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W. J. ELVIN ET AL
TAPE BELT

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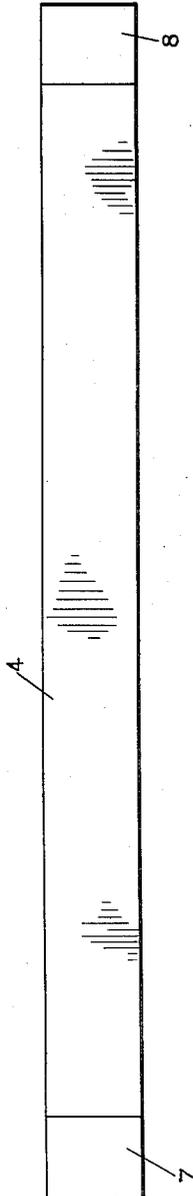


FIG-1

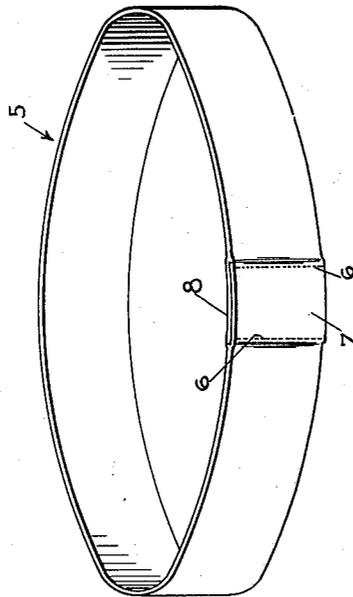


FIG-2

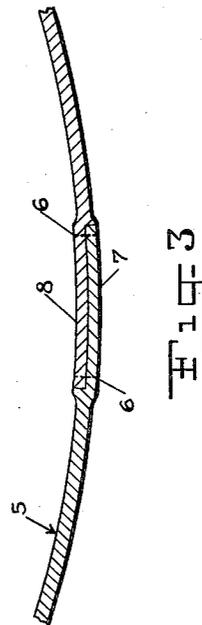


FIG-3

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TAPE BELT

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6 Claims. (Cl. 74-231)

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This invention relates to tape belts, and relates more particularly to fabric tape belts for ring twisting machines and like textile devices.

Fabric tape belts for use in textile devices, such as those employed for driving the spindles in ring twisting machines are normally woven cotton webs of narrow width. Such cotton tape belts have a relatively short operational life, namely on the order of 80 days. It is, therefore, an important object of this invention to provide a fabric tape belt which will not only have a longer operational life than a cotton belt, but which will also have other improved characteristics.

Another object of this invention is the provision of a fabric tape belt made of relatively strong yarns or filaments having a basis of a cellulose ester.

A further object of this invention is the provision of a novel method of preparing fabric tape belts.

Other objects of this invention will appear from the following detailed description and accompanying drawing.

In the drawing,

Figure 1 is a plan view of a fabric tape prepared in accordance with this invention, prior to having its ends lapped and joined to form a belt,

Figure 2 is a perspective view of the fabric tape belt formed from the fabric tape shown in Figure 1, and

Figure 3 is a detail cross-sectional view, on a slightly enlarged scale, of the lap of the fabric tape belt shown in Figure 2.

Like reference numerals indicate like parts throughout the several views of the drawing.

Referring now to the drawing for a detailed description of this invention, the reference numeral 4 indicates a fabric tape preferably woven of cellulose acetate yarns. The tape may be woven in the desired narrow width, usually $\frac{7}{8}$ " and $1\frac{1}{2}$ ", on a suitable loom, or the tape may be cut by means of a hot knife, which cuts and simultaneously seals the cut edge against raveling, from wide fabric webs of desired textile construction. Preferably, however, the tapes are woven on suitable looms which looms provide the edges with a selvedge whereby the tape belts may be used for a considerable length of time without fraying of the edges.

While it is preferred that the webs, both narrow and wide, be woven wholly from cellulose acetate yarn, they may also be woven from cellulose acetate yarn mixed with other yarns, i. e.

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the woven fabric web may be a mixed fabric containing cellulose acetate yarn alternating either in the warp or in the weft, or in both the warp and the weft, in any desired degree of alternation, with other thermoplastic yarns or yarns of non-thermoplastic fibers, such as cotton, regenerated cellulose, etc. Moreover, the tape may be prepared in such a manner that either the warp or the weft consists wholly of cellulose acetate yarn while the other component consists of non-thermoplastic yarn.

