April 6, 1937. T. HARRIS 2,076,271

COVERED ELASTIC THREAD

Filed Sept. 12, 1935 2 Sheets-Sheet 1

Fig. 1.

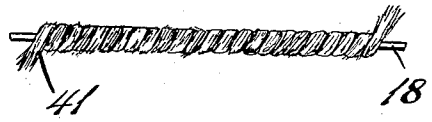
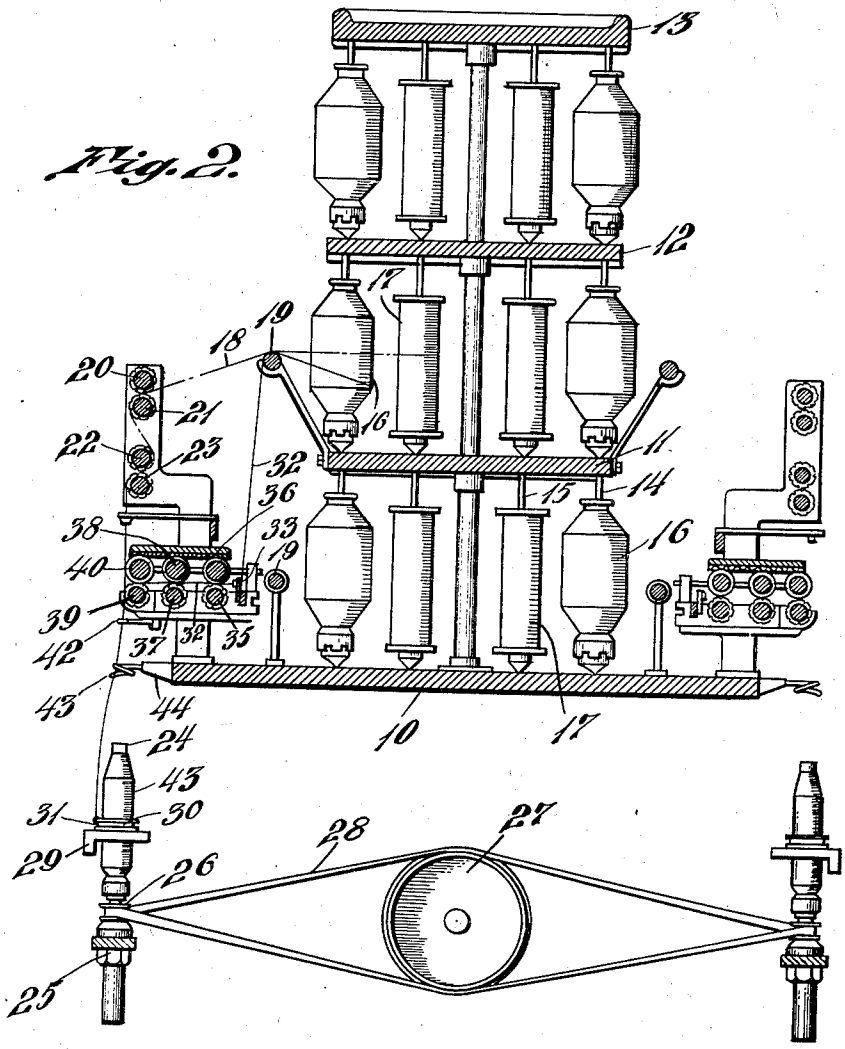



Fig. 2.




