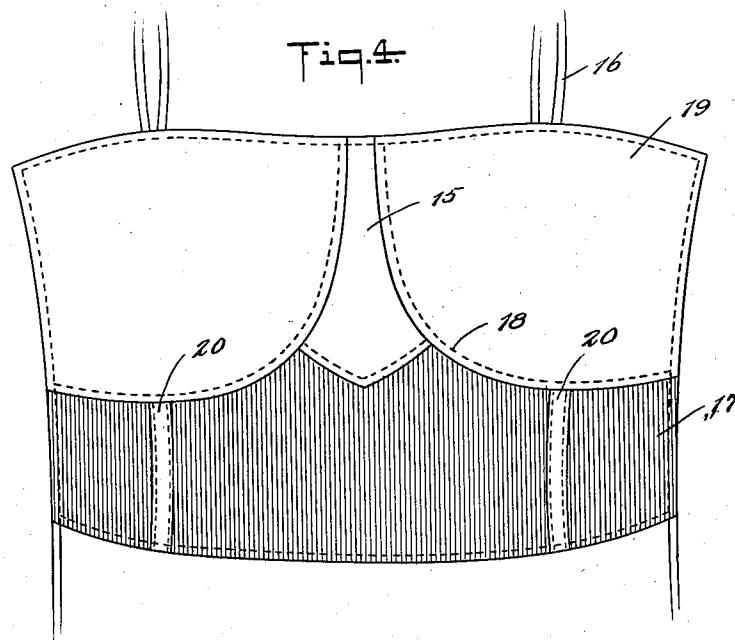


Fig. 5.

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## UNITED STATES PATENT OFFICE

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## ELASTIC FABRIC

Application filed June 17, 1931. Serial No. 545,011.

This invention relates to elastic knitted, woven or braided fabrics such as are used in corsets, reducing garments, garters, supporters, stockings with elastic tops, and a variety of other articles in which bands of elastic material enter the construction in one way or another.

The principal object of the invention is to provide an elastic fabric of uniform texture having a controlled amount of stretch and in which the individual elastic threads are held tenaciously in the knitted, woven or braided fabric, thereby greatly retarding slippage which is so prevalent in ordinary fabrics of this type.

Another object of the invention is to provide a fabric of the type described containing a plurality of elastic threads each having a rubber core and a plurality of covers which cooperate to control the stretch of the fabric, to anchor the threads in the fabric, to provide firm gripping surfaces for sewing machine stitches, and to limit the separation of the rubber core when severed and thereby maintain the continuity of the fabric.

In the manufacture of corsets and other garments it is customary to sew sections of elastic fabrics together or to other sections of non-elastic fabrics. When the elastic fabric is made of ordinary covered rubber threads, having the usual smooth outer surfaces, the sewing machine needle often enters the spaces between adjacent threads, or sometimes merely pierces the edges of the threads. Consequently, when the fabric is stretched, many of the covered rubber threads slip between the sewing machine stitches, and then through the fabric, causing objectionable imperfections and impairing the utility and value of the garment. The sewing machine needle may also glance off the smooth or hard surface of the thread, causing the needle to break with consequent loss in production. Sometimes the needle severs the rubber core, and when this happens the edges of the core pull apart in spite of the covering threads, leaving an unsightly gap.

Elastic rubber thread is used for the purpose mentioned above because of its qualities of extension and contraction. It is covered

to give added strength, prevent deterioration, and to control or regulate the stretch and contraction. The requirements of elastic fabrics are decidedly in favor of short stretch having a quick contraction to its original length after being stretched, and possession of the greatest possible strength with minimum bulk. In some fabrics the stretch is limited by laying an inextensible cotton stay thread alongside the rubber core, or by twisting threads around the rubber core in a long pitched or open spiral, but since such stay threads constitute only about 20% of the aggregate tensile strength of the total covering, they are readily broken and of doubtful further value.

Stay threads of the type referred to do not prevent slippage of the covered elastic threads through the fabric itself or through the sewing machine stitches. Some attempts, however, have been made to reduce the amount of slippage through the fabric by knotting the individual elastic threads at intervals to provide spaced knots or bumps intended to grip the knitting loops of a knitted fabric or the cross threads of a woven or braided fabric. One objection to this practice is that the knots form bumps or projections in the finished fabric which destroy its uniformity and render it objectionable for most purposes. Another objection is that since such knots are spaced apart on the surfaces of the elastic threads, they can only grip the fabric at spaced intervals. Furthermore, the portions of the threads lying between the knots are spaced further away from adjacent threads of the fabric than they would be if the knots were not present at all, so that the sewing machine stitches always tend to enter these spaces instead of piercing the covers of the elastic threads themselves.

