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E. C. HINCHLIFF

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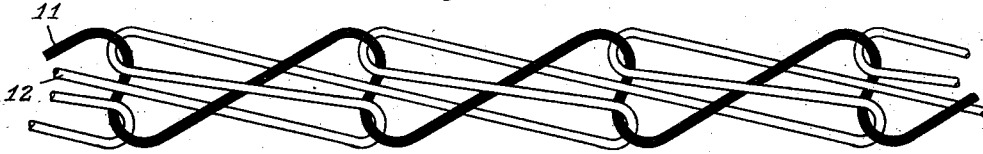
ELASTIC YARN AND METHOD OF MAKING

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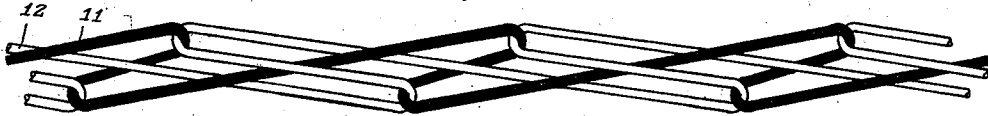
*Fig. 1.*



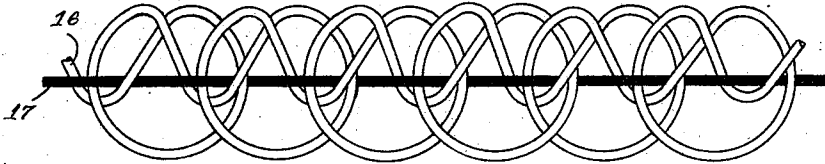
*Fig. 2.*



*Fig. 3.*



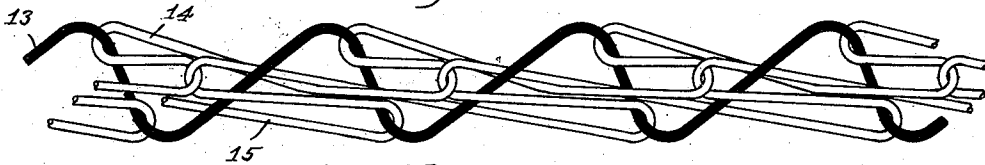
*Fig. 7.*



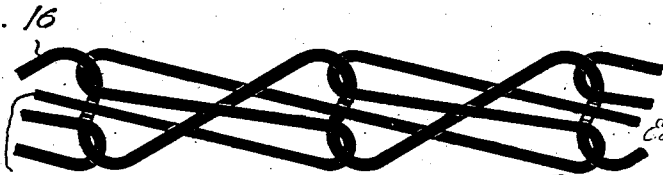
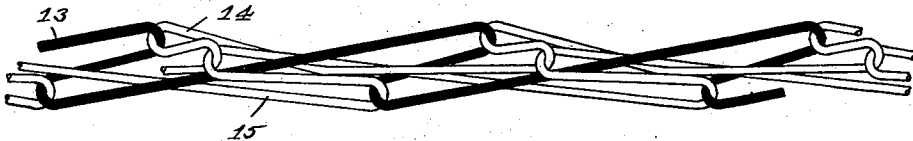
*Fig. 4.*



*Fig. 5.*



*Fig. 6.*



*Fig. 8.*

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# UNITED STATES PATENT OFFICE

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## ELASTIC YARN AND METHOD OF MAKING

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This invention relates to elastic yarn adapted for the manufacture of various textile fabrics and articles.

Heretofore, elastic yarns used in the manufacture of textile fabrics and articles have been characterized by a core of rubber or other elastic material covered by a fibrous inelastic material, usually by winding one or more strands of such fibrous material spirally upon the core. This yarn has a smooth cord-like body, the surface of which is comparatively smooth and hard depending on the material used for the covering. Because of the characteristics of such elastic yarns and of the fabrics produced by knitting or weaving, their use has been confined to the manufacture of surgical bandages and hosiery, corsets, foundation garments, garters, elastic bands, belts, and articles of this general class. Said elastic yarns are, however, not suitable for fancy work and novelty fabrics applicable to millinery, outer wear and sports apparel, nor to the manufacture of certain classes of textile articles having characteristics essentially different from the class referred to but which may be made with elastic yarns such as contemplated by my invention.

