Jan. 25, 1944. C. A. CASTELLAN 2,339,765

STAPLE FIBER CUTTER

Filed Oct. 22, 1942

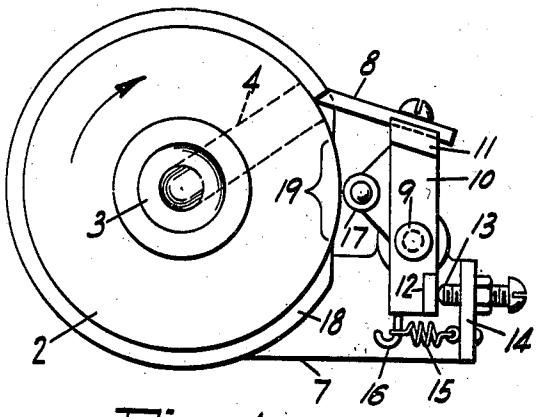



Fig-1-

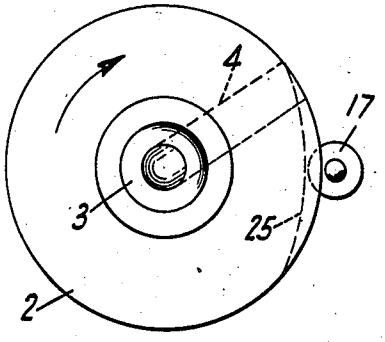



Fig-4-

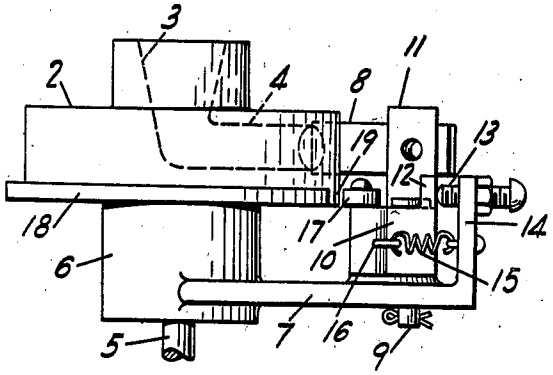



Fig-2-

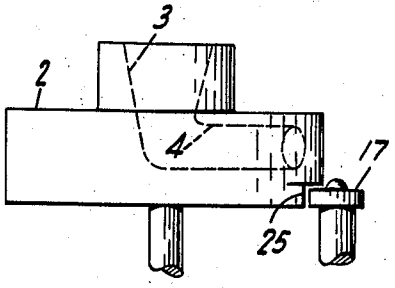



Fig-5-

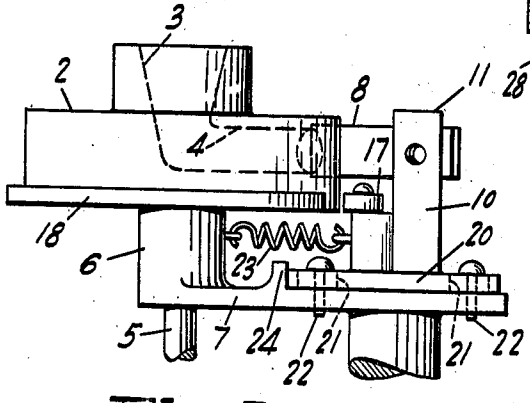



Fig-3-

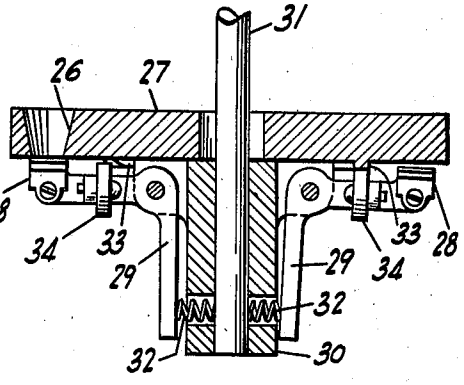



Fig-6-

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2,339,765

## STAPLE FIBER CUTTER

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8 Claims. (Cl. 164—61)

This invention relates to cutting devices particularly adapted to cut staple fibers from tows or ropes of continuous filamentary material, such as of rayon or other artificial filaments. It is concerned with cutters in which the filamentary tow is fed transverse of a cutting plane or shearing surface, such as by passage through a suitable opening in a member, hereinafter generically referred to as a "shear member" or "shear plate," adapted to support the tow in, or bring the tow into, cutting relationship with the knife and in which there is continuous relative motion between the shear member and the knife. Cutters of this character are illustrated in Beria Patent 1,723,998 and Blaschke 2,182,193.

