

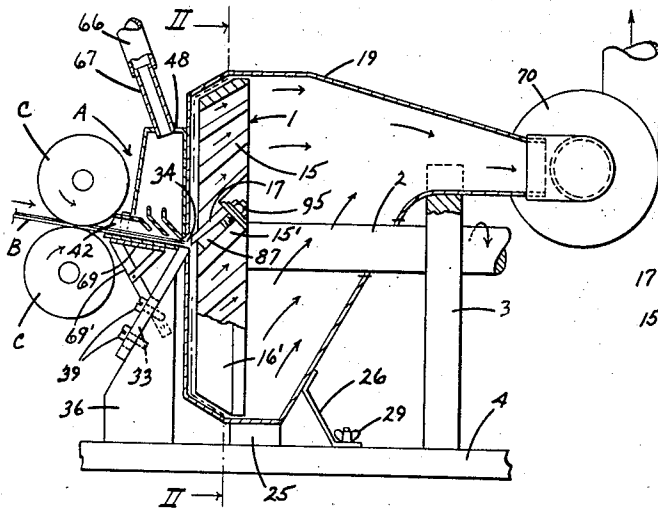
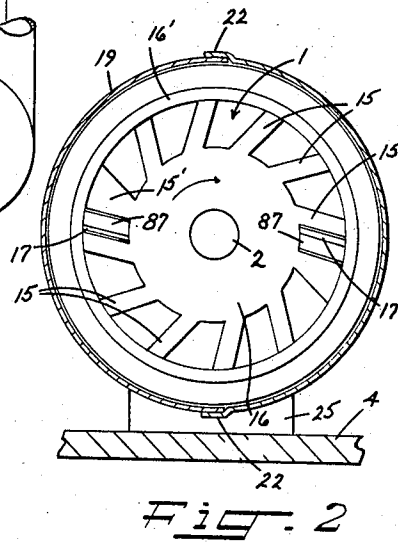
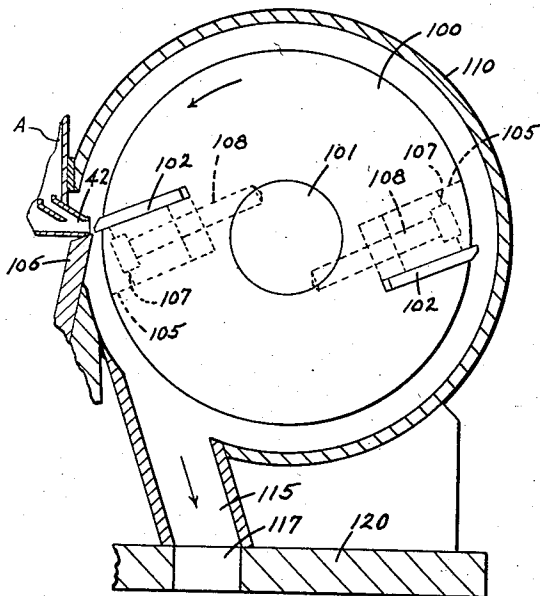
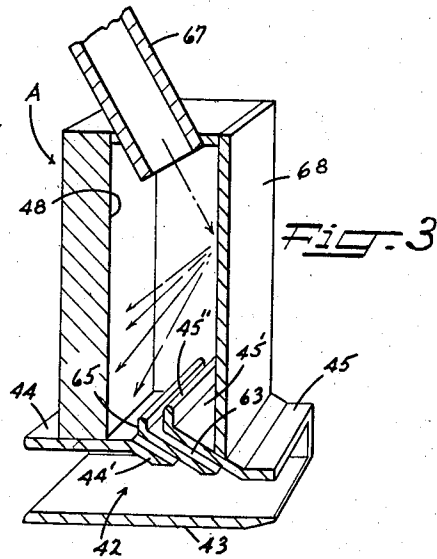
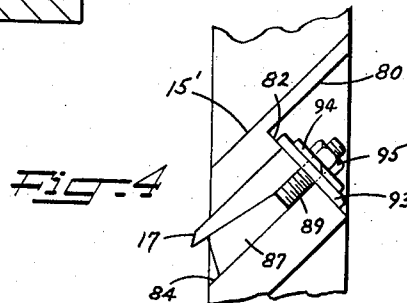
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FIBER CUTTER

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1

2,846,004

FIBER CUTTER

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The present invention relates to an apparatus and method for producing staple fiber or fiber flock material. In particular, the invention relates to an apparatus for cutting staple fiber or flock material from bundles of continuous textile filaments or bundles of fibers which bundles are fed to the cutter in either a dry or wet condition.