One of the objects of my invention is, therefore, to provide a new type of elastic yarn adapted for many new uses. This new yarn is characterized by relatively inelastic materials combined with elastic materials in such manner as to produce unusual qualities of appearance, handle, elasticity, and usability. According to my invention, this elastic yarn is composed of elastic and inelastic threads interlinked so as to give bulk or body to the yarn, making it adaptable for both hand and machine work and having unique qualities of appearance and attractiveness, whereby it is adapted for many new uses. In the preferred embodiment of my invention, one or more inelastic threads are interlinked by a succession of loops with one or more elastic threads according to the weight, elasticity and shape characteristics desired in the resultant yarn. The inelastic components of the yarn are so arranged by the looping as to maintain a normal length but are subject to displacement when the yarn is pulled

lengthwise to permit of a limited amount of stretch. The elastic components of the yarn will elongate under this pull and serve to return the inelastic components to their normal condition when the pull is released. These inelastic components also serve to limit the degree of elongation of the elastic components, thereby preserving the elastic properties of the yarn and making for greater durability. This yarn may be made in a large variety of forms according to the materials used and the shape characteristics of the interlinking elastic and inelastic threads. The yarn has qualities making it especially adaptable for dyeing so that almost unlimited combinations of color effects may be obtained. Furthermore, the finished yarns made in accordance with my invention have unusual qualities of feel and handle desirable for both hand and machine work. These qualities, together with the unique and attractive appearance of my new elastic yarns, make them adaptable in many new fields and uses. For example, in hand knitting, crocheting and tatting a yarn of considerable bulk is often desirable because it gives body and makes for rapid formation of an article. My new elastic yarn is especially suited to this type of handicraft and may be worked rapidly by hand in the production of articles for sale, particularly where it is desirable to meet quick demands for new styles and for seasonable requirements. It is also well suited for handle in knitting and weaving machines, especially where elasticity in the fabric is a desired factor. Its properties of elasticity make it especially useful for making crocheted hats in attractive styles. Here, as well as in the manufacture of other articles, a single size may be made for a variety of users' sizes because of the stretch and elastic properties of the yarn. It is well adapted to the manufacture of many other articles and garments where snug fitting is desired. For outer garments and in the field of sports apparel, my invention is especially useful because of the attractive appearance, color effects and soft feel of the yarn.

Another object of my invention is to pro-

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vide a new method of making elastic yarn of the character described.

Other objects and attendant advantages will be appreciated by those skilled in the art as the invention becomes better understood by reference to the following description when considered in connection with the accompanying drawings, in which—

Figure 1 is a view somewhat diagrammatically of a short length of elastic yarn made according to my invention, showing the yarn approximately full size;

Fig. 2 is an enlarged diagrammatic view of the yarn shown in Figure 1 in its normal condition;

Fig. 3 is a similar view showing the yarn stretched;

Fig. 4 is a view similar to Figure 1 of another form of elastic yarn made according to my invention;

Figs. 5 and 6 are enlarged diagrammatic views of the yarn shown in Fig. 4 in the normal and stretched condition, respectively;

Fig. 7 is an enlarged diagrammatic view of another form of elastic yarn embodying my invention; and

Fig. 8 is a diagrammatic view of that form of the yarn similar to Fig. 2 except that both threads are elastic.