In such cutters, the knife bears constantly against the shear member even when not actually cutting. It is an object of this invention to remove the knife from contact with the shear member during most of the non-cutting portion of each cycle of relative movement between the knife and shear member so that a proportional decrease in the wear of the knives and in the power consumption needed to drive the movable member of the cutter may be obtained. The resulting economies are, of course, especially important when operation is desired at high speeds of the movable member of the cutter.

In the drawing, illustrative of the invention,

Figure 1 shows a plan view of one embodiment of the invention,

Figure 2 is an elevational view of the embodiment of Figure 1,

Figure 3 is an elevation of a second embodiment of the invention,

Figure 4 is a plan view of a third embodiment of the invention,

Figure 5 is an elevational view of the embodiment of Figure 4, and

Figure 6 is an elevation partially in cross-section, showing another embodiment of the invention.

The embodiments of Figures 1 to 5 illustrate three modifications of the invention adapted to the type of cutter shown in the Beria patent cited above while Figure 6 shows a modification adapted to the type of cutter shown in the Blaschke patent cited above.

In Figures 1 and 2, the shear member is represented as the disk 2 which is provided with an axial channel 3 communicating with a radial channel 4 for receiving the tow into the central portion of the disk and feeding it radially outward therefrom. The disk 2 is mounted for rotation upon the shaft 5 within suitable bearings including an upper bearing 6 provided with an arm 7 adapted to support the knife 8 (the other bearings not being shown). The knife 8 is pivotally supported by an upright pin 9 upon the arm 7. The knife supporting block 10 is provided with an upstanding member 11 upon which the knife 8 is secured and a second upstanding ear 12 which is adapted to abut against a bolt 13 adjustably fastened in an upright projection 14 from the arm 7. A spring 15 fastened to the upright projection 14 at one end and to a pin or hook 16 secured upon the knife support at the other end tends to swing the knife support 10 in a counterclockwise direction( as viewed in Figure 1) so that the ear 12 upon the knife support 10 tends to approach the adjustable bolt 13. The knife support 10 is also provided with a cam follower 17, such as a roller suitably pivoted thereon, which is adapted to cooperate with a cam rim 18 formed integrally with the disk 2 attached thereto. The cam rim 18 is provided with a dwell or a cut-away portion 19 so that along this portion of the rotational cycle of the disk, the cam follower is freed and the knife is caused by spring 15 to approach and make contact with the external periphery or shear surface of the disk or shear member when the radial channel 4 presenting the filamentary tow is almost in cutting position. Shortly after cutting, the cam surface of rim 18 forces the follower 17 and knife 10 outwardly, thereby removing the knife from contact with the shear surface until the next cutting position is attained.

Although only one knife is shown cooperating with the disk of Figures 1 and 2, a plurality of knives may be employed and they may be disposed at equal distances about the periphery of the disk 2 or at unequel distances to obtain in the former case staple fibers of substantially uniform length and in the latter case of various lengths depending on the knife spacings about the disk. When more than one knife is employed, each knife may be supplied with a follower to cooperate with the cam rim upon the disk in a maner analogous to that of the knife shown in Figures 1 and 2. Where the knives are spaced at equal distances about the periphery of the disk, the cam surface may be so constructed that during operation, at least one of the knives is in contact with the peripheral surface of the disk throughout each revolution thereof. Thus, if four knives were provided about the disk, the cam may be provided with a dwell or cut-away portion such that each knife is in contact with the periphery of the disk during one-fourth of

its revolution. In that way, fluctuation in the speed of rotation of the disk during a given revolution may be substantially eliminated and the wear in each of the knives is equalized. Besides reducing the wear of each knife to one-fourth of what it would be if all of them were allowed to stay in contact with the periphery of the disk throughout each revolution during operation, the power consumed in driving the disk is considerably reduced. Where the knives are spaced at unequal distances about the disk, additional cam rims may be provided offset in parallel horizontal planes from the plane of the cam rim of Figure 2 and each knife may be provided with a follower adapted to cooperate with only one of the several cams. In this way, by correlating the various spaces between the knives with the length of the dwell in each of the several cams, one of the knives may be made to remain in contact with the periphery of the disk until the next makes contact with it and so on so that the wear upon the knives will be more equally distributed among them and fluctuation of speed will be minimized.

