Nov. 4, 1941. K. KÖSSLINGER ET AL 2,261,259

EXTENSIBLE SLIVER AND METHOD OF PRODUCTION

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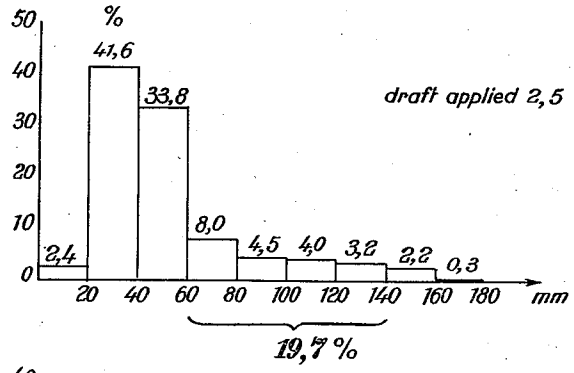



Fig. 1.

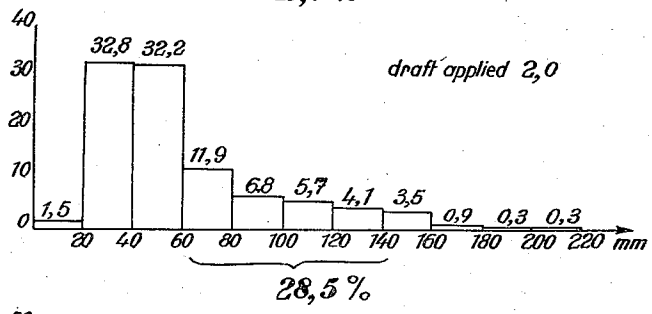



Fig. 2.

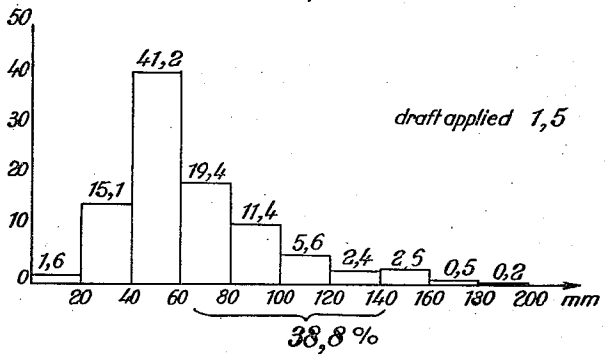



Fig. 3.

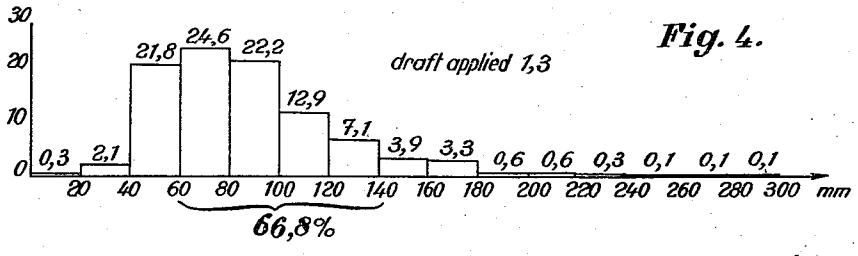



Fig. 4.

