Nov. 17, 1942. R. A. SMITH 2,302,354

METHOD AND APPARATUS FOR CUTTING STAPLE FIBER

Filed Aug. 13, 1941

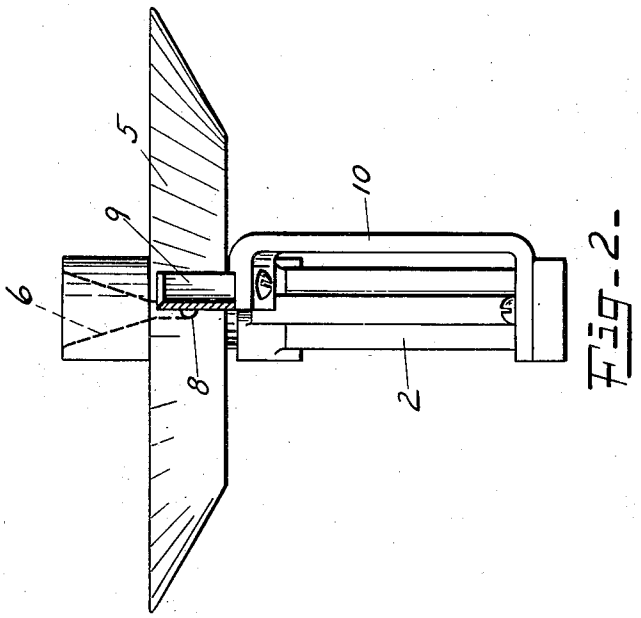


Fig-2.



Fig-4.

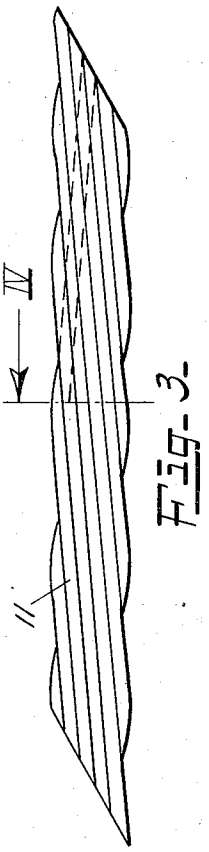


Fig-3.

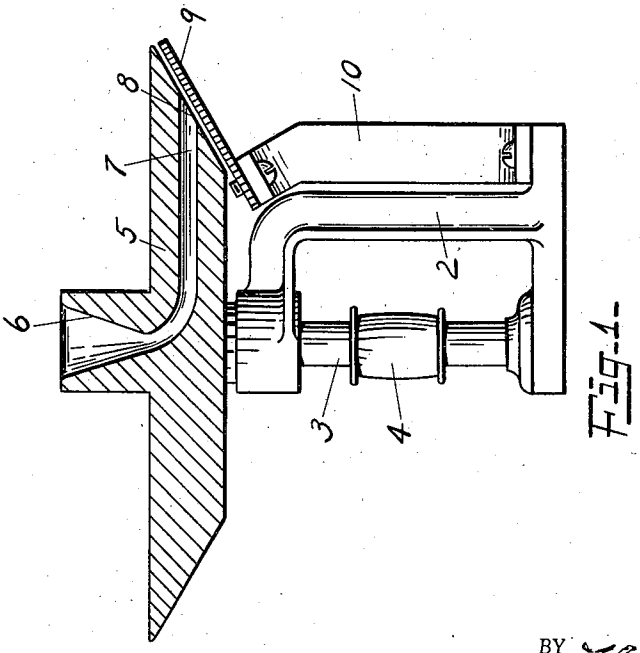


Fig-1.

INVENTOR.
ROBERT A. SMITH
BY Thomas R. O'Malley
ATTORNEY.

Patented Nov. 17, 1942

2,302,354

UNITED STATES PATENT OFFICE

2,302,354

METHOD AND APPARATUS FOR CUTTING STAPLE FIBERS

Robert A. Smith, Ridley Park, Pa., assignor to American Viscose Corporation, Wilmington, Del., a corporation of Delaware

Application August 13, 1941, Serial No. 406,633

9 Claims. (Cl. 164—36)

This invention relates to a method and apparatus for cutting staple fibers from continuous filaments of synthetic or artificial materials, such as rayon, Vinyon, nylon, etc.

It is an object of the invention to provide a method of obtaining staple fibers having a greater diversity of lengths than heretofore without the necessity of having to mix the different-length fibers from numerous batches to form the mixture of diverse lengths.

It is a further object of the invention to provide a novel form of apparatus to carry out in a practical way the method herein disclosed.

In the drawing, illustrative of the invention,

Figure 1 is an elevational view of the apparatus with the upper part in section,

Figure 2 is a side view of the apparatus,

Figure 3 illustrates, in greatly enlarged form, a length of a bundle of fibers cut from a continuous filament bundle, and

Figure 4 is a cross-section corresponding to Figure 3.

