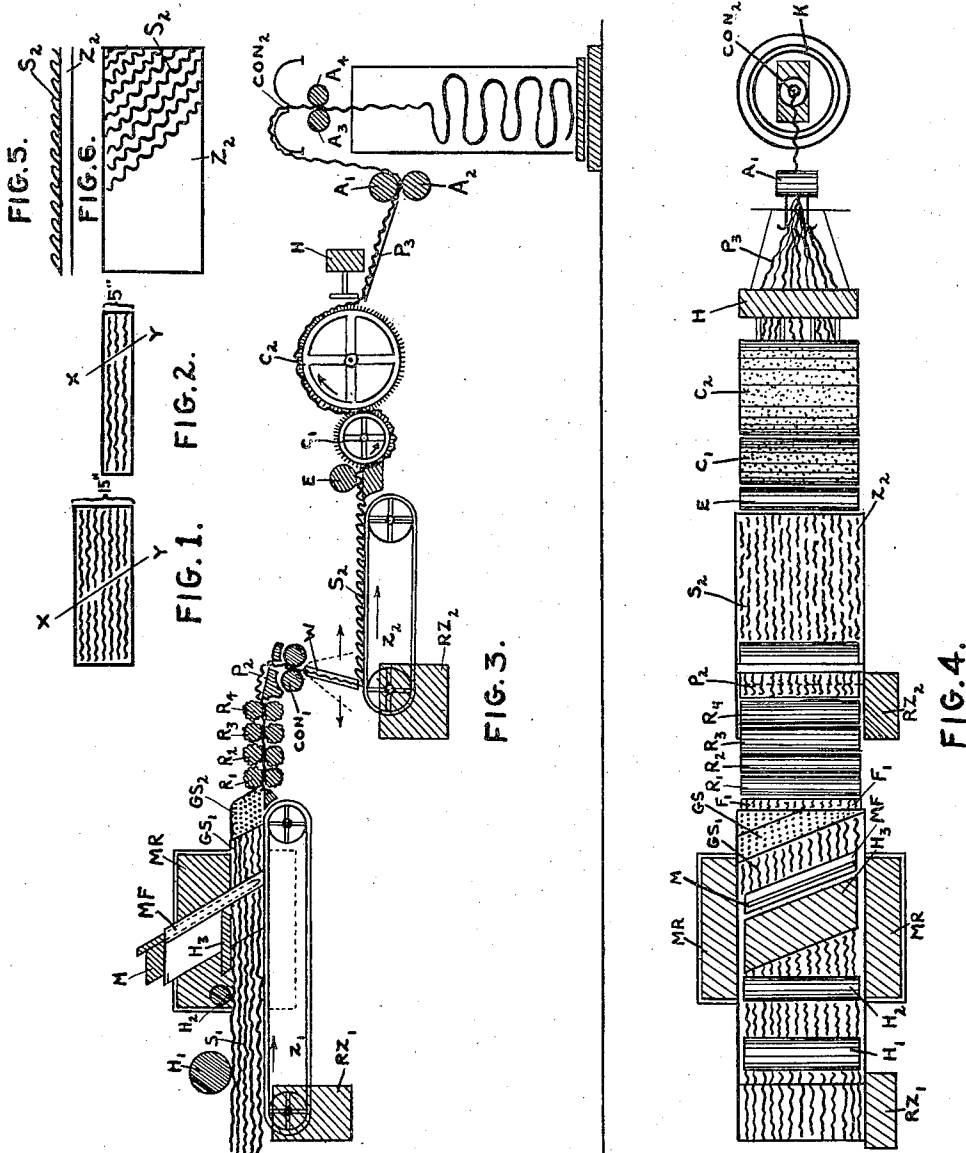


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PROCESS OF FORMING SPINNABLE SLIVERS FROM ARTIFICIAL
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PROCESS OF FORMING SPINNABLE SLIVERS FROM ARTIFICIAL FILAMENTS AND APPARATUS THEREFOR

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The present invention relates to a process of forming a spinnable sliver from artificial filaments and to an apparatus adapted to carry my process into practice.

5 The filaments obtained in the spinning of artificial fibers are, according to the present practice, wound on a spool, if necessary subjected to a washing process and then cut into fibers of a definite length, in which
10 form they are marketed as so-called "artificial staple fibers." In order to form a spinnable sliver from these staple fibers, it is the practice hitherto to subject the staple fibers at first to the action of an opening process
15 which generally comprises two stages, i. e., at first the fibers are treated with a bath having certain chemical ingredients, as for instance soap, glycerin, or similar agents, whereby the comparatively harsh, coherent
20 and unspinnable artificial filaments are opened up obtaining a good feel, whereas in the second stage the moist fibers are subjected to the action of heat which, in combination with the moisture taken up by the
25 fibers in the bath, effects a certain crinkling of the fibers. After the opening process the fibers usually possess a "spinnable" form. However, during the treatment with the bath the originally parallel position of the
30 single filaments to each other is lost, and after the opening process the filaments lie in a rather criss-cross position. It is therefore necessary to subject the artificial fiber mass after the opening process to some further mechanical process in which the fila-
35 ments are again brought into about parallel position. Only after this comparatively long procedure the artificial fiber mass can be converted by the well-known carding
40 process into a spinnable sliver.