Referring more particularly to Figs. 2 and 3, the reference numerals 11 and 12 are used generally to designate elastic and inelastic threads, respectively. The elastic thread may be of any suitable material possessing properties of elasticity and is preferably of rubber. This rubber thread may be covered or uncovered as the nature of the yarn may require. Where fine finish and appearance are desired the elastic core is covered by fibrous material so that the finished elastic yarn may be dyed to produce color effects. In some cases, however, the elastic and inelastic components may be of different colors. The inelastic thread is of fibrous material, such as cotton, wool, silk or rayon or mixtures thereof. In the form here shown only two threads are used but, as will be presently seen, additional threads may be employed; also, plural strands of thread of like or unlike materials may be used for the threads 11 and 12 to give greater weight, body, dyeing properties, or elastic properties, as the case may be. It will be observed that in the normal condition of the yarn, as shown in Fig. 2, the elastic thread 11 is interlinked or interlooped with the inelastic thread 12. In this particular case, the threads are interlinked by a chain stitch operation in which the shape characteristics of the stitches and the resultant loops are controlled by the tension on the respective threads. This form was made on a two-thread sewing machine which produces what is known as a buttonhole stitch. The elastic thread 11 may be either the needle or the looper thread and, in either case, the inelastic

thread will be the opposite. Difference in loop characteristics may be obtained by change in the nature of the stitch or by changing the tension on the threads, or by both. As will be observed in Fig. 2, the loops are somewhat open and loose, giving bulk or body to the yarn. In this normal condition the threads are not under tension other than the normal tension incidental to loop formation and the length of the yarn is determined by the loop characteristics. The yarn may be stretched by a pull lengthwise, thereby displacing the inelastic loops into the narrow compass, as shown in Fig. 3, in which case the elastic thread is elongated under the pull and when the pull is released the yarn is returned to the normal condition by the force of the elastic thread returning to its normal condition. It will be observed that stretch of the elastic yarn is limited by the displacement capacity of the inelastic thread, thereby limiting the elongation of the elastic thread, with the result that overstretching of the yarn is prevented, thus preserving the elastic properties of the yarn and making for greater durability.

In Figs. 4, 5 and 6, I have shown a three-thread elastic yarn made according to my invention in which a single elastic thread 13 is interlinked or interlooped with two inelastic yarns 14 and 15, which latter yarns are also interlooped one with the other. This yarn, made on a three-thread sewing machine, has characteristics similar to the yarn above described, except that two inelastic threads are used and each interloops with the other. This gives more weight and body to the yarn. By increasing the tension and length of stitch the loops may be brought into closer relationship, thereby giving a form having a body more firm than the two forms described.

In Fig. 7, I have shown another form of my new elastic yarn. In the manufacture of this yarn the inelastic thread 16 has a comparatively light tension and is formed in a succession of wide loops with which the elastic thread 17, under comparatively heavy tension, is interlooped. The yarn is shown in its normal condition in this figure free from tension other than the normal loop tension of the inelastic thread, the elastic thread assuming a straight line position but, nevertheless, interlooped with the inelastic thread.

In Fig. 8 I have shown a form of my new elastic yarn similar in shape or loop characteristics to that shown in Fig. 2 but both threads 16 and 17 are of elastic material; in other words in this form of my invention, all of the threads are elastic, as above mentioned.

In some cases it may be desired to omit the elastic thread or threads and to use all inelastic threads, that is, of materials such as above described.

It should be manifest from the foregoing

that in the practice of my invention various forms of elastic yarn may be made by a succession of interlooped loops of two or more separate continuous threads, and that by change in the stitch and tension of the threads the loop characteristics may be varied considerably. It should also be apparent that by reason of the various forms and characteristics within contemplation of my invention a new type of elastic yarn may be produced in a great variety of body and appearance characteristics particularly well suited for the class of work above described. This new type of elastic yarn has unusual properties of elasticity by reason of the interlinking or interlooping of the component threads. The structural characteristics of the yarn give unusual qualities of feel and appearance in an elastic yarn. The shape characteristics of the loops give a pattern or design effect which distinguishes each form of the yarn, and by varying these shape characteristics as well as the materials of the threads as above explained, innumerable pattern effects may be obtained particularly suitable for style and variety requirements. Furthermore, by reason of the structural makeup of the new elastic yarn almost unlimited combinations of color and materials may be produced. As a result of these characteristics, my new elastic yarn lends itself to many new uses, especially in the arts of knitting, crocheting, tatting, and the like although it may also be used in the art of weaving. It is especially adapted for hand needle or hook work. Many new results are thus obtained by the manufacture of my new yarn in combining elasticity with such qualities as excellence of feel and handle, ease of dyeing and finishing, and unique and attractive appearance.