INVENTOR.
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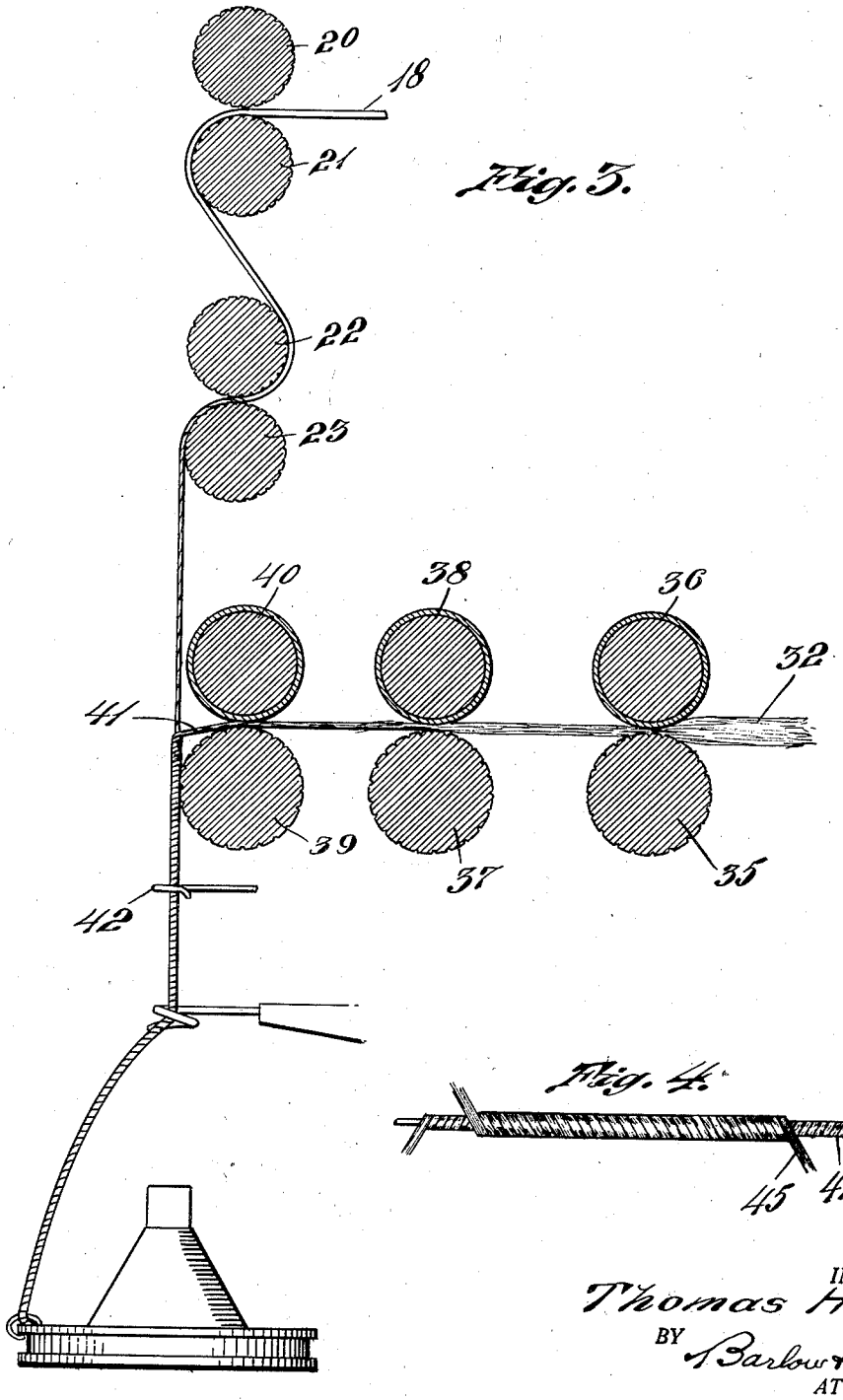


Fig. 5.




Fig. 4.

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# UNITED STATES PATENT OFFICE

2,076,271

## COVERED ELASTIC THREAD

Thomas Harris, Providence, R. I., assignor to Harris Textile Machinery Corporation, a corporation of Rhode Island

Application September 12, 1935, Serial No. 40,314

7 Claims. (Cl. 117—35)

This invention relates to a covered elastic thread and which is an improvement in certain respects with relation to my co-pending application, Serial No. 36,300, filed August 15, 1935.

One of the objects of this invention is the formation of a thread having an elastic core and a complete covering of non-elastic material which will permit more freedom of action in expansion and contraction of the thread than the usual spun and twisted fibers cover applied to the core, or even the cover applied by the method described in my co-pending application.

Another object of the invention is the positive and complete independent control of the elastic core with reference to the attenuating mechanism for the non-elastic material, whereby a greater variation in the result to be obtained may be had.

