Sept. 20, 1938. K. H. BOWEN 2,130,944

FIBROUS TAPELIKE BODY AND METHOD OF MAKING SAME

Filed April 20, 1936

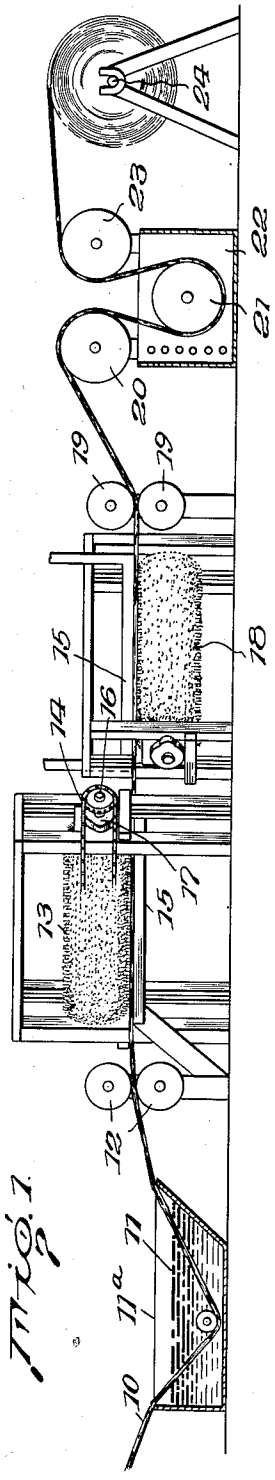


Fig. 1.

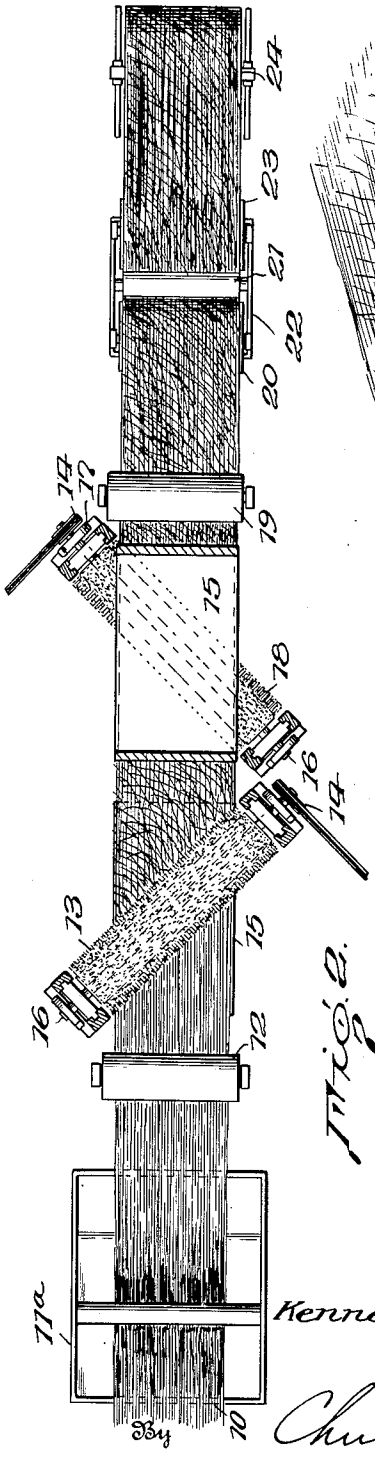


Fig. 2.

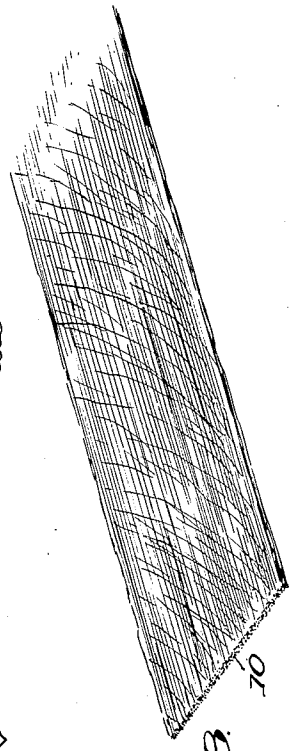


Fig. 3.

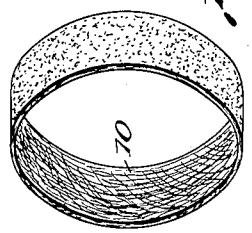


Fig. 4.

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FIBROUS TAPELIKE BODY AND METHOD OF MAKING SAME

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7 Claims. (Cl. 154—2)

This invention relates to improvements in fabricated fibre bodies of band or tape-like formation and the method of producing the same.

One object of the present invention is to produce a band or tape-like fibrous body, preferably of vegetable fibres, capable of withstanding not only longitudinal tensional strains but, also, any transverse strains that might be imposed thereon.