The cellulose acetate yarn employed in preparing the tape belts in this invention is of high tensile strength. Such strong yarns are produced by stretching the cellulose acetate yarn under suitable conditions. For example, the cellulose acetate yarn, or the cellulose acetate filaments from which the yarn is prepared, may be subjected to a stretching operation in presence of solvents or swelling agents for the cellulose acetate, such as dioxane, acetone, acetic acid and diacetone alcohol, either in the form of aqueous solutions thereof or in the vapor state.

A particularly satisfactory method of treating the filamentary materials having a basis of cellulose acetate to increase the tensile strength thereof is to subject them to a stretching operation in the presence of water, or saturated or wet steam under pressure at a temperature above 100° C. The degree of stretch to which the filamentary materials are subjected is preferably on the order of 200% or more. While the materials stretched are preferably continuous filaments or yarns composed of continuous filaments, they may be spun yarns made of short or more or less long lengths of filaments.

Tapes made of stretched cellulose acetate yarn are much superior than cotton tapes when employed as spindle belts since the cellulose acetate tapes have an elongation of over 50% less than the cotton tapes and have a serigraph break of 530 pounds against 480 pounds for the cotton tapes, when the tapes are conditioned, and a serigraph break of 564 pounds against 365 pounds for the cotton tapes in the bone-dry state.

To form the tape belt, generally indicated by reference numeral 5, the tape 4 of stretched cellulose acetate yarn, is lapped and sewn at the lap by suitable stitching shown at 6 in Figures 2 and 3. However, the ends 7 and 8 of the tape 4 which form the lap of the belt 5 are first treated to reduce the thickness thereof by subjecting said ends 7 and 8 to a saponification treatment. This saponification treatment not only

causes the ends to be reduced in thickness, but also changes the chemical composition and increases the tensile strength of the yarns in the area saponified.

The saponification of ends 7 and 8 may be effected by treating said ends with any suitable saponifying agent, either inorganic or organic. Examples of inorganic saponifying agents are ammonium, caustic soda, caustic potash and sodium silicate, while examples of organic saponifying agents are organic nitrogenous bases, such as lower aliphatic amines, polymethylene amines, for example, cyclohexylamine, N-alkyl and aralkyl substitution derivatives thereof and heterocyclic bases, for example piperidine. The degree of saponification of the ends 7 and 8 of the tape 4 is such that the thickness of the tape at said ends is reduced from 60 to 65% of its original thickness so that the thickness of the lap formed in belt 5 is from 120 to 130% of the thickness of the tape, thus approaching the quality of an endless belt.

While the present invention has been described above more particularly with reference to cellulose acetate yarns or filaments, yarns or filaments of other esters of cellulose may also be employed to produce the fabric tapes, such as, for example, cellulose propionate and cellulose butyrate. Yarns and filaments of mixed esters of cellulose such as cellulose acetate propionate and cellulose acetate butyrate may also be employed to form the fabric tape.

The term "integral" as employed in the claims is to be construed in its narrowest sense, namely as meaning structurally integral and constituting a single piece.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of our invention.

Having described our invention, what we desire to secure by Letters Patent is:

1. A belt comprising a woven fabric tape consisting essentially of yarns having a basis of a cellulose ester and having integral ends reduced in thickness by a saponification treatment, said ends being lapped and positively joined at the lapped portions.

2. A belt comprising a woven fabric tape consisting essentially of yarns having a basis of cellulose acetate and having integral ends reduced in thickness by a saponification treatment, said ends being lapped and positively joined at the lapped portions.

3. A belt comprising a woven fabric tape consisting essentially of stretched yarns having a basis of a cellulose ester and having integral ends reduced in thickness by a saponification treatment, said ends being lapped and positively joined at the lapped portions.

4. A belt comprising a woven fabric tape consisting essentially of stretched yarns having a basis of cellulose acetate and having integral ends reduced in thickness by a saponification treatment, said ends being lapped and positively joined at the lapped portions.

5. A belt comprising a woven fabric tape consisting essentially of stretched cellulose ester yarns and having integral ends of regenerated cellulose, said ends being lapped and positively joined at the lapped portions.

6. A belt comprising a woven fabric tape consisting essentially of stretched cellulose acetate yarns and having integral ends of regenerated cellulose, said ends being lapped and positively joined at the lapped portions.

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