T. MIDGLEY.

METHOD OF COVERING STRANDS WITH RUBBER

APPLICATION FILED DEC. 10, 1919.

1,370,339. **Patented Mar. 1, 1921.**

Fig. 1.

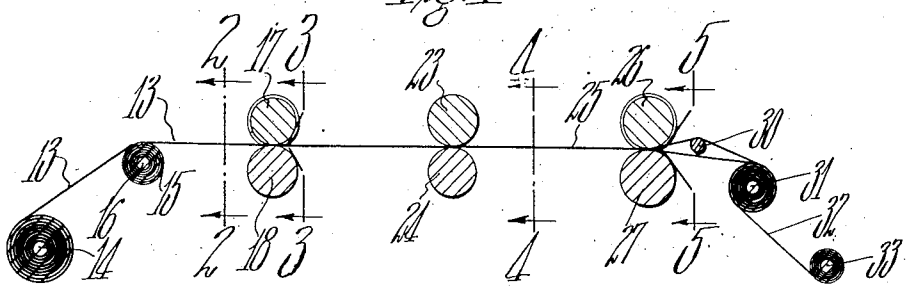


Fig. 2.

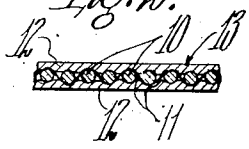


Fig. 5.

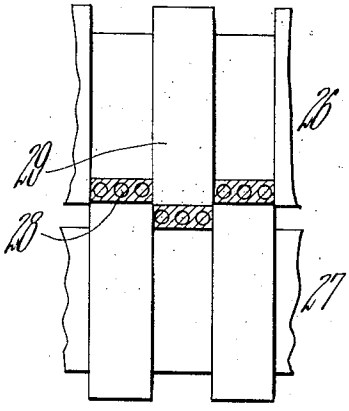


Fig. 4.

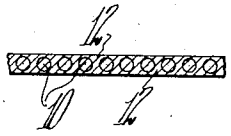


Fig. 6.

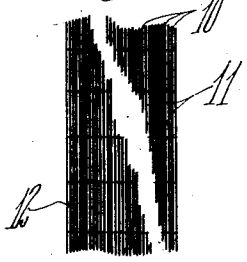


Fig. 3.

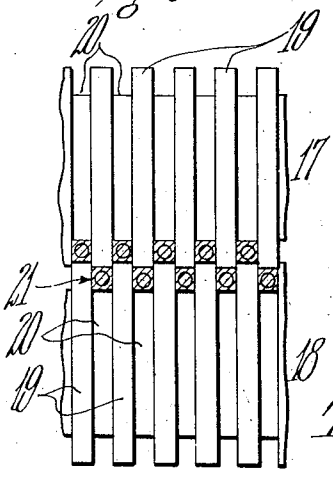
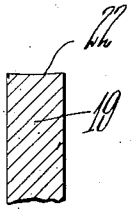


Fig. 7.



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METHOD OF COVERING STRANDS WITH RUBBER.

1,370,339. Specification of Letters Patent. Patented Mar. 1, 1921.

Applictaion filed December 10, 1919. Serial No. 343,835.

To all whom it may concern:

Be it known that I, THOMAS MIDGLEY, residing at Hampden, county of Hampden, State of Massachusetts, have invented certain new and useful Improvements in Methods of Covering Strands with Rubber, of which I declare the following to be a full, clear, and exact description.

My invention relates to the production of fibrous strands composed of one or more cords or the like covered with rubber, such as are used in the manufacture of the cord type of automobile tire casings.

It has for its object the conversion of what is known as thread-fabric or cord-fabric which has been coated with rubber by any well-known process, into a fabric in which the rubber is forced thoroughly between the several cords. It has for a further object the manufacture of strips or strands composed of a plurality of parallel cords thoroughly embedded in a matrix of rubber. It has other and further objects which will appear from the description and claims.

My invention will now be described with particular reference to the accompanying drawings, in which—

Figure 1 is a diagrammatic view showing the method of treating thread or cord fabric to produce rubber covered strands having one or more cords;

Fig. 2 is a section of the original fabric taken on line 2—2 of Fig. 1;

Fig. 3 is a view of the first rolls, taken on line 3—3 of Fig. 1;

Fig. 4 is a view of the fabric after it has passed the first and second rolls, taken on line 4—4 of Fig. 1;

Fig. 5 is a view of the final slitting rolls, taken on line 5—5 of Fig. 1;

Fig. 6 is a plan view of a sheet of thread fabric before it has passed through the first rolls, corresponding to the section shown in Fig. 2 but on a smaller scale; and

Fig. 7 is an enlarged detail of the first rolls.