My improved fabric is made up of a plurality of covered elastic threads which are specially constructed to control the stretch of the fabric in which they are used. The fabric has a smooth, uniform texture entirely without knots or bumps which are characteristic of some of the anti-slipping fabrics mentioned above, and is so constructed that the roughened gripping surfaces of the indi-

vidual elastic threads cooperate with each other and with the knitting loops of a knitted fabric, or the cross threads of a woven or braided fabric, to retard slippage and enable the sewing machine needle to pierce the body of the threads without special effort or skill on the part of the operator.

These and other features and advantages of the invention will be described in connection with the accompanying drawings, in which:

Fig. 1 is an enlarged view showing one form of elastic thread employed in the construction of my fabric;

15 Figs. 2 and 3 are similar views showing two different modifications in the construction of the covered elastic threads;

Fig. 4 is a front view of a brassière having a waist band constructed of elastic material made according to my invention;

20 Fig. 5 is a plan view showing one form of knitted elastic fabric constructed according to the invention;

Fig. 6 is a plan view showing a woven elastic fabric constructed according to the invention; and

Fig. 7 is a plan view showing a braided fabric.

The elastic thread shown in Fig. 1 consists of one or more rubber core threads or strands 1 on which are wrapped a plurality of superimposed spirally wound textile cover threads 2, 3, 4 and 5.

The innermost cover 2, consisting of two ends of suitable textile fibres such as cotton, is wound upon the rubber core preferably with a short pitched close spiral so that it completely encloses the rubber core when in the normal contracted conditions shown in the drawings.

40 The second cover 3 is generally similar to the first cover, but is preferably composed of three ends of textile fibres wound in the opposite direction over the first cover, also in a short pitched close spiral. The covers 2 and 3 together substantially cover and conceal the rubber core even when it is stretched to the limit of its elasticity.

The third cover 4 is preferably composed 50 of one end of fine, hard twisted cotton which is wound tightly over the inner covers in a long pitched open spiral running in the opposite direction to the cover 3. The fourth cover 5 is also composed of one end of hard twisted cotton which is wound in an opposite direction to the cover 4, also in a long pitched open spiral.

The covers 2 and 3 serve to protect and strengthen the rubber core, and also cooperate in controlling the stretch thereof. Covers 4 and 5 with their long pitched open spirals cooperate in compressing the first two covers, causing the resulting extensible encasement to grip the rubber core, and causing the cover 3 to protrude or bulge out between the open

spirals, raising countless small ridges or corrugations continuously around the outer surface of the thread.

The construction shown in Fig. 2 differs from that previously described in that it employs only three covers. The innermost cover 6 is composed of four ends of cotton which are wound upon the rubber core in a short pitched close spiral, completely enclosing the rubber core as shown in the drawing. The second and third covers 7 and 8, respectively, are each composed of one end of hard twisted cotton wound tightly over the cover 6 in long pitched open spirals similar to the covers 4 and 5 in Fig. 1.

75 In Fig. 3, the innermost cover 9 is composed of one end of cotton wrapped in a short pitched close spiral. The second cover 10 is composed of three ends of cotton wound in the opposite direction over the first cover, also in a short pitched close spiral. The third and fourth covers 11 and 12, respectively, are each composed of one end of hard twisted cotton wrapped in long pitched open spirals, similar to the outer covers previously described.

80 In all the forms described above, all the covers forming the encasement about the rubber core will tighten and reach the breaking point at substantially the same time, well within the elastic limit of the rubber core, limiting the stretch of the rubber and insuring that the breaking points of the core and all the covers are reached at approximately the same point.

85 The fabric shown in Fig. 5 is a knit fabric having inelastic knitting loops 13 enclosing or interlaced with longitudinal elastic covered threads 14 constructed according to any of the modifications shown in Figs. 1, 2 and 3. It will be understood, however, that the fabric may be woven, braided or otherwise constructed, since I do not limit myself to any particular type of fabric. In any case, the fabric is knitted, woven or braided tightly, or in a close mesh, so that in Fig. 5, for example, the roughened gripping surfaces of the elastic threads 14 are tightly held by the knitting loops 13, greatly reducing the amount of slippage of the elastic threads 14 and making it difficult to pull the threads 14 out of the fabric even when the ends are exposed as in Fig. 5 which, of course, is an abnormal condition. The spaces between the adjacent elastic threads 14 are somewhat exaggerated in Fig. 5 in order to clarify the showing, and in actual practice the roughened gripping surfaces of adjacent threads may bulge out and substantially fill all such spaces as are shown in the drawing.

90 The brassière shown in Fig. 4 is of the type shown in Patent 1,640,823, issued August 30, 1927 to Katherine E. Cunningham, having an easy fitting vest 15 provided with shoulder straps 16 and an elastic belt portion

17 which is stitched to the vest along the lines 18 which curve upwardly to form the usual pockets 19. The garment may be opened at the side or back and provided with 5 hooks and eyes or other suitable fastening means for securing the meeting edges together. The elastic belt portions 17 are also stitched to intermediate inelastic sections 20 which are usually provided in garments of 10 this type.