Inventors
Karl Kösslinger and
Paul Saffert

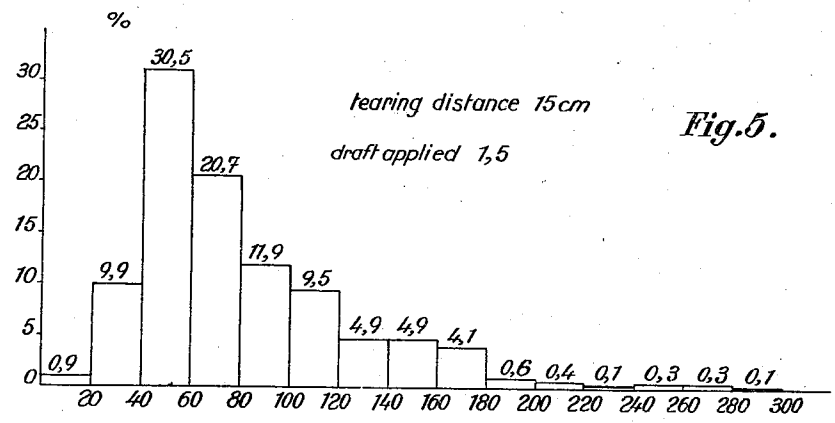
By Their Attorneys

Hutz and Joslin

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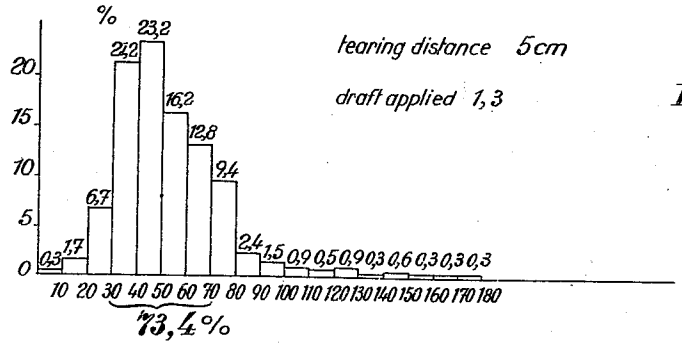
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tearing distance 15cm

draft applied 1,5

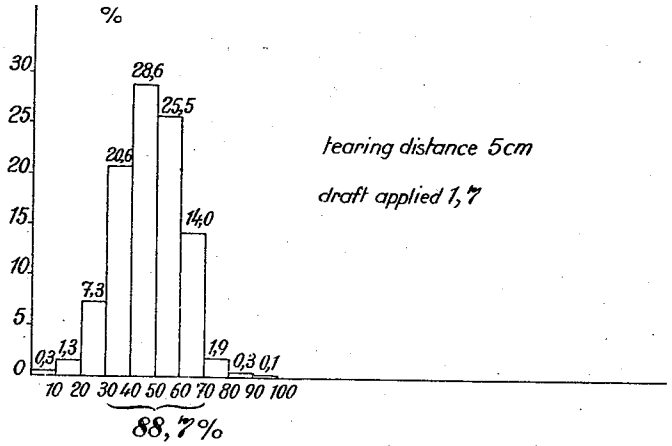
*Fig.5.*




tearing distance 5cm

draft applied 1,3

*Fig.6.*




tearing distance 5cm

draft applied 1,7

*Fig.7.*

Inventors
Karl Kösslinger and
Paul Saffert

By Their Attorneys

Hutz and Joslin

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# UNITED STATES PATENT OFFICE

2,261,259

## EXTENSIBLE SLIVER AND METHOD OF PRODUCTION

Karl Kösslinger, Dessau, and Paul Saffert, Wolfen, Kreis Bitterfeld, Germany, assignors, by mesne assignments, to Walther H. Duisberg, New York, N. Y.

Application March 10, 1938, Serial No. 195,110
In Germany December 15, 1937

6 Claims. (Cl. 19—1)

This invention relates to an extensible sliver consisting of artificial staple fibers in substantially parallel position and to the method of producing the same.

Several processes and devices have been proposed for producing extensible slivers from endless bundles or slivers of continuous fibers. This conversion has in some cases been attempted by cutting and others by tearing a continuous bundle or sliver, in each case retaining substantially the original parallel position of the individual fibers.

For example, it has formerly been proposed to convert a continuous bundle of cellulose fibers into an extensible sliver by feeding the bundle continuously and as far as possible without slip through two pairs of rollers having different peripheral speeds; in this case the feeding device has to forward a continuous bundle at a certain speed and to hold it against slip so that it can be subjected to the draft necessary for tearing the sliver. The pair of draft rollers produces such draft by its greater peripheral speed and the fibers of the continuous bundle are individually torn at the weakest points thereof.