It will be seen from the above-given description of the hitherto known processes that the originally parallel position of the single filaments to each other is lost during
45 the first stages and has to be restored later on in a rather troublesome and tedious process. One of the objects of my invention is to carry out the opening up of the cut artificial filaments in such a manner that
50 the originally parallel position of the single

filaments to each other is maintained during the entire process.

Another object of my invention is to provide an apparatus which is suitable for carrying into practice my simplified process. Other objects of my invention will be seen from the detailed description hereafter following.

In the accompanying drawing, illustrating the preferred form of my invention, Fig. 1 is a horizontal section and Fig. 2 is a vertical section through a fiber cake used as starting material. Fig. 3 is a sectional view of the apparatus for carrying out my process and Fig. 4 is a horizontal view of the same, both figures showing details of construction. Fig. 5 is a side view and Fig. 6 represents a top view of the feeding device Z_2 (shown in Figs. 3 and 4), covered with parallel lying filaments S_2 (shown in Figs. 3 and 4).

In my process I use as starting material a fiber cake in which the artificial filaments lie as nearly parallel to each other as possible.

According to my knowledge, there are known at the present time several methods which yield fiber cakes of the desired quality. Inasmuch as the manufacture of such fiber cakes is not an object of my invention, I do not believe it necessary to describe such known processes more fully.

However, it may be worth while to mention that the quality of the starting material to be used in my process may be modified to a certain degree and suited to the demands of each particular case by subjecting the artificial filaments on the spool, i. e., before cutting them, to certain washing, purifying and opening-up processes. For instance, it may be possible in this manner to improve the feel of the filaments.

The filaments should be cut on the spool in a straight line and opened up to a certain degree before introducing them into the operations of my process. As will be obvious, the length of the parallel filaments obtained in this way corresponds with the circumference of the spool.

In order to transform the cake of fila-

ments into a spinnable sliver, I at first cut the filaments by means of a suitable cutting apparatus in a two-fold oblique direction. Inasmuch as the performance of the cutting operation is a rather important feature of my process, I want to explain the expression "two-fold oblique direction" as used in my specification and claims by means of Figs. 1 and 2 of the accompanying drawing. Fig. 1 represents a horizontal section through a fiber cake, having a length of about 30", a width of about 15" and a height of about 5", lines X and Y showing the direction of the cutting knife as being oblique to the length direction of the fiber cake. Fig. 2 represents a vertical section through the same fiber cake and shows the direction of the cutting knife as being oblique to the vertical direction of the fiber cake.

After the cutting procedure I feed the cut material to drafting rolls. In consequence of the two-fold oblique direction of the cake the feeding starts gradually. From Fig. 4 of the accompanying drawing it can be seen, for instance, that the feeding starts on F_1 and crosses slightly over to F_2 .

I prefer to use several pairs of drafting rolls and to impart to each pair of rolls a different speed.

By the combined action of the gradual feeding with the action of the different speeding rolls I effect an opening up or, in other words, a drawing out of the comparatively compact mass of filaments used as the starting material into a rather thin layer. As stated in the beginning of my specification, the parallel position of the single filaments to each other is maintained during these drawing out steps as well as during the later steps of my process.

A further step of my process aims to give to the fibers a certain modification in their structure by means of a suitable mechanical treatment. It is known that the artificial filaments are completely straight and therefore rather unsuited for forming a spinnable sliver. By a certain mechanical treatment I impart to the filaments a crinkled structure. This may be done in several ways. I prefer to effect my aim by using drafting rolls formed from corrugated metal, thus combining the drawing out process with the crinkling process.

In addition to the steps mentioned before, I prefer to subject the comparatively thin layer of parallel filaments, as obtained after the steps mentioned before, to the action of constantly rotating needle cylinders for combing out the material. Of course, as the final step of my process I use a condensing apparatus in order to condense the fiber web formed during the previous stages of my process to a sliver.

A preferred method of carrying out my

process and especially the apparatus used in this preferred method are shown in Fig. 3 of the accompanying drawing. Fig. 3 shows a sectional view of my apparatus and Fig. 4 a horizontal view of the same. Z_1 , situated at the left side of the drawing, represents a feeding apron, the movement of which is regulated by the regulator RZ_1 . S_1 represents the artificial fiber cake which may have, for instance, a height of about 5" and a width of about 15". The mass of artificial fibers is tightly pressed on the feeding apron Z_1 by means of rolls H_1 , H_2 and plate H_3 .