Another object of the invention is the complete and positive stretching of the elastic core prior to its being positioned at its point of covering, although maintaining this stretched condition at the time of being covered.

Another object of the invention is the delivery of the covering strip of material at substantially right angles to the core with a movement of the core such that the pitch of the covering on the core will be very short and consequently permit greater elongation before binding upon the rubber core than heretofore.

Another object of the invention is to revolve but one end of a core for the causing of a cover to be assembled thereon such as the causing of a twist to be placed in the core for the purpose of wrapping the cover thereon.

Another object of the invention is to provide a covered elastic thread which will not kink when relaxed such as by applying a covering in two layers applied in opposite directions.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is an enlarged view of the finished material;

Fig. 2 is a sectional view showing a creel upon which the supply package is mounted, and also showing in section the stretching and drafting rolls for the product as well as a portion of the packaging means of the usual spinning frame;

Fig. 3 is an enlarged sectional view of the rolls for attenuating the non-elastic material and also the nip rolls for stretching the elastic material and showing the relation of the covering to the core.

Fig. 4 is an enlarged view of a finished material with two layers of covering on the core.

Commercial elastic yarn at the present time usually consists of a rubber core about which there is helically wrapped a non-elastic twisted fibrous thread of material. This thread is wrapped about the core when the core is stretched and prevents contraction of the thread to its original naked rubber size, thus leaving the core constantly under tension. On the other hand, if this thread were not stretched to its limit when covered, this covering would restrict the thread to a certain amount and prevent it from stretching to the extent it would without the covering. Thus the commercial yarn is limited in its contraction and extension, and in order to provide a greater range of contraction or extension, I have used a covering of fibers which will be relatively untwisted by utilizing the usual drafting frame through which the fibers are delivered and twisting an elastic core to assemble or wrap these fibers thereon, and I position the elastic core at substantially right angles to the axes of the pairs of rolls and positively control the amount of stretch placed in the rubber completely independently of these drafting rolls and prior to the positioning of the rubber core at a point to be covered and then maintain the stretched condition of the core and at the same time twist it in such a manner as to cause the non-elastic fibers to be wrapped about the elastic core and completely cover the same, and by maintaining the angle between the covering material and the core at substantially right angles and causing the travel of the core at a certain speed, the helical winding has a very short pitch and allows even greater freedom of the elasticity and contraction than that had by the process set forth in my co-pending application above referred to; and the following is a more detailed description of the present embodiment of this invention, illustrating the preferred means by which these advantageous results may be accomplished:

With reference to the drawings, 10 designates a platform of a frame having supporting decks 11, 12 and 13 above it. Between these decks on suitable spindles 14 or 15, packages 16 of roving and packages 17 of naked rubber threads are supported.

The rubber core 18 is led from its package 17 over a guide rod 19 and through a pair of nip rolls 20 and 21 and then through another pair of nip rolls 22, 23, which are traveling faster than the rolls 20, 21 at a predetermined rate so as to place the desired amount of stretch in the elastic core 18, approximately 400% strtetch is found satisfactory for one sort of commercial thread. This elastic core is then led down to a suitable packaging means consisting of a spindle 24 mounted in the bolster 25 and driven by a whirl 26 from a suitable drum 27 by a belt 28 and along which package the ring rail 29 travels having a ring 30 mounted therein with a traveler 31

thereon, whereby a suitable builder motion for the finished product is provided and the core is caused to twist between the traveler and the nip of the rolls 22, 23.

A non-elastic fibrous roving 32 is drawn from the package 16 over the guide rod 19, thence through suitable guides 33 and between the drafting rolls 35, 36; 37, 38; and 39, 40, which are positioned to cause the work to travel in a plane at right angles to the travel of the core of elastic material 18 and here shown in substantially a horizontal plane at right angles to the vertical traveling core 18.

The covering material which in its attenuated condition, I will now designate as 41, will, when started, continue to wrap about the elastic core which is twisting along its stretch from the ring traveler back to the nip of the rolls 22 and 23, causing this covering material 41 to be wrapped about the core and because of the rate of travel of the core wrap thereon with a very short pitch. The speed of the core past the point of delivery of the covering being so arranged relative to the amount of covering that the pitch will be relatively short, such as illustrated more particularly in Figure 3.