Cord fabric is composed of a plurality of relatively closely-spaced parallel cords forming a sheet which is coated on one or both sides with rubber. In the type of cord fabric which will be hereinafter referred to as thread fabric (see Figs. 2 and 6) the parallel cords are retained in place during the application of the rubber by a weft of fine threads relatively widely spaced (one-fourth to one-half inch). These threads prevent the cords from tangling and from becoming misplaced during the coating, which is usually done in a calender, but give only negligible strength to the fabric. They indeed have a somewhat deleterious effect, preventing free adjustment of the cords to positions of equilibrium when the fabric is being built into a tire. The weft threads also act to hold the cords so closely together that the rubber is with difficulty forced thoroughly between them. A coated thread fabric for this reason generally has the characteristics shown in Fig. 2. The warp of cords 10 is crossed at right angles by the light weft 11 which, as shown in Fig. 6 is relatively widely spaced. The rubber coating 12 penetrates only partially between the cords (Fig. 2) causing the cords to be but insecurely held together. A further effect of the weft is to slightly distort adjacent cords out of their true position, as will be apparent from this drawing, and for this reason unevenness will be caused in the thickness of the rubber layer at these points. This last defect occurs only at or near the weft thread, the cords lying substantially in a single plane at intermediate points.

To remedy the above troubles, and to provide strands having one or more cords firmly embedded in rubber I have devised the method which will now be described. Briefly, the method consists in forcing the rubber between the cords and simultaneously severing the weft threads. If it is desired to produce as a final product a fabric having a plurality of adjacent parallel cords, the cords which are separated by the above step may be reunited, preferably by passing between pressure rolls. This forms a fabric in which the rubber penetrates fully between the cords, and in which the deleterious effect of the weft threads is not present. The fabric may be subsequently severed into strips having two, three, or more cords.

I have illustrated diagrammatically one way in which my method may be carried out. The thread fabric 13, which may be coated on both sides in any usual or preferred manner, is supplied on a roll 14 together with a liner 15 serving to prevent adjacent layers of the fabric from adhering to each other. The liner is stripped from the fabric and is wound upon a reel 16. The fabric is first passed between rolls 17 and

18, each preferably built up of disks 19 and smaller disks 20 arranged in alternation, with the disks 19 of the two rolls arranged to overlap, as appears in Fig. 3. By passing the fabric through these rolls the several cords are severed from one another, breaking the weft threads, and at the same time forcing the rubber upon the previously uncovered portions of the cords. Preferably the relative adjustment of the rolls are such that the pocket formed between the disks, indicated at 21, will be sufficiently small so that a slight compression will be exerted upon the severed cord. Preferably, also, the peripheries of disks 19 are made slightly concave, as indicated at 22, (Fig. 7), this having been found to assist in severing the rubber and in forcing it against the sides of the cords.

If single cords coated with rubber are the desired product the operation may stop here, but one of the results I desire to obtain is the production of a cord fabric in which the cords are firmly embedded in a matrix of rubber extending between the cords as well as over the surface of the fabric. For this purpose the severed cords are passed between plain rollers 23 and 24, whereby the rubber is caused to flow together and unite, forming a cord fabric similar to the usual product but with the rubber firmly pressed against the cords throughout their surface. It will be understod that the rubber is in the uncured state, so that adjacent surfaces will unite when pressed against each other.

It is sometimes desirable for certain methods of tire building to provide strips of fabric composed of two or three parallel cords. If such a product is desired the reunited fabric 25 is passed between rolls 26 and 27, a similar construction to rolls 17 and 18 but with the disks made wider, so as to accommodate the desired number of cords, as shown at 28. From the third pair of rolls the strips pass alternately above and below a guide 30, so as to insure their complete separation. The separated strips may be wound upon a reel 31 together with a liner 32 fed from a reel 33.

While the advantages of my method are more completely brought out in cases where thread fabric is used as a starting point, the method is equally applicable to cord fabric not embodying cross-threads, but in which the rubber fails for one reason or another to penetrate between the cords.

What I claim as new and desire to secure by Letters Patent is:

1. The method of making cord fabric consisting in coating with rubber on both surfaces a fabric composed of a plurality of parallel cords, severing the fabric so coated between adjacent cords and simultaneously forcing the rubber against the sides of the cords, and then reassembling the severed cords in adhering parallel relation.

2. The method of making cord fabric consisting in severing between adjacent cords a fabric composed of a plurality of parallel, slightly spaced cords, said fabric being coated with a tacky covering; forcing the covering substance against the sides of the cords; and reassembling the separated cords in adhering parallel relation.

3. The method of making rubber covered cords which consists in coating with rubber on both sides a fabric composed of a warp of cords and a weft of relatively light positioning elements, and severing said rubber and weft elements between adjacent cords and simultaneously forcing the rubber against the sides of the cords.

4. The method of making rubber covered cords which consists in coating with rubber on both sides a fabric composed of a warp of cords slightly spaced severing the fabric longitudinally between adjacent cords to produce individual cords, and forcing the rubber against the sides of the cords.

5. The method of making rubber covered strands consisting in severing between adjacent cords a fabric composed of a plurality of parallel, slightly spaced cords, said fabric being coated with a tacky covering substance; forcing the covering substance against the sides of the separated cords; reassembling the separated cords in adhering parallel relation; and severing the reassembled fabric into longitudinal strips, each strip containing a plurality of cords.

THOMAS MIDGLEY.