M indicates the cutting knife, MF being the guide and frame through which the knife moves. MR is the regulator for the knife M . The knife is so constructed that it is cutting through the fiber cake in a two-fold oblique direction. The cutting process is carried out as follows:

The knife M is up. The regular RZ_1 , which is working intermittently, moves the feeding apron Z_1 with the artificial fiber cake S_1 in the right-hand direction the number of inches required to cut the fiber. After having moved forward the desired number of inches, the regulator RZ_1 causes the feeding apron Z_1 to stop. Plate H_3 holds the material very tightly to the feeding apron Z_1 . At this moment the knife M comes down and cuts the material. This is the situation shown in Fig. 3, the knife being down between the cut off fiber "prisma" GS_1 and the fiber cake S_1 . GS_1 represents the cut off material. After that the knife M is again caused to go up. The regulator RZ_1 again pushes the feeding apron with the fiber cake S_1 in the right-hand direction for the required length, feeding at the same time the cut off material GS_1 to the drafting rolls R_1 , R_2 , R_3 , and R_4 .

GS_2 indicates the position of GS_1 after the feeding apron Z_1 has moved for the second time and before the cutting process starts for the second time.

The rolls R_1 , R_2 , R_3 and R_4 are going. The right corner of the cut off fiber cake GS_1 , now being in the position GS_2 , will be caught immediately by rolls R_1 and with the moving of the raw material S_1 in the right hand direction, when the process goes on, the whole fiber "prisma" GS_2 is soon fed in the rolls R_1 and then passed on to the following rolls R_2 , R_3 and R_4 .

As the fiber cake is cut in a two-fold oblique direction the feeding starts on the corner F_1 of the cut off fiber "prisma" (shown in Fig. 4), crosses slightly over to F_2 (compare Fig. 4) and, in the proportion as the cut off fiber "prisma" GS_1 is pushed in the position GS_2 , the feeding starts again on F_1 .

The four pairs of drafting rolls R_1 , R_2 , R_3 , 130

and R_4 are made of corrugated metal, and each pair revolves at a different speed.

The drafted sliver moves from the guide P_2 to the condenser rolls CON_1 . Underneath this condenser, extending over the whole width, is a swinging apparatus W which places the drafted bands on the feeding apron Z_2 . This is done as shown in Fig. 5 and Fig. 6.

Z_2 is continually moving through the regulator RZ_2 . The feeding device Z_2 is entirely covered as shown in Fig. 3 with practically all parallel filaments. Fig. 5 is a side view and Fig. 6 represents a top view of the feeding device Z_2 showing the drafted and parallel lying filaments S_2 .

When the S_2 material has been drafted through R_1 to R_4 , it is fed by the device E to the constantly rotating cylinder C_1 and C_2 which cylinders are covered with fine needles for combing. H combs the material from cylinder C_2 on the plate P_3 which serves as a bridge for the material coming from the cylinder C_2 . A_1 and A_2 condense the fiber web to a sliver (SL) through CON_2 , A_3 and A_4 and goes into a rotating can K for spiral wind (already known in cotton carding).

It will be obvious that certain modifications might be made from the process as described in this specification without departing from the essential principle of my invention.

I claim:

1. The process of forming a spinnable sliver from artificial filaments which comprises transforming a compact mass of parallel artificial filaments into a thin layer of the filaments while maintaining the parallel position of the filaments and converting then the thin layer thus obtained into a spinnable sliver.

2. The process of forming a spinnable sliver from artificial filaments which comprises cutting a compact mass of parallel artificial filaments in a two-fold oblique direction, feeding the cut filaments gradually to a drawing out apparatus whereby a thin layer of filaments is formed, and transforming the thin layer of filaments thus obtained into a spinnable sliver.

3. The process of forming a spinnable sliver from artificial filaments which comprises cutting a compact mass of parallel artificial filaments in a two-fold oblique direction, feeding the cut filaments gradually to several pairs of feeding rolls which revolve with different speeds, subjecting the thin layer of filaments thus obtained to the action of two constantly rotating needle cylinders and condensing then the fiber web to a sliver.

4. The process of forming a spinnable sliver from artificial filaments which comprises cutting a compact mass of parallel

artificial filaments in a two-fold oblique direction, feeding the cut filaments gradually to several pairs of feeding rolls which revolve with different speed and which are made from corrugated metal, subjecting the thin layer of filaments thus obtained to the action of two constantly rotating needle cylinders and condensing then the fiber web to a sliver.

5. Apparatus for forming a spinnable sliver from artificial filaments, which comprises in operative combination means for cutting the compact fiber mass in a two-fold oblique direction, means for feeding the cut filaments to at least two pairs of drawing rolls, means for imparting to each pair of the rolls a different speed, and means for condensing the thin layer of filaments thus formed to a spinnable sliver.

6. Apparatus for forming a spinnable sliver from artificial filaments, which comprises in operative combination means for cutting the compact fiber mass in a two-fold oblique direction, at least two pairs of drawing rolls made of corrugated metal, means for feeding the cut filaments to the drawing rolls, means for imparting to each pair of the rolls a different speed and means for condensing the thin layer of filaments thus formed to a spinnable sliver.

In testimony whereof, I affix my signature.

MEINARD FREDERICH THOMA.