

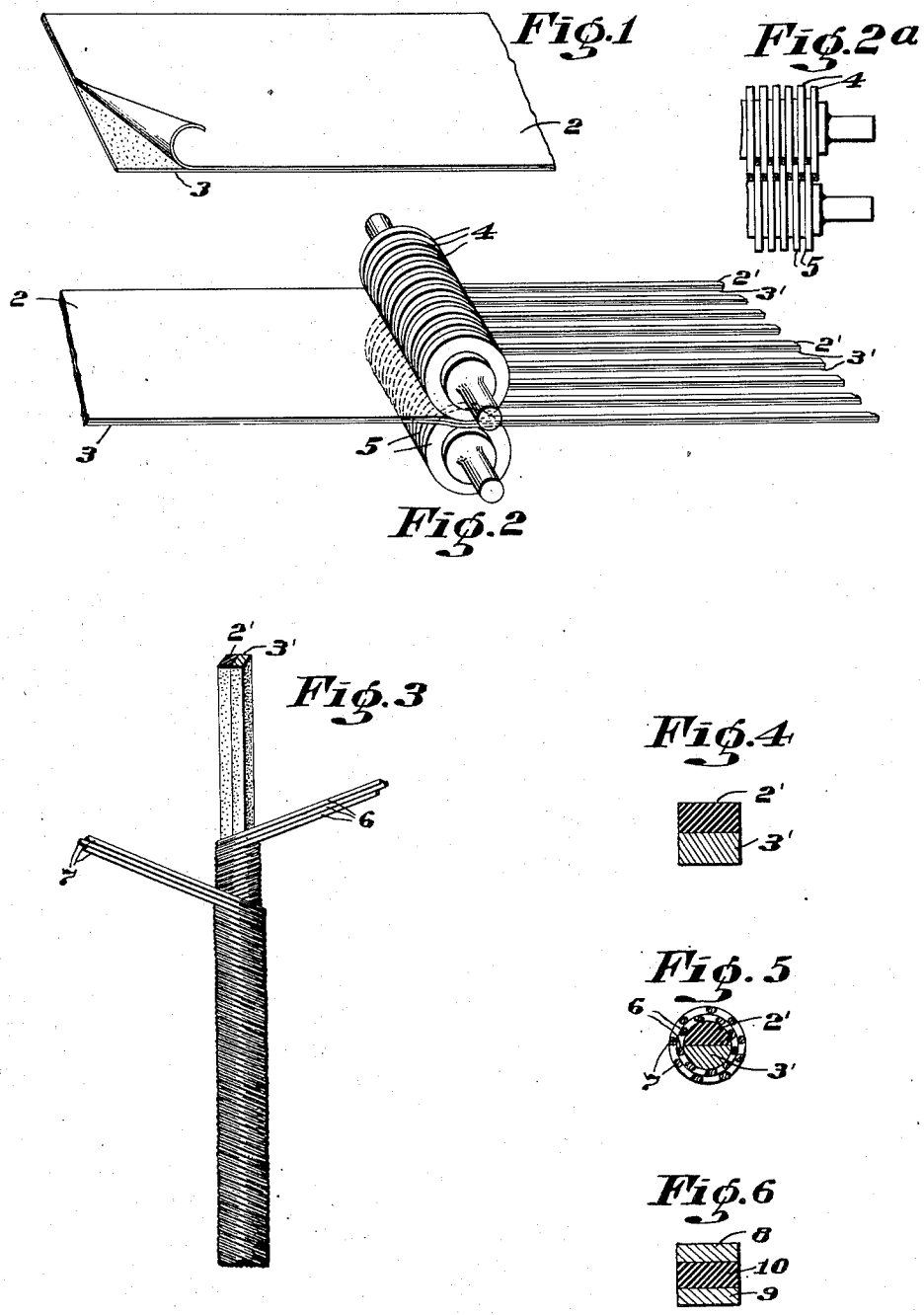
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G. S. VAN VOORHIS

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METHOD OF MAKING RUBBER THREAD

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INVENTOR:
George S. Van Voorhis,
BY *J. H. McCready*
ATTORNEY.

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METHOD OF MAKING RUBBER THREAD

George S. Van Voorhis, Northampton, Mass., assignor to United Elastic Corporation, Easthampton, Mass., a corporation of Massachusetts

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5 Claims. (Cl. 154—2)

The rubber thread used in the manufacture of fabrics commonly takes two forms, one consisting of bare rubber and the other of covered rubber, the latter comprising a rubber core with a cover of thread or yarn wound or braided around it. Both the bare rubber and the core frequently consist of a plurality of strands closely associated with each other and used in the fabric as a single thread.