Another object is the formation of a vegetable fibre body such as a band or tape which is of exceedingly simple construction, but which will efficiently withstand the strains above mentioned.

A still further object is the production of a continuous, flexible band or tape-like body composed practically entirely of fibres and a binder for bonding the fibres together, wherein substantially all of the fibres are arranged in parallelism longitudinally of the band or tape, but portions of some of the individual fibres, usually those on one or both surfaces of the body, are displaced and disposed transversely of the band or tape, thus increasing the ability of the finished article to withstand lateral stresses.

Another object of the invention is the production of a spliceless, continuous band formed of vegetable fibres bonded together, particularly adapted for the application of an abrasive material to one surface thereof, thus constituting an abrading belt or band.

Another object is the production of an endless, spliceless band wherein the individual fibres run or extend for at least one convolution, so to speak, of the belt.

Another object is the provision of a band or tape-like body, such as described, and particularly an endless, spliceless belt from fibres which have not been fabricated except by being laid in parallelism whereby the band or belt will be flexible, but inextensible, in that no woven material being used, it is impossible for the belt to stretch.

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

In the accompanying drawing, illustrating one form of apparatus for carrying out the method involved in the production of the present article,

Figure 1 is a side elevational view, partly in section;

Fig. 2 is a top plan view;

Fig. 3 is a perspective view illustrating a short length of the tape-like body contemplated by the present invention; and

Fig. 4 is a perspective view of an endless, spliceless band, made according to the present invention.

As previously indicated, essential features of the present invention consist in arranging the fibres of which the band or tape is formed in parallelism with one another longitudinally of the body and displacing a portion of individual fibres to dispose said displaced portions transversely of the tape or band. As to the arrangement of the fibres in parallelism with one another, this may be done on the usual machines commonly employed in the preparation rooms of rope factories. These machines, commonly referred to as "draw-frames", are of well-known construction and need not be described in detail or illustrated. Suffice it to say that the fibres of the sliver are passed through these machines and the several fibres of the sliver drawn or combed, so to speak, until they lie in substantial parallelism with one another longitudinally of the sliver.

A sliver of fibres, thus prepared, is indicated at 10 in the accompanying drawing, and in carrying out the present invention such a body of fibre is treated with a bonding agent for securing the fibres together in a unitary mass. For instance, a continuous length of fibrous body may be immersed in a bath of bonding material 11, as indicated in Figs. 1 and 2. From the bath of bonding material, the length of fibrous body passes between presser rolls 12 which may remove any excess of bonding material, after which the length of parallel fibres is treated or acted upon to displace portions of the individual fibres and dispose said displaced portions transversely of the length of the body of fibres. For instance, one mode of manipulating the fibres, which has been used with success, consists in the use of one or more brushes adapted to engage one or both sides of the tape-like body. Where it is deemed desirable to displace some of the fibres at each side of the tape-like body, the said body may be first passed into engagement with a brush 13 rotated by driving connections 14 from any suitable source of power, a platform 15 being provided to support the tape-like body while being acted upon by the brush 13. Preferably, brush 13 is disposed diagonally of the reach of material and, if desired, the shaft 16 of the brush may carry cam members 17 which will cause the brush to rise and fall whereby the brush will only inter-

mittently engage the body of fibres and thus displace only portions of individual fibres. Brush 13 acts upon the upper surface of the tape and, as shown, a second brush 18 may be provided for similarly acting upon the fibres on the other side of the tape. Where the second brush is used, it may be disposed diagonally of the tape in a direction opposite to brush 13, so that the displaced fibres at the two sides of the tape will be disposed in opposite directions. The displaced portions of the fibres will, of course, lie in planes parallel to the surfaces of the tape 10. Where a continuous, flexible tape is to be formed, the length of fibres, after having thus been treated with the bonding material 11 and acted upon by whatever number of brushes might be employed, or other fibre-displacing means, is heat treated to facilitate setting of the binder and then wound on a suitable support. For instance, the tape may pass from the last brush, through guide rollers 19, thence over a drum 20 and around a drum 21 in a heating compartment 22, from whence it passes out over a drum 23 onto the support 24. If desired, drums 20 and 23 located exteriorly of compartment 22 may also be heated.

It might be added that similar driving connections are provided for each brush and each brush is mounted as described in connection with brush 13, in that the several brushes are adapted to move back and forth toward a backing or other support 15 for the tape-like body.