I claim:

1. An elastic yarn composed of inelastic thread having loops and an elastic thread interlooped with said loops.
2. An elastic yarn composed of inelastic thread having loops and an elastic thread passing through said loops.
3. An elastic yarn comprising elastic and inelastic threads, the inelastic thread being formed in a succession of loops and the elastic thread passing successively through said loops.
4. An elastic yarn comprising elastic thread and inelastic thread, one of said threads having zig-zag formation and the other passing through the loops formed by said zig-zag formation.
5. As a new article of manufacture, an elastic yarn suitable for fancy work and the production of novelty fabrics and articles, composed of relatively inelastic and elastic threads interlinked one with the other by a succession of loops having shape character-

istics giving body and pattern effect to the yarn.

6. An elastic yarn comprising inelastic thread formed into a succession of normally overlapping loops, an elastic thread passing through said loops, said loops being displaced lengthwise by stretch and the elastic thread serving to return said loops to their normal overlapping relation.

7. As a new article of manufacture, an elastic yarn suitable for fancy work and the production of novelty fabrics and articles, composed of a plurality of threads one of which is elastic, one of said threads having zig-zag formation and the other passing through the loops of said zig-zag formation.

8. As a new article of manufacture, an elastic yarn suitable for fancy work and the production of novelty fabrics and articles, composed of a plurality of threads one of which is elastic, one of said threads being formed into a succession of overlapping loops and the other thread passing through said loops, said loops having shape characteristics giving body and pattern effect.

9. As a new article of manufacture, an elastic yarn suitable for fancy work and the production of novelty fabrics and articles, composed of a plurality of elastic threads one of which is formed into a succession of loops and another of which passes through said loops, said threads forming a single yarn, and said loops having shape characteristics giving body and pattern effect.

10. An elastic yarn comprising elastic thread interlooped with inelastic thread in a succession of loops, the shape characteristics of the loops of the inelastic thread determining the normal length of the yarn and permitting stretch by displacement of said loops to a taut condition when the yarn is pulled lengthwise, the elastic yarn being elongated by such stretch and serving to return said loops to their normal shape characteristics when the pull is released.

11. As a new article of manufacture, an elastic yarn suitable for fancy work and the production of novelty fabrics and articles, composed of relatively inelastic material combined with elastic material, the inelastic material consisting of one or more fibrous threads and the elastic material of one or more elastic threads, the inelastic threads being formed in a succession of loops and the elastic threads passing successively through said loops, said elastic thread serving to maintain the normal shape characteristics of said loops and also the normal length of the yarn.

12. As a new article of manufacture, an elastic yarn composed of one or more inelastic threads formed in a succession of loops and one or more elastic threads passing successively through said loops, the interlinking of said threads giving body to the yarn mak-

ing it adaptable for hand work in the production of textile fabrics and articles, the yarn being lengthwise elastic by reason of the combined displacement of the inelastic thread loops and the inherent elasticity of the elastic thread, the elastic thread serving to maintain the normal shape characteristics of the inelastic thread loops and also the normal length of the yarn.

10 13. An elastic yarn suitable for hand knitting, crocheting and tatting in the production of fancy fabrics and novelty textile articles, composed of relatively inelastic material combined with elastic material, the inelastic  
15 material consisting of one or more fibrous threads and the elastic material of one or more elastic cores each covered with a fibrous winding whereby said threads may be dyed to produce determined color effects, the in-  
20 elastic threads being formed in a succession of loops and the elastic threads passing successively, through said loops, giving body and pattern effect to the yarn.

14. The method of making elastic yarn  
25 consisting in forming a succession of loops of inelastic thread and passing elastic thread through said loops.

15. The method of making elastic yarn consisting in forming a succession of loops  
30 of inelastic thread and interlooping said loops with elastic thread.

16. The method of making elastic yarn consisting in forming a succession of loops of in-  
35 elastic thread and interlooping said loops with elastic thread and controlling the tension of said threads to produce different loop characteristics.

In witness of the foregoing I affix my signature.

40 EDWARD C. HINCHLIFF.

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