While both of these forms of rubber have been used for a great many years, a serious objection to them is the fact that if a strand becomes nicked in any way, as for example by the needle of a sewing machine, the strand so injured then will break very easily. When this occurs the ends of the broken strand pull back into the goods due to the fact that the rubber normally is under considerable tension, and it produces a flaw in the goods which, if the strand is large, materially affects the saleability of the product. When bare rubber breaks in this manner the broken ends are very likely to work through the weave and appear in the surface of the fabric as small black dots.

While this difficulty can be reduced by using a covered rubber in which the core is composed of two or more strands, there are also objectionable features to this form of rubber thread. Among these objections may be mentioned particularly the fact that the strands of a core rarely occupy a uniform relationship to each other throughout the length of a thread. Usually these threads are square in cross-section and they are covered while under tension. The covering most commonly used consists in wrapping a fibrous yarn or thread around the core, a second wrapping frequently also being applied over the first one and wound oppositely to it. During this winding operation the threads are very likely to be moved into different relationships to each other. A further difficulty is that the tension on the individual strands is rarely uniform. These variations produce surface irregularities in the goods and detract from the desired smooth appearance of the fabric.

The present invention aims to improve the methods of manufacturing rubber thread with a view to producing a more uniform product, preventing the relative shifting of the rubber strands in elastic fabrics and in covered rubber thread, and facilitating the maintenance of a more uniform tension on the strands of rubber thread and rubber cores wherever a stranded thread or core is used.

The nature of the invention will be readily

understood from the following description when read in connection with the accompanying drawing, and the novel features will be particularly pointed out in the appended claims.

In the drawing,

Figures 1 and 2 are perspective views illustrating steps in the present method;

Fig. 2^a is a rear elevation of portions of the cooperating slitting disks;

Fig. 3 is a perspective view, partly in section, showing a product of this method;

Figs. 4 and 5 are transverse, sectional views at different points through the covered rubber illustrated in Fig. 3; and

Fig. 6 is a similar view of a modification.

According to the method provided by this invention, a plurality of sheets of rubber are united directly to each other in face to face relationship by a union, the character of which is controlled, and the composite sheet so produced later is subjected to a slitting operation which divides it into threads of the desired dimensions, each thread having a ply structure. In Fig. 1 two such rubber sheets are illustrated at 2 and 3; respectively. These sheets may be brought together and combined before vulcanization, the slitting operation being performed either before or after vulcanization, as desired, or the sheets may be cemented together. The nature of the union so produced, however, should be quite different from that ordinarily made in combining sheet rubber, care being taken to avoid the blending of the two sheets into a single integral structure. This control of the union produced between the sheets may be effected by introducing limited quantities of some separating substance between the sheets during, or prior to, the act of combining these sheets. As shown in Fig. 1, the upper surface of the lower sheet 3 has been lightly coated with talc, as indicated by the stippling. The lower tacky surface of the upper sheet then is applied to the talc covered surface of the lower sheet and the two are pressed together. By suitably limiting the quantity of the talc used and the tackiness of the upper sheet, the strength and extent of the adhesive union so produced between the sheets can be controlled within wide limits. Other sheets or plies can be united to those shown in the same manner, and this unit or combining operation can be performed either on individual sheets or on continuous webs, the talc, clay, or other finely divided separating substance being blown between the webs of rubber before they come together, or applied to one web only by

suitable machinery. In some cases, as for example where a relatively weak union is desired, it is preferable to apply the separating material liberally and wipe or brush off the surplus, while other requirements would be better served by applying the talc or equivalent material in extremely limited and controlled quantities.

After the rubber sheets or webs have been so united, the composite sheet so produced is slit in any convenient manner to divide it into individual threads, each of which will consist of strands cut, respectively, from said sheets. This operation may be most conveniently performed in a slitting or cutting machine of some type commonly used heretofore in the manufacture of rubber thread. One such machine is illustrated diagrammatically in Fig. 2. It comprises an upper series of disks 4 and a lower series 5, the individual disks of one series fitting between and overlapping those of the other, and the two being held together in face to face contact with each other throughout their overlapping areas by some suitable pressure arrangement. As the rubber sheet or web is fed between these disks it will be cut by them into threads, each thread being of a width equal to the thickness of one of the disks. Another cutting or slitting machine commonly used in this art consists of a drum on which the web of rubber is wound and mechanism for revolving the drum slowly while a high speed sharp edged cutting disk is held in position to cut through the entire body of rubber and is fed in a direction parallel to the axis of the drum by a distance equal to the width of one thread during each revolution of the drum.