Figure 3 shows a modification in which the pivotal action of the knife support 10 is substituted by a reciprocatory action. In this embodiment, the knife support 10 is provided with a base 20 having slots 21 extending radially from the axis of the disk 2. These slots serve as guideways for bolts or pins 22 secured in the arm 7 supporting the knife support 10. A spring 23 having one end attached to the upper bearing 6 and the other end attached to the knife support 10 tends to press the knife support 10 with the knife 8 toward the disk 2 and an abutment 24 extending above the arm 7 serves as a limiting stop for this motion. If desired, the abutment 24 may be attached adjustably to the arm 7. As in the preceding embodiment, a follower 17 is provided to cooperate with the cam rim 18 formed in similar manner to that of Figures 1 and 2. The operation of the device of Figure 3 is similar to that of Figures 1 and 2 but in place of the rocking or pivotal motion imparted to the knife holder 10 by the operation of the cam against the follower in Figures 1 and 2, the operation of the cam against the follower in Figure 3 causes sliding or reciprocatory motion of the knife support 10.

In Figures 4 and 5 a modification is shown in which in place of having a cam rim 18 extending outwardly from the periphery of the disk 2 for the desired portion of the circumference thereof, a portion of the disk periphery itself serves as a cam, a complementary portion 25 being cut away so that when the follower 17 enters the cutaway portion under the action of spring 15 or 23, the knife comes into contact with the periphery of the disk as in the preceding embodiments.

Figure 6 shows a modification of the invention applied to the type of cutter shown in Blaschke 2,182,193. In this cutter, the filamentary tow is fed downwardly through the opening 26 in a stationary shear member 27 whose lower surface in proximity to the opening serves as a shearing surface in cooperation with the knife or knives 28. The filamentary tow may be fed downwardly into this opening by suitable means, such as by the annular jet of fluid, such as air, shown in the Blaschke patent. The knives are carried upon bell-crank levers 29 pivotally mounted upon a hub 30 carried upon a shaft 31 for rotation therewith. The arms of the bell-crank levers opposite to the arms carrying the knives may be pressed outwardly from the shaft 31 by suitable springs 32 bearing against the shaft and housed in recesses within the rotary member or hub 30. As so far described, the cutter is no different than that shown in the patent cited. In accordance with the invention, however, a cam ring 33 is formed integrally or attached upon the under surface of the stationary shear member 27, this cam ring having a dwell in the form of a part omitted adjacent the opening 26 in the stationary shear member 27. The arms of the bell crank levers carrying the knives are each provided with a follower 34, preferably, in a form of a roller which is adapted to cooperate with the cam ring 33. In this manner, as the shaft rotates the rotary member 30 carrying the knives 28, the cam ring 33 on the stationary shear member forces the followers 34 downwardly, thereby keeping the knives out of contact, until they approach the opening 26 in the shear member 27 through which the filamentary tow is presented for cutting in which position, by virtue of the dwell in the cam ring, the springs 32 are allowed to act to force the knives 28 into contact with the shear member 27. In this embodiment, one or more knives may be carried by the rotary member 30 and when a plurality of knives are carried thereby, the cam ring 33 may be so constructed as to allow one of the knives to be in contact with the shear member 27 throughout operation. This may be done whether the knives are equidistantly or otherwise spaced about the rotary member 30. Where they are not so equidistantly spaced, the stationary shear member 27 may be provided on its under surface with a plurality of concentrically offset cam rings and each of the bell crank levers may be provided with a follower adapted to follow only one of the cam rings analogous to the system described above with respect to Figures 1 and 2. It is to be understood that the stationary shear member 27 may be provided with more than one opening through which tows may be introduced in which case a plurality of tows may be cut simultaneously, one tow being cut at each of the openings.

