

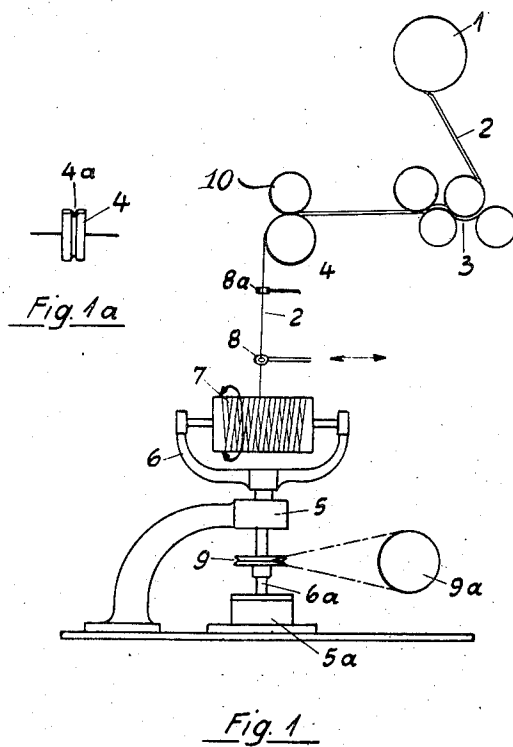
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PROCESS OF PRODUCING TWISTS OF ORGANIC THERMOPLASTIC MATERIAL

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PROCESS OF PRODUCING TWISTS OF
ORGANIC THERMOPLASTIC MATERIAL

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The present invention relates to an improved process of producing twists of organic thermoplastic material.

Threads or bands of organic thermoplastic materials have already been twisted while hot, as for example by blowing hot air against them. However, a uniform twist cannot be obtained, or can be obtained only with difficulty, when working with wide bands or with bands in which the threads are not uniform, or when twisting bands with a simultaneous stretching thereof.

I have now found that fibrous materials, i. e., fibers, threads, yarns or bands of organic thermoplastic substances can be twisted in a specially advantageous manner by leading them over hot surfaces so that they become plastic and twisting them, if desired with simultaneous stretching.

Fibers, threads, yarns and bands of organic masses which pass when heated into a readily deformable state are generally suitable for the present process, as for example masses of polyvinyl compounds, in particular polyvinyl chloride, conversion products of butadiene rubber and natural rubber, and cellulose derivatives, such as cellulose ethers. The masses may also contain softening or plasticizing agents or small amounts of solvent. The polymerization products of vinyl compounds are especially suitable for twisting threads or bands with simultaneous stretching. Thus for example bands of polyvinyl chloride prepared by rolling polyvinyl chloride and after treating the rolled product without using pressure at temperatures at which said product has only a slight shape stability, as for example at from 250 to 280° C., yield by twisting with simultaneous strong stretching, yarns having a tensile strength more than six times greater than when twisted without stretching. The process may also be used with special advantage for twisting foils, bands or threads which by drawing them over surfaces heated high enough to render the masses plastic or along short radiating surfaces, have been stretched more or less strongly. By twisting such foils, bands or threads, the stretching may be increased, reduced or kept at the same strength.

One method of carrying out the process according to this invention will now be described with reference to the accompanying drawing Figure 1 of which shows diagrammatically an arrangement of apparatus for the purpose and Figure 1a, which is a front elevation of a detail of said arrangement. It is to be understood,

however, that the invention is not restricted to the particular arrangement shown.

According to Figure 1 a rolled-up band 2 of an organic thermoplastic material is situated on a roller 1 and is supplied by means of a conveyor mechanism 3 to a hot cylinder surface 4 which may be fixed or rotatable. This cylindrical surface 4 preferably has a groove or hollow 4a (as shown in Figure 1a in which the surface 4 is turned through 90°) which serves to guide the band. In the bearings 5 and 5a there rotates the pivot 6a of the frame bearing for the twisting spool 7. The frame bearing 6 is kept in rapid rotation by the drive 9 and 9a. At the same time the spool 7 is slowly rotated positively about its axis by a suitable device (not shown). The band 2 sliding over the hot surface 4 is twisted thereon by the rapid rotation of the frame bearing 6 and consequently of the spool 7 to form a yarn which is led through the stationary eye 8a and through the thread guide 8 which reciprocates in the direction of the arrows and thus is wound up on the spool 7.

The twist of the yarn formed is given by the ratio of the circumferential speed of the spool 7 and the number of rotations of the frame bearing 6. The ratio of the circumferential speed of the spool 7 and of the roller train 3 gives the degree of stretching which may be imparted to the thread or band during twisting if desired.

The arrangement can be varied in many ways. For example a wing or ring twisting machine of known kind, which if desired permits of a more or less strong stretching force during twisting, may be used instead of the spooling device with the spool 7 described. Furthermore for example a device consisting of rolls or cylinders and which permits of drawing off the threads or yarns from the heated surface at definite speed with or without stretching, may be arranged between the rings of a wing twisting machine. A counter roller 19 is applied to the hot cylinder 4 in order to increase the uniformity of the twist or of the stretching. The threads or bands may also be preheated before they meet the hot cylinder 4. The hot surface may also be constructed for example as a funnel. The twisting of one or more bands simultaneously is effected especially well in this way.

In order to obtain an especially smooth and uniform twist of high tensile strength the twisting process is advantageously carried out if desired while simultaneously stretching within the temperature range at which the materials to be twisted possess the greatest reversible extensi-

bility or resilience, i. e., in the case of polyvinyl chloride or polystyrene of high degree of polymerization at above 110° C. and of lower degree of polymerization below that temperature. If yarns preferably obtained by twisting bands, especially thin bands, are strongly stretched at the said temperature range, they can be split off to single threads while retaining the twist obtained by a strong mechanical treatment, as for example by repeated bending or heating, whereby they become softer and more flexible or supple.

According to the present invention, even wide bands may readily be worked up without special precautions to yarns and ropes having smooth and retentive twist.

A loose twist is obtained by twisting at temperatures which are not so high.

When the twist of the yarn produced by twisting is partly or wholly untwisted at a temperature lower than the twisting temperature, the yarn acquires a powerful, stable crimping. By twisting the mass in a highly plastic state, threads similar to horse-hair are obtained.

By the process there is obtained in particular a very uniform smooth twist, even with wide

bands. Furthermore by twisting with simultaneous stretching or by subsequent stretching, the yarns acquire a specially high tensile strength.

5 What I claim is:

1. In the production of a twist from a uniform band of an organic thermoplastic substance, the steps which comprise leading the band over a surface heated to a temperature at which the band possesses the maximum reversible extensibility and twisting the band immediately thereafter with simultaneous stretching.

2. In the production of a twist from a uniform band of polyvinyl chloride, the steps which comprise leading the band over a surface heated to a temperature at which the band possesses the maximum reversible extensibility and which lies above 110° C. and twisting the band immediately thereafter with simultaneous stretching.

3. The process as defined in claim 1 wherein the organic thermoplastic substance is polystyrene.

4. The process as defined in claim 1 wherein the organic thermoplastic substance is a cellulose ether.

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