As shown in Figs. 2 and 3, the brushes, where brushes are used for the displacement of the fibres, cause portions of the individual fibres to be disposed transversely of the band or tape-like body. Due to the fact that substantially all of the fibres are arranged in parallelism without any spinning, twisting or weaving, the finished band or tape is substantially inextensible but, of course, is freely flexible in all directions. Also, due to the transverse disposition of portions of the individual fibres on one or both surfaces of the finished tape or band, it is impossible for transverse stresses to disrupt the article. In other words, the bonding agent alone is not relied upon to prevent rupture of the band by transverse stresses. In fact, the transverse disposition of fibres renders the band or tape substantially inextensible laterally, just the same as the parallel disposition of the major portion of the fibres eliminates longitudinal elasticity. It will be appreciated that a tape-like body of the construction described can be made in a continuous length, although it may subsequently be severed into sections and laminated, if desired, for the formation of various articles.

Primarily, however, the invention is applicable for the production of endless, spliceless belts. For instance, the revolving support 24 on which the tape is wound may be provided with means for oscillating the same axially, whereby a continuous length of the tape will be wound on a drum with successive convolutions overlapping one another axially of the drum. The thickness of the belt or endless band to be formed will determine the number of convolutions wound on the drum. Also, if desired, the drum or support on which the convolutions are wound, may be heated and additional binder applied to the tape as it is wound on said support. The invention is highly advantageous in the production of comparatively short endless belts or bands, because the fibres used in the manufacture of the belt can be of such a length as to extend one entire convolution of the band or belt. The length of the winding drum 24 may be greater than the width of the band to be produced, but the cylindrical sleeve-like body of fibres formed on the drum may be cut to form a number of bands or endless belts. Such a band or endless belt is illustrated in Fig. 4, abrasive material having been applied to the exterior surface of the band. As will be observed in this figure, portions of individual fibres on the inner surface of the band are disposed transversely. As previously pointed out, there will be no stretch whatever in a band of this construction due to the fact that the major portion of the fibres is simply disposed in parallelism longitudinally or circumferentially of the band. As a consequence, the present method, and the article produced thereby, possess characteristics of simplicity and economy while, at the same time, the article will be freely flexible but inextensible longitudinally as well as laterally and, in addition, the transverse disposition of portions of the individual fibres prevents rupture of the band or tape by lateral stresses.

Another advantage of an endless, spliceless belt made up according to the present invention is that there will be no irregularity in the surface of the belt as is true of spliced belts, unless the greatest of care is exercised in overlapping the ends of a spliced belt. In other words, where a group of fibres, unassociated with one another, but laid in parallelism longitudinally of the belt, are utilized in forming the belt, the fibres are free to wedge between one another at all points and, as a consequence, the belt is of uniform thickness throughout, possessing no humps, a feature which is very important in the use of sanding or polishing articles with the belt.

What I claim is:

1. A fibre tape composed essentially of comparatively long fibres, substantially all of said fibres being arranged in substantial parallelism for a portion of their individual length longitudinally of the tape with certain of said fibres disposed transversely of the tape for a portion of their length in a plane substantially parallel to the surface of the tape, and a binder for binding the fibres into a unitary structure.

2. A vegetable fibre tape composed substantially entirely of comparatively long vegetable fibres, substantially all of said fibres being arranged in substantial parallelism for a portion of their individual length longitudinally of the tape, a portion of the individual fibres at one surface of the tape being disposed transversely of the tape for a portion of their length only in a plane substantially parallel to the surface of the tape, and a binder for securing all of said fibres into a unitary structure.

3. A continuous, flexible tape composed of vegetable fibre and a binder securing the fibres together in a unitary body, all of said fibres being arranged in substantial parallelism longitudinally of the tape for at least a portion of their length with portions of certain fibres displaced and disposed transversely of the tape in a plane substantially parallel to the surface of the tape.

4. A continuous, flexible tape-like body composed of vegetable fibres and a binder securing the fibres together in a unitary body, a majority of the fibres being arranged in parallelism longitudinally of the tape with portions of individual fibres on the opposite surfaces of the tape displaced and disposed transversely of the body, the displaced fibres on one of said surfaces being disposed oppositely to those on the other surface.

5. An endless, flexible, spliceless belt or band

formed of vegetable fibres and a binder securing said fibres together in a unitary body, a majority of said fibres being arranged substantially parallel to one another longitudinally of the band for a portion of their individual length, portions of said individual fibres being displaced and disposed transversely of the band in a plane substantially parallel to the surface of the belt.

6. The method of forming a fibre band or tape-like body which comprises arranging a plurality of comparatively long fibres in substantial parallelism longitudinally of said body, displacing portions of individual fibres on the surface of the band and disposing said displaced portions transversely of said body in a plane substantially parallel to the surface of the band, and binding said fibres in a unitary body.

7. The method of forming a fibre band or tape-like body which comprises arranging the fibres in substantial parallelism longitudinally of said body, displacing portions of individual fibres at opposite surfaces of said body and disposing said displaced portions transversely of the body with the displaced portions at opposite sides disposed in opposite directions, said displaced portions being disposed in planes substantially parallel to the surfaces of the band and securing said fibres in a unitary mass with a binder.

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