Heretofore when knitted, woven or braided fabrics were used in garments of this type, or in other garments where it was necessary to stitch the elastic material directly to other 15 elastic or inelastic sections, difficulty was encountered because the sewing machine needle usually tended to enter the spaces between adjacent elastic threads, or else merely pierced the edges of such threads. As a result, the elastic sections were not attached securely together or to the inelastic portions of the garment, and the garment would easily pull out of shape. If the rubber core of any elastic thread happened to break, the sewing 20 machine stitches would not assist materially in holding the severed ends of the thread together because the stitches at best would never run longitudinally through the thread for any appreciable distance. This 25 was a great disadvantage because the covers heretofore used to wrap the rubber core could not be depended upon to prevent the severed ends of the core from separating.

In Fig. 4 the showing of the elastic fabric 30 is diagrammatic, and in actual practice the elastic threads 14 run horizontally, or from left to right in the drawings, so as to hold the garment snugly about the body of the wearer and flatten the diaphragm. The several covers or wrappings of the elastic threads 14 cooperate to control the stretch of the fabric which may be limited to any desired degree, and also form an encasement which decidedly limits the separation of the several ends of 40 the rubber core and encloses them in such a manner as to make any rupture hardly perceptible. The roughened gripping surfaces of the threads 14 are firmly anchored in the knitting loops 13, and the roughened surfaces of the threads enable the sewing machine needle to pierce the body of the threads, preventing the needle from glancing off or breaking, and preventing the threads from slipping through the stitches or the fabric. 45 Even if an occasional stitch fails to pierce the body of the threads 14, the rough gripping surfaces of the threads will cling to the surrounding portions of the fabric and prevent slipping.

50 Fig. 6 shows one form of woven fabric constructed according to my invention. In this view the usual inelastic warp and weft threads are indicated at 22 and 23, respectively. The elastic weft threads 24, similar 55 to the threads 14 in Fig. 5, are woven into

the fabric at any desired intervals. It will be understood, of course, that the elastic threads 24 may be run into the fabric as warp threads. In any case the cross threads grip the roughened surfaces of the elastic threads 70 and hold them tenaciously in the fabric.

Fig. 7 shows one form of braided fabric constructed according to the invention, consisting of a series of longitudinal elastic threads 25 running parallel to each other and 75 preferably spaced uniformly throughout the fabric, and united by inelastic braiding threads 26.

It will be understood that I do not limit myself to any particular number of strands in the core or covers of the elastic threads, or to the preferred arrangement of spiral covers, or to the particular fabrics which I have shown here for purposes of illustration, as it will be evident that various changes may be made in the details of construction without departing from the scope and spirit of the invention as defined in the appended claims.

90 The invention claimed is:

1. An elastic fabric comprising a plurality of elastic threads having a rubber core, an inner cover wound around the core in a short pitched spiral and an outer cover wound around the inner cover in a long pitched spiral compressing the inner cover and causing it to bulge out between the convolutions of the outer cover, and a plurality of inelastic threads interlaced with said elastic threads and gripping the bulging outer surfaces thereof.

2. An elastic fabric comprising a plurality of elastic threads having a rubber core, a plurality of spirally wound superimposed covers on the core, one entirely outside the other, the outermost cover having a greater pitch than the inner cover and compressing same to form an extensible encasement gripping the rubber core and limiting the stretch thereof, and a plurality of inelastic threads interlaced with said elastic threads and gripping the outer surfaces thereof.

105 3. An elastic fabric comprising a plurality of elastic threads having a rubber core, an inner cover wound around the core in a short pitched spiral and a pair of outer covers wound around the inner cover in oppositely directed long pitched spirals compressing the inner cover and causing it to bulge out between the convolutions of the outer covers, and a plurality of inelastic threads interlaced with said elastic threads and gripping the bulging outer surfaces thereof.

110 4. An elastic fabric comprising a plurality of elastic threads having a rubber core, an inner cover wound around the core in a short pitched spiral and a pair of outer covers wound around the inner cover in oppositely directed long pitched spirals compressing the inner cover and causing it to bulge out be-

tween the convolutions of the outer covers, all of said covers being adapted to tighten so as to break at substantially the same point well within the elastic limit of the rubber 5 core, and a plurality of inelastic threads interlaced with said elastic threads and gripping the bulging outer surfaces thereof.

5. A knitted elastic fabric comprising a plurality of elastic threads having a rubber 10 core, an inner cover wound around the core in a short pitched spiral and an outer cover wound around the inner cover in a long pitched spiral compressing the inner cover and causing it to bulge out between the convolutions 15 of the outer cover, and a plurality of knitting loops forming the body of the fabric and gripping the bulging outer surfaces of said elastic threads.

Signed at Stoughton, in the county of Norfolk and State of Massachusetts this 12 day of June A. D. 1931.

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