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PRODUCTION OF TEXTILE MATERIALS

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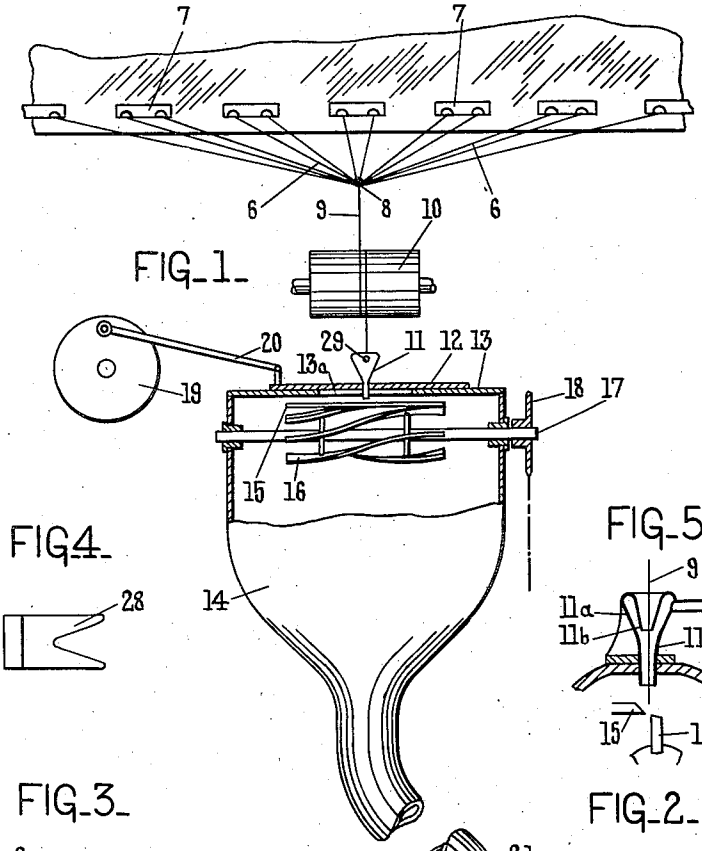


FIG_1_

FIG_4_

FIG_5_

FIG_3_

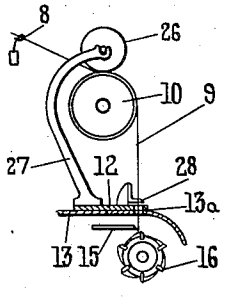
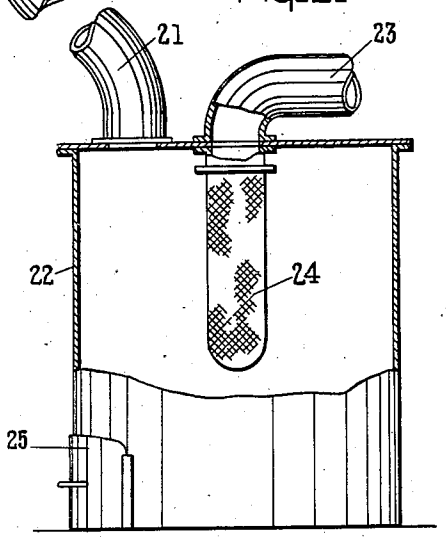


FIG_2_



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1,969,770

PRODUCTION OF TEXTILE MATERIALS

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8 Claims. (Cl. 164—68)

This invention relates to the production of textile materials, and particularly to the production of staple lengths of fibres for spinning into textile yarns or threads. The invention is particularly concerned with the production of such staple lengths from substantially continuous textile filaments, and more especially from continuous artificial filaments, such as filaments of cellulose acetate or other cellulose derivatives or viscose or other reconstituted cellulose filaments.

According to the invention, substantially continuous textile filaments are led into the nip of a cutter having a fixed blade and a co-acting moving blade, the filaments being fed to the cutting point by means of a traversing guide moving to and fro along the lengths of the blades. Conveniently, a number of moving blades are employed, which blades may be disposed on a rotatable cylinder. By providing traversing means to feed the filaments to the cutting device, the fixed and moving blades of the device may be made of considerable length, so that they only lose their keenness slowly. Cutting is thus enabled to proceed for long periods without the necessity for sharpening the blades or replacing the cutting device by a newly-sharpened one.

The filaments may conveniently be supplied to the traversing guide in the form of a twisted or untwisted thread, or a number of such. In order to produce staples of uniform length, the filaments should be fed at a constant rate and the cutter should be driven at a constant rate. The filaments may be fed to the cutting device from a pair of nip rollers or a single roller round which the filaments pass to make non-slipping contact therewith. Alternatively, the filaments may be supplied directly from a bobbin or like package rotated with a substantially constant peripheral speed.