The embodiments illustrated in Figures 1 to 5 may be applied to a modification in which the knife or knives 8 instead of being stationary are caused to rotate with their cam followers 17 about the disk 2 carrying the cam 18. For example, the invention may be applied to the form of cutter shown in Lodge U. S. Patent 2,278,662.

While preferred embodiments of the invention have 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 and scope of the invention as defined by the appended claims.

I claim:

1. In a cutting device comprising a cutting member, a shear member having at least one portion adapted to serve as a cutting base in cooperation with the cutting member and having at least one portion not so adapted, means for imparting continuous motion to one only of the members relative to the other to effect cyclical juxtaposition of the cutting and non-cutting portions of the shear member with respect to the cutting member to effect intermittent cutting, the combination therewith of means for separating the cutting member from contact with said shear member during a substantial part of the periods of juxtaposition of the non-cutting por-

tion of the shear member with respect to the cutting member.

2. In a cutting device comprising a cutting member, a shear member having at least one portion adapted to serve as a cutting base in cooperation with the cutting member and having at least one portion not so adapted, means for imparting continuous motion to one only of the members relative to the other to effect cyclical juxtaposition of the cutting and non-cutting portions of the shear member with respect to the cutting member to effect intermittent cutting, the combination therewith of cam means for separating the cutting member from contact with said shear member during a substantial part of the periods of juxtaposition of the non-cutting portion of the shear member with respect to the cutting member.

3. In a cutting device comprising a cutting member, a shear member having at least one portion adapted to serve as a cutting base in cooperation with the cutting member and having at least one portion not so adapted, and means for imparting continuous motion to one of the members relative to the other to effect cyclical juxtaposition of the cutting and non-cutting portions of the shear member with respect to the cutting member to effect intermittent cutting, the combination therewith of a cam follower on the cutting member and of cam means on said shear member arranged to separate the cutting member from contact with said shear member during a substantial part of the period of juxtaposition of the non-cutting portion of the shear member with respect to the cutting member.

4. In a device for cutting a filamentary bundle to discontinuous lengths, a rotatable shear member arranged to discharge the filamentary bundle outwardly from its axis, means for rotating the member, at least one knife arranged to cooperate with the shear member to cut the outwardly extending bundle intermittently, and means for separating the knife from contact with the shear member during a substantial part of the period intervening between successive cuttings.

5. In a device for cutting a filamentary bundle to discontinuous lengths, a rotatable shear member arranged to discharge the filamentary bundle outwardly from its axis, means for rotating the member, at least one knife arranged to cooperate with the shear member to cut the outwardly extending bundle intermittently, a cam on the shear member, a support for the knife carrying a follower, the cam and follower being arranged to take the knife out of contact with the shear member during a substantial part of the period intervening between successive cuttings.

6. In a device for cutting a filamentary bundle to discontinuous lengths, a disk having an axial channel for receiving the bundle connected to a radial channel for feeding the bundle outwardly therefrom, means for rotating the disk, at least one knife arranged about the periphery of the disk to cooperate with the opening of the axal channel in the disk to cut the outwardly extending bundle intermittently, a cam on the disk, a support for the knife carrying a follower, the cam and the follower being arranged to take the knife out of contact with the disk during a substantial part of the period intervening between successive cuttings.

7. In a device for cutting a filamentary bundle to discontinuous lengths, a stationary shear member having an opening, a support carrying a knife for cooperating with the shear member to sever bundle extending through said opening, means for rotating said support with respect to the shear member to effect intermittent cutting, and means for separating the knife from contact with the shear member during a substantial part of the period intervening between successive cuttings.

8. In a device for cutting a filamentary bundle to discontinuous lengths, a stationary shear member having an opening, a support carrying a knife for cooperating with the shear member to sever bundle extending through said opening, means for rotating said support with respect to the shear member to effect intermittent cutting, a cam on the sear member, a support for the knife carrying a follower, the cam and follower being arranged to take the knife out of contact with the shear member durng a substantial part of the period intervening between successive cuttings.

CARL A. CASTELLAN.