Although numerous proposals have been made in the art for improvements in the processes and apparatus involved, it has hitherto not been practically possible to obtain a uniform distribution of staple lengths within the extensible sliver. In consequence these processes have not found any widespread practical application.

None of the inventors, even when he used progressive tearing, has been in a position to give a serviceable working prescription. Thus in the literature there are found proposals which recommend that the continuous fibers should be divided into sections which are of smaller length than corresponds with the distance from the pair of tearing rollers. For a double or manifold tearing the earlier inventors have already recommended that the tearing distance should be primarily adjusted to about double the staple length and only during the second or any further tearing should the distance be adjusted to the desired final staple length. But even this teaching has not sufficed because it was not disclosed that in the draft regard must be had to the physical constants of the fiber under treatment, especially its extensibility. For example earlier inventors have given the indefinite prescription that any desired draft might be used and in some cases 4-, 5- and 6-fold drafts have been said to be applicable. Such high drafts are probably derived from the textile art in general; it appeared, however, that in tearing continuous bundles of artificial fibers they are completely useless.

It is therefore an object of the present invention to provide a process of producing an extensible sliver from a bundle of continuous artificial fibers, in which sliver the individual fibers are in substantially parallel position and in which substantially all the fibers have a length which is within a certain predetermined range.

A further object is the provision of a method by which a sliver of the kind referred to may be obtained in continuous operation with a minimum of the power and in a simple and reliable manner.

Further objects will become apparent from the detailed specification following hereinafter.

Reference is made to the accompanying drawings in which Figs. 1, 2, 3, and 4 are fiber diagrams which explain the improvement brought about by the invention with reference to a single stage tearing process and Figs. 5, 6, and 7 show the improvement brought about by the invention when using a multiple stage tearing process.

It has been found that for the distribution of the staple the tension applied in the tearing operation is of decisive influence. The new teaching is that one has to suit the draft to the existing extensibility in such a manner that the draft only exceeds by a little the limit of extensibility. Taking for instance a fiber which exhibits about 20 per cent extensibility, the lower limit of the draft is about 1.3; as the upper limit there is to be chosen a draft of at most 2 up to 2.5. Any higher draft leads to excessive production of too short fibers, which renders the sliver obtained completely useless for the further working.

By applying the new teaching to a single stage tearing, it is even then possible to obtain a sliver of useful staple distribution.

Quite especially, however, the new teaching shows an advantageous result in a tearing process in two or more steps in which each individual draft is adjusted in accordance with the existing extensibility of the fiber, with simultaneous adjustment of the tearing distance. With systematic regard to the influence of the draft on the staple distribution in the tearing process the tearing distance and draft can be adjusted in accordance with the existing extensibility and the desired staple distribution. The effect of the new teaching will be explained with reference to the accompanying staple diagrams. Each of these diagrams is based upon a particular draft,

the values of which are as follows: Fig. 1, the draft applied is 2.5; Fig. 2, it is 2.0; Fig. 3, it is 1.5; Fig. 4, it is 1.3; Fig. 5, it is 1.5; Fig. 6, it is 1.3; Fig. 7, it is 1.7. The abscissas number in each diagram is the length of the staple in millimeters and the ordinate figures give the percentage of total staple fiber.

Figs. 1–4 show a summary of the dependence of the staple distribution on the draft with a constant tearing distance of 14 cms. and with the same kind of fiber having a single titer of 1.4 deniers (lustrous viscose fiber). The basis is a fiber of about 20 per cent extensibility and the range of 60 to 140 mms. should be considered.

In diagram 1 only a small fraction of the total quantity of fiber (19.7 per cent) is within this region.

Even with a draft of 2.0 (see Diagram No. 2) no essential improvement is produced, for here 28.5 per cent lie in the said range.