The main difficulty encountered in producing fiber flock or staple is that it is difficult to obtain accurate cut fiber length since the arrangement of the individual yarn filaments within the bundle or tow are disturbed as the tow approaches the cutting area. The disturbance results from a turbulent air condition adjacent the cutting area created by the rapid rotation of the cutter head and blades affixed thereto. Such turbulence causes the filament ends adjacent the cutter to fan out, curl up, flutter and otherwise become disarranged. At the present time, there is no satisfactory cutter on the market for cutting flock material of accurate length, especially flock lengths as low as 1/2 millimeter in length from yarn filaments or fibers in a dry condition.

It is therefore one object of my invention to provide a flock or fiber cutter which will cut yarn or fiber bundles in either dry or wet condition into accurate and uniform fiber lengths.

It is a further object of my invention to provide a flock cutter wherein the supply bundle of yarn or fibers is urged firmly against the cutting edge of a stationary blade as it is being cut whereby disturbance of the supply filaments or fibers adjacent the cutting area is prevented.

It is still a further object of my invention to provide in a fiber cutter an aspirator or air blasting unit which both aids in feeding and guiding the supply yarn or fiber bundle to the cutting area and angularly directs a fluid medium against the bundle as it passes over the cutting edge of the stationary blade whereby the supply of filaments or fibers is urged firmly against the cutting edge of a stationary blade as it is being cut.

It is still another object of my invention to provide a suitable fiber draw-off device whereby the cut fiber may be rapidly removed from the cutting area.

Other objects and advantages of my invention will become more apparent from a study of the following description and drawings wherein:

Figure 1 is a side view partially sectioned of the fiber cutter;

Figure 2 is a section taken along lines II, II of Figure 1;

Figure 3 is a perspective partially in section of the aspirator unit which guides the fiber or continuous filament supply bundle to the cutting area and also urges the supply bundle firmly against the cutting edge of the stationary blade;

Figure 4 is an enlarged fragmentary detail showing the manner in which the rotating cutting blades are mounted in the cutter head; and

Figure 5 is a view of a modification of the fiber cutter of Figure 1.

Briefly, the apparatus of my invention includes a ro-

2

tatable fan type cutter head with at least one fiber cutting blade mounted therein which blade cooperates with a stationary fiber cutting blade to shear or cut off staple fiber or flock-sized fiber from a supply bundle of fibers or filaments fed to the stationary blade. A pair of feed rolls directs the supply yarn or fibers into an aspirator unit which feeds the supply to the cutting area and which also directs a blast of a fluid medium, such as compressed air, against the bundle at an angle to the path of bundle travel whereby the bundle is urged firmly against the cutting edge of the stationary blade. In addition, the blast of air prevents the individual filament ends or fibers within the supply bundle from becoming disarranged adjacent the cutting blades because of air turbulence created by the rotating cutter head. The fan blades are canted and during rotation they create a suction which moves the air and cut fibers in an axial direction through the open spaces between the blades. A housing is positioned around the cutter head and a blower positioned therein behind the cutter head cooperates with the cutter head and the aspirator to create a suction within the housing in a direction away from the cutter head whereby the cut fibers are even more rapidly drawn away from the cutting area. In addition, the suction will help to prevent the filament ends or fibers within the supply bundle from becoming disarranged as they pass to the cutting edge of the stationary blade.

Referring now to the drawings, and especially Figures 1 and 2, a preferred embodiment of my fiber cutter comprises a rotatable propeller or fan type cutter head 1 mounted on a drive shaft 2 which is journaled in support 3 affixed to the main support 4. The cutter head 1 has fan blades 15, 15 which extend radially in overlapping manner from the hub 16 to the rim 16' of the head 1. The blades 15, 15 are canted as they extend from the hub whereby when the head 1 rotates, air and cut fibers or flock move in an axial direction through the open spaces between the blades 15, 15. The rim 16' stabilizes the blades to minimize vibration thereof during rotation. Fiber cutting blades 17, 17 are mounted in the ribs 15', 15' in a manner to be described hereinafter. The cutter head 1 and shaft 2 are enclosed in a suitable housing 19 formed of two separate pieces as shown in Figure 2 which overlap and snap into interlocking relationship as at 22, 22. The hood is supported by the supports 3 and 25. In addition, a supporting clamp 26 is affixed to the bottom portion of one of the halves of the hood 19 and is adapted to be secured to the main support 4 by wing nut 29.