A thread produced in this manner is illustrated in Figs. 3, 4, and 5, the individual strands being shown at 2' and 3', respectively. It should be observed that while the strands are united with a sufficient degree of adhesion to hold them in a fixed relationship to each other, nevertheless the identity of the individual strands is preserved, and the nature of the union is such that the breaking of one strand will not weaken the unbroken strand. Consequently, the tear produced in nicking one thread by the needle of a sewing machine will not travel through into the unnicked strand. As above stated, the nature of this union can be controlled within wide limits. Usually it is preferable to make this union sufficiently strong to prevent the ends of a broken strand from separating greatly from the strand to which they are united, although some separation very likely will occur if the remaining strand is stretched greatly, since the union between the strands will rarely be as strong as is either strand. The fact, however, that both strands are united together substantially throughout their lengths is an important advantage in either covered or uncovered rubber thread, since it avoids the difficulty heretofore experienced in maintaining the strands of a multiple strand core under the same tension during the covering operation, it holds the strands in the same positional relationship to each other throughout their lengths, and it affords a control over a broken strand which has not been available heretofore. In addition, the fact that the strands of a multiple strand core or rubber thread are directly united together, reduces the expense of handling the thread both during the process of making a covered thread and weaving with bare thread.

After such a thread has had fibrous yarns, such as those shown at 6 and 7, wound around it to

cover it, it then assumes a circular form, as illustrated in Fig. 5.

A further advantage of this process is that the strands of a rubber core or thread made in this manner may have different compositions. Sometimes this is desirable in order to produce unique color effects, one strand being of a different shade from the other or others. In fact, several colors may be combined in a single ply thread made by this process. In some cases, also, one of the strands may be utilized to limit the stretch or elongation of the other or others. Such a thread is illustrated in Fig. 6, consisting of two outside plies 8 and 9 bonded to the opposite sides of an intermediate ply 10, the latter being made of some rubber compound which has a relatively limited stretch, while the other two are of a livelier composition and capable of a considerably greater degree of elongation. The lower degree of stretch of the middle strand will therefore serve to limit the maximum elongation of which the entire thread is capable, while still utilizing the high degree of elasticity of the other plies.

The present application is a division of my earlier application Serial No. 698,143, filed November 15, 1933 for Elastic thread and methods of making the same, (since issued as Patent No. 1,963,813) the claims in this case being limited to the method or process, and the claims on the novel product being presented in said earlier application.

Having thus described my invention, what I desire to claim as new is:

1. That improvement in methods of making rubber thread which consists in uniting a plurality of sheets of unvulcanized rubber directly to each other in a face to face relationship, introducing a non-adhesive barrier substance between the sheets so as to control the character of the union so produced to prevent the formation of said sheets into an integral structure while still producing a substantial union between them, and subsequently slitting the composite structure so formed to produce threads, the strands of which are held normally in a fixed relationship to each other.

2. That improvement in methods of making rubber thread which consists in uniting a plurality of sheets of unvulcanized rubber, differing substantially in composition, directly to each other in a face to face relationship, introducing between said sheets a non-adhesive barrier substance so as to form a union having a substantial degree of strength but which does not integrally unite the sheets, and then slitting the composite sheet so formed to produce threads each having a ply structure.

3. That improvement in methods of making rubber thread which consists in uniting two sheets of rubber directly to each other in a face to face relationship to produce a union between them offering considerable resistance to separation but in which the identity of the individual sheets is maintained by the introduction between the sheets of a non-adhesive barrier substance, and then slitting the composite sheet so formed to produce threads each having two strands cut, respectively, from said sheets.

4. That improvement in methods of making rubber thread which consists in uniting a plurality of sheets of rubber directly to each other in a face to face relationship, introducing a controlled quantity of a finely divided separating material between said sheets in connection with said uniting operation and thereby controlling the strength

of the union between said sheets, and then slitting the composite sheet so formed to produce threads each having a ply structure.

5 5. That improvement in methods of making rubber thread which consists in uniting a plurality of sheets of unvulcanized rubber, introducing between them a non-adhesive barrier substance

whereby the sheets are united directly to each other in a face to face relationship by a union having a substantial degree of strength but which does not integrally unite the sheets and then slitting the composite sheet so formed to produce 5 threads each having a ply structure.

GEORGE S. VAN VOORHIS.