With a draft of 1.5 (see Diagram No. 3) the number in question is already 38.8 per cent and with a draft of 1.3 (see Diagram No. 4) the figure rises to 66.8 per cent.

In these four diagrams it is apparent that an improvement of the fiber distribution is obtained by applying the invention to a single tearing.

Figs. 5–7 comprise fiber diagrams by which the effect of the new process is shown for the tearing of continuous artificial slivers for working up like cotton, in which case fibers between 30 and 70 mms. are still permissible.

Here also the fiber torn has an extensibility of about 20 per cent. There is used the same kind of fiber which yielded the figures for Diagrams 1–4, namely one having a single titer of 1.4 deniers (lustrous).

Diagram 5 shows the result of the preparatory first tearing with a tearing distance of 15 cms. and a draft of 1.5. Correspondingly with the diminution of extensibility by the first drafting operation the draft in the second tearing is diminished to 1.3 with simultaneous reduction of the tearing distance to 5 cms. In this case 73.4 per cent of the total amount of fibers are within the desired range between 30 and 70 mms. A considerable portion of the fibers still exceeds the upper limit of 70 mms., which is undesirable. For eliminating this undesired fraction of long fibers there is advantageously selected for the third tearing a much higher draft, for example 1.7, as shown in Diagram 7, the previous tearing distance of 5 cms. being retained. Under these conditions the fraction of 73.4 per cent obtained in the second operation is increased to 88.7 per cent by this third operation while longer or shorter fibers occur no longer in any essential proportion.

Preferably after each tearing the sliver of fibers is subjected to a crimping.

The process described may be applied with obvious modification to artificial fibers of any origin and suitable for any textile use.

What we claim is:

1. In the method of producing an extensible staple fiber sliver from a bundle of endless or continuous artificial fibers by tearing, said fibers having an extensibility of about 20 per cent, the improvement which comprises adjusting the draft applied to said bundle of endless fibers to between 1.3 and 2.0 while not substantially exceeding the limit of extensibility of said fibers whereby from about 28% to about 67% of the total staple fiber obtained is within the range of from 60–140 mm.

2. In the method of producing an extensible staple fiber sliver from a bundle of endless or continuous artificial fibers by tearing, said fibers having an extensibility of about 20 per cent, the improvement which comprises tearing said fibers with a draft not exceeding 1.3 whereby about 67% of the total staple fiber obtained is within the range of from 60–140 mm.

3. In the method of producing an extensible staple fiber sliver from a bundle of endless or continuous artificial fibers having an extensibility of about 20 per cent by tearing in several progressive stages, the improvement which comprises applying for each tearing stage a draft of between 1.3 and 1.7, while not substantially exceeding the limit of extensibility of the said fibers whereby about 88% of the total staple fiber obtained is within the range of from 30–70 mm.

4. In the method of producing an extensible staple fiber sliver from a bundle of endless or continuous artificial fibers having an extensibility of about 20 per cent by tearing in three progressive stages the improvement which comprises applying a draft of 1.5 in the first tearing operation, a draft of 1.3 in the second tearing operation and a draft of 1.7 in the third tearing operation.

5. In the method of producing an extensible staple fiber sliver from a bundle of endless or continuous artificial fibers having an extensibility of about 20 per cent by tearing in several progressive stages, the improvement which comprises applying for each tearing stage a draft of between 1.3 and 1.7 and crimping after each tearing operation the extensible sliver produced.

6. In the method of producing an extensible staple fiber sliver from a bundle of endless or continuous artificial fibers having an extensibility of about 20 per cent by tearing in three progressive stages, the improvement which comprises applying a draft of 1.5 in the first tearing operation, a draft of 1.3 in the second tearing operation and a draft of 1.7 in the third tearing operation and crimping after each tearing operation the extensible sliver produced.

KARL KÖSSLINGER.
PAUL SAFFERT.