The cutting edge of a stationary blade 33 cooperates with the rotatable blades 17, 17 through a slot 34 in the face of the housing and is adjustably supported on support 36 secured to the primary support 4. As seen in Figure 1, the blade 33 is held in place by bolts 39, 39 which extend through slots in the blade 33 and into the support 36. By loosening the bolts 39, 39 the vertical position of the blade may be adjusted as desired.

An aspirator or air blasting unit A (also see Figure 3) is provided for aiding in the guiding and feeding of a bundle B of fibers or continuous filaments to the cutting edge of the stationary blade 33, for urging the bundle firmly against the cutting edge of the stationary blade, and for controlling the individual filament or fiber arrangement within the bundle as it passes over the stationary blade cutting edge. The aspirator A, in its preferred form, includes an open end guide chamber 42 which receives the supply bundle of fibers or filaments B from a pair of feed rolls C, C. The bottom plate 43 of guide chamber 42 at the exit end thereof contacts the stationary blade and terminates at a point immediately adjacent the cutting edge of the stationary block 33.

The top plates 44 and 45 of the guide chamber 42 (Figure 3) extend inwardly for a distance from opposite

3

ends of the chamber 42. The plate 44 angles downwardly to form a foot or baffle plate 44' while the plate 45 swings upwardly to form an inclined section or baffle plate 45' which terminates in a vertical foot 45". The channel formed between the foot 44' of plate 44 and the inclined section 45' of plate 45 intersects the bottom plate 43 at the exit end thereof at approximately a 30° angle thereto. An open bottom chamber or housing 48 is affixed to the top plates 44 and 45' of guide chamber 42 to straddle the channel between the plates 44' and 45'. An additional baffle plate 63 is provided which is fixed to the walls of the chamber 48 and extends downwardly through the channel formed by the plates 44' and 45' into the guide chamber at approximately a 30° angle to the bottom plate 43 of guide chamber 42. The plate 63 lies parallel with the plates 44' and 45' whereby two channels are actually formed which are in direct alignment with the exit of the bottom plate 43 of the guide chamber 42. The baffle plate 63 terminates in a vertically extending foot section 65 extending upwardly within the chamber 48.

Compressed air is introduced into the chamber 48 through a flexible tube 66 and a rigid tube 67 which extends within the top portion of chamber 48. The air strikes the wall 68 of chamber 48 at approximately a 30° angle thereto. The chamber walls guide the air in a path (indicated by the arrows, Figure 3) down to and through the channels formed by the baffles 44', 63 and 45'. The foot sections 45" and 65 of the baffles guide the compressed air into the channels between the baffle plates 44', 45' and 63. The streams of air emerging from the channels between the baffle plates strike both the end of the bottom wall 43 at the exit end of the guide chamber 42 and the cutting edge of the stationary blade immediately adjacent thereto at approximately a 30° angle to the plane of the bottom wall 43 and the cutting edge of the stationary blade 33. The air blast is in the direction of travel assumed by the supply bundle over the cutting edge of the stationary blade 33. The aspirator unit B has several functions. It aids in feeding and guiding the fibers or filaments to the cutting edge of the stationary blade 33 and holds them down on the cutting edge of the stationary blade. In addition, it prevents the individual filament or fiber ends of the supply bundle adjacent the cutting blades from being disarranged by the turbulent air as created by rotation of the cutter head 1. The entire aspirator assembly A is affixed to plate 69 which, in turn, is supported by a Y bracket 69' affixed to support 36.

To provide for rapid withdrawal of the cut flock or staple fiber from the cutting area a source of vacuum such as a blower 70 connected with the housing 19 creates a strong flow of air or suction passing from the aspirator A through the spaces between the fan blades 15, 15 toward the rear of the hood 19 from which it is expelled. The cut fibers are picked up by the air flow and carried along therewith. With this arrangement, any regrinding of the cut fibers by the blades or adhering together of the fibers is prevented.

With the above described cutter, the supply bundle is under control at all times whereby uniformity and accuracy of fiber length is achieved throughout the cutting operation.