It is desirable to provide means to deliver the filaments close to the cutting point, and these means may conveniently serve to traverse the filaments along the length of the cutting device.

The moving blades may be mounted parallel to the axis of a cutting cylinder or may be arranged helically round the cylinder. The traversing guide is preferably moved at a slow rate along the length of the cylinder in order to avoid appreciable variations between the length of the staple fibres when the blades are arranged helically.

The filaments may be drawn from any suitable source of supply by any convenient feeding means operating at a rate which, together with the frequency of cutting effected by the moving blades, determines the length of fibre cut. Thus the filaments may be passed between a pair of nip rollers rotating at constant speed to feed the filaments forward at a constant rate. Or again, the filaments may be passed round a single roller with which they make non-slipping contact, which roller, when cutting takes place continuously with the production of the filaments, may be the usual feed-roller used for determining the rate of filament production. Alternatively, the filaments may be fed directly from a package from which they are taken, the package being rotated at constant peripheral speed, as for example by means of a constantly driven frictional driving roller acting on the surface of the package.

The actual feeding of the filaments to the cutting point may conveniently be accomplished by blowing or sucking the filaments into the nip of the knives. Thus, the filaments may be passed through a tube through which air is blown or sucked, and this tube can serve as the traversing guide which leads the filaments to and fro along the length of the blades. The tube through which the filaments pass may be the inner tube of an ejector device to which a stream of air is supplied to propel the filaments forward.

Any convenient number of filaments may be led to the traversing guide of the cutting device. For example, the cutting device may be employed to receive the filaments produced from the whole of the spinning jets of a spinning machine, or from a number of such jets, or from jets on two or more machines, suitable guide means being employed to conduct the filaments to the traversing guide.

The staple fibres cut by the machine may be removed by any convenient means, as for example by means of a vacuum exhaust device, the fibres being sucked away from the knives into a suitable container. It is preferred that the cutting device should be surrounded with suitable guards in order to prevent accidental injury to the operative, and these guards may be constructed to form a chamber enclosing the cutting device and confining the draught caused by suction so that it passes wholly towards the nip of the knives. With the use of an enclosed cutting device, the suction applied to remove the cut fibres may be sufficient to draw the filaments through the traversing guide, which is arranged to move along a slot that is covered by a travers-

ing plate except for an opening provided to receive the guide.

The invention may be applied to substantially continuous textile filaments of all kinds, whether of natural origin, such as silk, or whether artificially produced, and is especially useful in the latter connection, when it may be applied continuously with the production of the filaments by either the dry or the wet method. Thus, the invention may be employed for producing staple fibre from filaments of organic derivatives of cellulose, such as cellulose esters, e. g. cellulose formate, acetate, propionate, and butyrate, or cellulose ethers, such as methyl, ethyl, and benzyl cellulose, or of reconstituted cellulose, such as viscose, cuprammonium, or nitrocellulose artificial silk. The staple fibres produced may be spun into yarns, alone or mixed with other fibres, by any convenient textile process, such for example as are used for the spinning of wool or cotton, or the fibres may be used for any other purpose.

The invention will now be described with reference to the accompanying drawing which shows an apparatus suitable for the cutting of filaments of artificial silk continuously with their production by the dry method, but it is to be understood that the illustration is given by way of example only and is in no respect limitative.

Fig. 1 is a front elevation of the apparatus according to the invention, making staple fibre of constant length;

Fig. 2 is a front elevation of a storage receptacle into which the cut fibres are drawn by suction, the suction serving to carry the fibres away from the cutting apparatus;

Fig. 3 is a sectional side elevation of an alternative form of filament feeding and guiding means;

Fig. 4 is a plan of the guide shown in Fig. 3; and

Fig. 5 is a cross-sectional view of a pneumatic guide shown in Fig. 1.

Any suitable number of multi-filament threads 6 are led from their points of exit from the dry-spinning cabinet 7 to a guide 8, where they are united into one end or bundle 9 and guided to the feed roller 10. The bundle 9 may be wound once or more round the feed roller 10 so as to be gripped firmly by the roller and fed forwards at a constant speed. The surface of the roller 10 may be somewhat roughened, as by grinding to reduce any possible slip of the filaments over the surface of the roller. The bundle 9 passing from the feed roller 10 enters an ejector device 11 into which is forced a supply of compressed air by means of a pipe 29. The pneumatic device 11, which is shown in cross-section in Fig. 5, comprises inner and outer inverted cones 11*b* and 11*a* with open lower ends and joined together at their upper ends so as to form an annular space with a downwardly pointing outlet. The pipe 29 delivers a supply of compressed air to the space between the two cones, the stream being directed to the opening at the bottom of the device, creating suction at the point of entry of the bundle into the device and emitting a draught which propels the bundle downwards.