Heretofore, little attention has been paid to the question of controlling the length of staple fiber except to attempt to obtain as uniform a fiber length in the product as possible. However, it is now generally accepted that fibers of the same origin or different origins blend better and produce a more even yarn if the staple fiber content consists of a diversity in lengths of the fibers. In accordance with the invention, a staple is produced containing a great diversity of lengths therein by first twisting a tow or bundle of generally parallel continuous filaments and cutting the twisted bundle obliquely with respect to the axis of the bundle. The twisting of the filaments about the axis of the bundle causes the filaments at the exterior of the bundle to be longer than the central filaments for a given length along the bundle. Therefore, by cutting the bundle at points equidistant along its axis, a diversity of fiber lengths is obtained in the product. The greater the number of turns in the twist along a given length of the bundle, the greater is the diversity of lengths of the fibers. Furthermore, the more acute the angle that the cutter makes with the bundle axis, that is, the further the angle is from a right angle to the axis, the greater is the diversity of the lengths of fibers. For a given angle, a greater diversity of lengths of fibers is obtained by avoiding an integral number of turns of twist in the bundle between the points of cutting and by approaching a twist of one-half turn or an odd-numbered multiple of one-half turn between the points of cutting. For example, cutting a tow having a twist of one-half, one and one-half, or two and one-half turns between cuts results in a much greater diversity between the lengths of the fibers than would be obtained with a twist of one, two, or any integral number of turns between the cuts.

In the drawing, there is shown one embodiment of a preferred form of apparatus for carrying out the method. Figures 1 and 2 illustrate a cutter of the Beria type comprising a support 2 within which a shaft 3 is rotatably mounted. The shaft 3 is provided with a pulley 4 by which it may be driven by a belt not shown. A disc 5 is secured to the end of the shaft 3 for rotation therewith. This disc is provided with a funnel-like entrance 6 for the filamentary bundle which is connected with the radial bore 7 extending to the periphery of the disc at 8. The periphery of the disc is shaped in the form of a frustum of a cone and rotates in close proximity or actual contact with the cutter blade 9 supported on the arm 10.

In operation of the device, the disc 5 is rotated about its axis and a bundle of continuous filaments in the form of a tow or the like is fed into the funnel-like entrance 6 and is drawn through the radial portion 7 of the bore by virtue of the centrifugal force set up by the rotation of the disc. Since the portion of the filamentary bundle in the radial bore 7 is rotated about the axis of the bundle entering at 6 the hub of the disc, a twist is imparted to the filamentary bundle or tow. The extent of the twist may be determined by controlling the rate of delivery of the tow to the funnel 6 and the speed of rotation of the disc 5. By suitably adjusting these factors and by taking account of any tendency of the particular tow to untwist during its travel through the radially-extending channel, the number of turns of twist between successive points of cutting by the knife blade may be controlled as desired, and, as stated previously, is preferably adjusted to constitute one-half or an odd-numbered multiple of one-half turn between successive cuttings. If desired, the cutting device may be substituted by one which allows the disc 5 to make a plurality of revolutions between cuts, as suggested in Maxton, 2,228,995.

In Figure 3, there is shown in a diagrammatic way and in greatly enlarged scale, a cut length of a filamentary bundle in which there is one-half turn between the cuts. For example fiber 11 extends from the front of the bundle at the left end of Figure 3 around to the back of the filament bundle at the right end of Figure 3. In

Figure 4, there is shown an idealized cross section of the bundle of Figure 3.

While a preferred embodiment of the invention has been disclosed, the description is intended to be illustrative only, and it is to be understood that changes and variations may be made without departing from the spirit or scope of the invention as defined by the appended claims.

What I claim is:

1. In a method of producing staple fiber from continuous filaments in a bundle, the steps of twisting said bundle and cutting said twisted bundle at spaced intervals therealong obliquely with respect to the axis of said bundle.

2. In a method of producing staple fiber by cutting a bundle of continuous filaments at spaced intervals therealong, the steps of imparting a twist to said bundle of

$$\frac{n}{2}$$

turns per interval of cutting wherein n is an odd number, and cutting said twisted bundle obliquely with respect to the axis of said bundle.

3. Apparatus of the character described comprising a rotatable member, a channel therethrough having a substantially radially extending portion opening into the outer surface of said member, said surface being constituted by at least a portion of a conic surface and having its axis coincide with the axis of rotation of said member, and cutting means adjacent the path of said conic surface.

4. Apparatus of the character described comprising a rotatable member, a channel therethrough having a substantially radially extending portion opening into the outer surface of said member, said surface being constituted by at least a portion of a conic surface and having its axis coincident with the axis of rotation of said member, and cutting means substantially tangent to said surface.

5. In apparatus of the character described, centrifugal means for advancing a bundle of filaments and means for cutting said bundle obliquely with respect to its direction of advance.

6. In apparatus of the character described, centrifugal means for advancing a bundle of filaments and having a substantially radially extending channel connected with an axially extending opening, means for directing a bundle of filaments into said axial opening, and means for cutting said bundle obliquely with respect to its direction of advance from said radially extending channel.

7. Apparatus of the character described comprising a member having a frustro-conical peripheral surface rotatable upon its axis, a channel having a substantially axially extending mouth and a substantially radially extending portion opening into said peripheral surface, a cutting device arranged adjacent to said peripheral surface and means for rotating said member.

8. Apparatus of the character described comprising means for twisting a bundle of continuous filamentary material and means for cutting said twisted bundle at spaced intervals therealong obliquely with respect to the length of said bundle.

9. Apparatus of the character described comprising means for imparting a twist to a bundle of continuous filamentary material and means for cutting said twisted bundle obliquely with respect to the length of said bundle at successive points spaced so that the bundle in the interval therebetween has substantially

$$\frac{n}{2}$$

turns where n is an odd number.

ROBERT A. SMITH.