Figure 4 illustrates the manner in which the rotating blades 17, 17 are mounted on the cutter head 1. As seen therein, an elongated slot 80 is cut into the back portion of the rib 15' and extends partially therethrough to form a shoulder 82. A second elongated slot 84 in alignment with the slot 80 is cut into the front portion of the rib 15' and extends into the slot 80. A cutting blade 17 in the form of a wedge shaped tool bit is positioned within the second slot 84. A wedge shaped plug 87 is also positioned within the second slot 84 and cooperates with the bit 17 to firmly hold the bit 17 in place within the second slot 84. The plug 87 terminates in a threaded portion or screw 89 which extends upwardly into the slot 80

4

through a removable plate 93. A washer 94 and a lock nut 95 fit over the free end of the shaft 89. After properly adjusting the cutting blade or bit 17 within the front or second slot 84, the lock nut 95 is then tightened to draw the plug 87 upwardly into the second slot 84 to wedge it tightly against the blade 17 to firmly hold the blade in place. The blade 17 may have several threaded portions or screws 89 with additional lock nuts 95. With such an arrangement, shuttering or oscillation of the blade is prevented regardless of the R. P. M. of the cutter head 1. By adjusting the position of the blade 17 within the slot 84 the length of the cut fibers or flock may be accurately controlled.

Figure 5 illustrates an embodiment of my invention wherein a solid side cutter head 100 is used instead of the end cutter head 1 of Figure 1. The rotating fiber cutting blades 102, 102, in this instance, extend through and beyond the periphery of the disc cutter head 100. To mount the blades 102, 102 within the head 100, elongated slot 105, 105 are cut into the head through the periphery thereof. A fiber cutting blade 102 and a wedge 107 are inserted within the slot 105. A bolt 108 extends through the shaft in the wedge 107 and through an aligned threaded hole within the cutter head 100. By tightening the bolts 108, the wedge 107 is forced into the slot 105 to firmly hold the blade 102 in position. The rotatable blades 102, 102 cooperate with the stationary blade 106 to cut flock material or staple fiber from a supply bundle of continuous filaments or staple fiber fed to the cutting area through the aspirator unit A.

The cutter head 100 is driven by shaft 101 and a housing 110 is positioned over the cutter head 100 and the drive shaft. The housing is so constructed that it defines a passageway 115 leading off from the cutting area through an opening 117 in the primary support 120. A source of vacuum such as a blower (not shown) is connected with the passageway 115 whereby a flow of air is created from the cutting area through the channel 115. The air flow picks up the cut fibers and rapidly removes them from the cutting area thus preventing any regrinding of the fibers between the rotating and stationary blades.

It should also be understood that the length of the cut fibers or flock may be varied by adjusting the speed of the feed rolls B, B, by varying the number of rotating knives on the cutter head, or by adjusting the R. P. M. of the cutter head.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the present invention as defined in the appended claims.

I claim:

1. A fiber cutter comprising a rotatable cutter head mounted on a drive shaft, a stationary blade mounted adjacent the cutter head over which blade travels a supply bundle of filaments or fibers to be cut, at least one cutting blade secured to the cutter head which cooperates with the cutting edge of said stationary blade, an aspirator unit mounted adjacent the stationary blade which unit comprises a lower walled guide chamber for the supply bundle of filaments or fibers, the exit end of said guide chamber lying immediately adjacent the cutting edge of the stationary blade, a channel extending through the top surface of the lower guide chamber which channel is in alignment with the end of the bottom wall of the guide chamber at the exit end of the chamber at approximately a 30° angle thereto, and an upper walled chamber affixed to the top wall of the guide chamber which communicates with the lower guide chamber through said channel and into which air under pressure is supplied.

2. A fiber cutter comprising a rotatable cutter head mounted on a drive shaft, a stationary blade mounted adjacent the cutter head over which blade travels a supply bundle of filaments or fibers to be cut, at least one cutting blade secured to the cutter head which co-

5

operates with the cutting edge of said stationary blade, an aspirator unit mounted adjacent the stationary blade which unit comprises an open-end walled guide chamber for the supply bundle of filaments or fibers wherein the exit end of said chamber lies immediately adjacent the cutting edge of the stationary blade, said guide chamber having a pair of top wall sections which extend toward each other from opposite ends of the chamber and which terminate in angularly extending portions to form a channel through the top of the chamber which channel is in alignment with the end of the bottom wall of the guide chamber at the exit end of the chamber at approximately a 30° angle thereto, and a bottomless walled upper chamber affixed to the top surface of the guide chamber which chamber communicates with the guide chamber through said channel, and a conduit extending into the upper chamber at approximately a 30° angle to one side of the side walls of the chamber for introducing air under pressure into the upper chamber from which point the air is guided by the chamber walls through the channel in the direction of travel of the supply bundle through the guide chamber and against

10

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both the bottom wall of the guide chamber at the exit end thereof and the cutting edge of the stationary blade immediately adjacent thereto.

3. A fiber cutter according to claim 2 comprising an additional plate positioned between the angularly extending portions of the two top sections of the guide chamber which plate divides the channel formed therebetween into two channels.

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