The pneumatic device 11 is attached to a sliding plate 12 which is traversed to and fro on the top plate 13 of a chamber 14 by means of a crank 19 and connecting rod 20, the outlet of the device 11 passing through a slot 13*a* in the plate 13. The bundle is thus brought in front of the edge of a stationary blade 15 of a cutting device having a series of blades 16 which form a rotatable cylinder. The rotary cylinder is mounted on a shaft 17 which passes through the body of the chamber 14 and is provided at one end with a chain sprocket 18 or any other suitable driving means.

The bundle of filaments is severed into staple fibres whose length is determined by the rate of delivery of the roller 10, the number of blades 16 and the rate of cylinder rotation. Since the device 11 traverses along substantially the full length of the blades 16, excessive wear on any particular part of the blades is prevented and the cylinder has a long cutting life, so that production of fibre can continue for a considerable time before the cylinder requires to be resharpened.

The cut fibres are drawn away from the cutting device by suction to the bottom of the chamber 14, thus reducing the possibility of clogging of the knives, and are pneumatically conveyed to a storage receptacle 22 through a pipe 21. The suction is provided by pump, suction vessel, (not shown), or the like and is applied through the pipe 23 which extends into the receptacle 22 and terminates in a straining bag 24. A door, such as the vertically sliding trap 25, is provided in the storage receptacle to enable the collected fibres to be removed at intervals. The storage receptacle may be situated in any convenient position, not necessarily adjoining the cutting device.

An alternative method of bundle delivery is shown in Fig. 3 in which a pressure roller 26 mounted in bearings on arms 27 is arranged to press the filaments against the roller 10 to ensure steady feed. The arms 27 are integral with the traverse plate 12 and the pressure roller 26 is thereby traversed to and fro along the surface of the feed roller 10 as the filaments move along the length of the blades 16. If desired, the guide 8 may be attached to the traversing mechanism.

Instead of using an ejector device to feed the filaments to the cutting device, a simple guide 28 may be employed as shown in Fig. 3. This guide comprises a V-shaped slot, and is attached to the sliding plate 12 so as to traverse along the slot 13*a*. In this case the suction applied to draw the fibre from the knives is also utilized to draw the bundle through the orifice afforded by the end of the slot in the guide 28 as it passes along the slot 13*a*.

In order to prevent undue interference with the feeding of the filaments by any fan action created by the rotation of the cutting blades a number of perforations may be provided in the cover 13 towards one end of the cutting cylinder so that the resultant flow of air through the perforations counteracts the tendency of air movement within the chamber 14 to cause the filaments entering the chamber to whip. The number of perforations remaining open may be controlled by means of a slide or shutter. In this way, greater uniformity of staple is obtained.

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

1. Apparatus for the production of staple fibre, comprising a cutting device having an elongated fixed blade and a coacting moving blade and means for traversing said filaments along the length of the blades of the cutting device.

2. Apparatus according to claim 1, wherein the cutting device comprises a rotary moving blade.

3. Apparatus according to claim 1, wherein the cutting device comprises a plurality of blades rotatable about a common axis.

4. Apparatus according to claim 1, comprising suction means adapted to remove the cut fibres from the vicinity of the cutting device.

5. Apparatus according to claim 1, comprising an ejector device for feeding the filaments to the cutting device.

6. Apparatus for the production of staple fibre, said apparatus comprising a cutting device having an elongated fixed blade and a co-acting moving blade, means for traversing filaments along the length of the blades of the cutting device, ejector means for feeding filaments to said cutting device, and suction means adapted to remove cut fibres from the vicinity of the cutting device.

7. Apparatus for the production of staple fibre, said apparatus comprising in combination a dry-spinning apparatus for the production of artificial filaments, a cutting device having an elongated fixed blade and a co-acting moving blade, means for leading the filaments from the spinning apparatus and traversing them along the device of the blades of the cutting device

8. Apparatus for the production of staple fibre, said apparatus comprising in combination a dry-spinning apparatus for the production of artificial filaments, a cutting device having an elongated fixed blade and a co-acting moving blade, means for leading the filaments from the spinning apparatus and traversing them along the length of the blades of the cutting device, ejector means for feeding filaments to said cutting device, and suction means adapted to remove cut fibres from the vicinity of the cutting device.

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