The spindle 24 is rotated at sufficient speed and with proper weight traveler to maintain stretch in the rubber core after placed therein by the nip rolls 20, 21 and 22, 23 through which it passes.

The covered elastic core thread thus formed passes down through the guide hook 42 and the pigtail guide 43 on the thread board 44 and thence through the ring traveler 31 and to the bobbin 43 on the spindle where it is suitably packaged.

The product which I thus form I find to be more flexible as to contraction and expansion than any similar product I know of on the market and even better than that in my co-pending application, above referred to. The cover permits the rubber core to return almost to untensioned condition if desired, although because of the twist in the rubber core it kinks somewhat when so permitted and is therefore held under tension for control of the same. However, in order to counteract this twist in the rubber core I may oppositely twist the rubber core previously to its covering in an amount substantially equal to the amount of twist placed therein by the ring spinner and accordingly when the thread emerges after this previous twisting there will be no twist in the core and thus this kinking will not occur.

Another method of treating the thread after one covering 41 is applied, as above pointed out, is to apply another covering 45 to the thread by wrapping the cover in the opposite direction, as shown in Fig. 4. The thread after first covered will in this case be substantially operated upon by a similar apparatus to that above described except that the twisting of the covered thread to wrap the second cover thereon will be in the opposite direction and the twist will be about half the amount of twist utilized for wrapping the first cover on the core or an amount sufficient to reduce kinking of the doubly covered thread beyond practical objection.

I find this method of covering of advantage where a light weight core is used and where it is impractical to revolve the supply package or both ends of the core being covered, as shown in my co-pending application Serial No. 740,955.

The foregoing description is directed towards the method and construction illustrated, but I desire it to be understood that I reserve the privilege of resorting to all the equivalent changes to which the construction and method are susceptible, the invention being defined and limited only by the terms of the appended claims.

I claim:

1. The method of forming a covered elastic thread, which consists in twisting an elastic core and delivering fibers to said core to wrap about the same and subsequently twisting the covered core in the opposite direction and delivering fibers to said covered core to wrap about the same and form a second layer of covering on the core.

2. The method of forming a covered elastic thread, which consists in twisting an elastic core and delivering fibers to said core to wrap about the same and subsequently twisting the covered core in the opposite direction by a lesser number of revolutions and delivering fibers to said covered core to wrap about the same and form a second layer of covering on the core.

3. In an apparatus of the character described, means for stretching an elastic filament a predetermined amount, means independent of said stretching means for attenuating non-elastic fibers so positioned as to deliver the non-elastic fibers at substantially right angles to the elastic filament, and means for twisting the filament by revolving only its delivery end and thereby causing the non-elastic fibers to be wrapped around the filament as a core.

4. In an apparatus of the character described, a pair of rolls for stretching an elastic filament, independent means for attenuating non-elastic fibers, said second means being positioned to deliver the non-elastic fibers at right angles to the elastic filament, and means for twisting the filament and to cause the non-elastic fibers to be wrapped around the filament as a core.

5. In an apparatus of the character described, a pair of rolls for stretching an elastic filament, a plurality of independent rolls for attenuating non-elastic fibers and having therein axes in a line at right angles to the path of travel of the elastic filament and their delivery point adjacent thereto, and means for twisting the filament to cause the non-elastic fibers to be wrapped about the elastic filament as a core.

6. In an apparatus of the character described, means for stretching an elastic filament a predetermined amount, independent means for attenuating non-elastic fibers positioned to deliver the non-elastic fibers at right angles to the elastic filament, and a ring twister for twisting the elastic filament and thereby causing the non-elastic fibers to be wrapped about and cover the elastic filament as a core.

7. In an apparatus of the character described, a pair of rolls for stretching an elastic filament, a plurality of independent rolls for attenuating non-elastic fibers and having therein axes in a line at right angles to the path of travel of the elastic filament and their delivery point adjacent thereto, and a ring twister for twisting the elastic filament and thereby causing the non-elastic fibers to be wrapped around the elastic filament as a core.

THOMAS HARRIS.