Jan. 28, 1958 R. D. HEFFELFINGER ET AL 2,821,253

FIBER CUTTER

Filed April 14, 1955 2 Sheets-Sheet 1

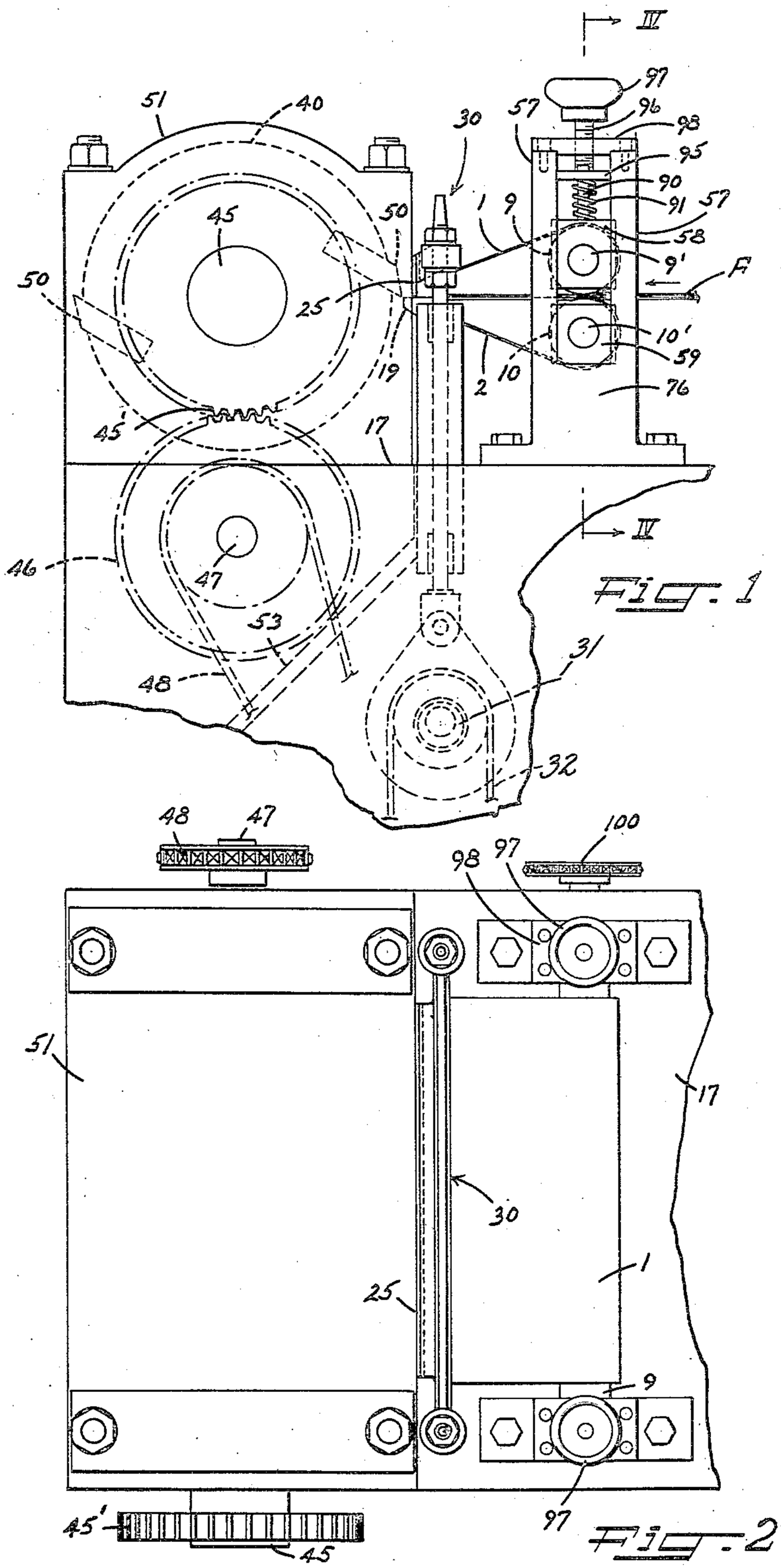

Fig. 1

Fig. 2

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Filed April 14, 1955 2 Sheets-Sheet 2

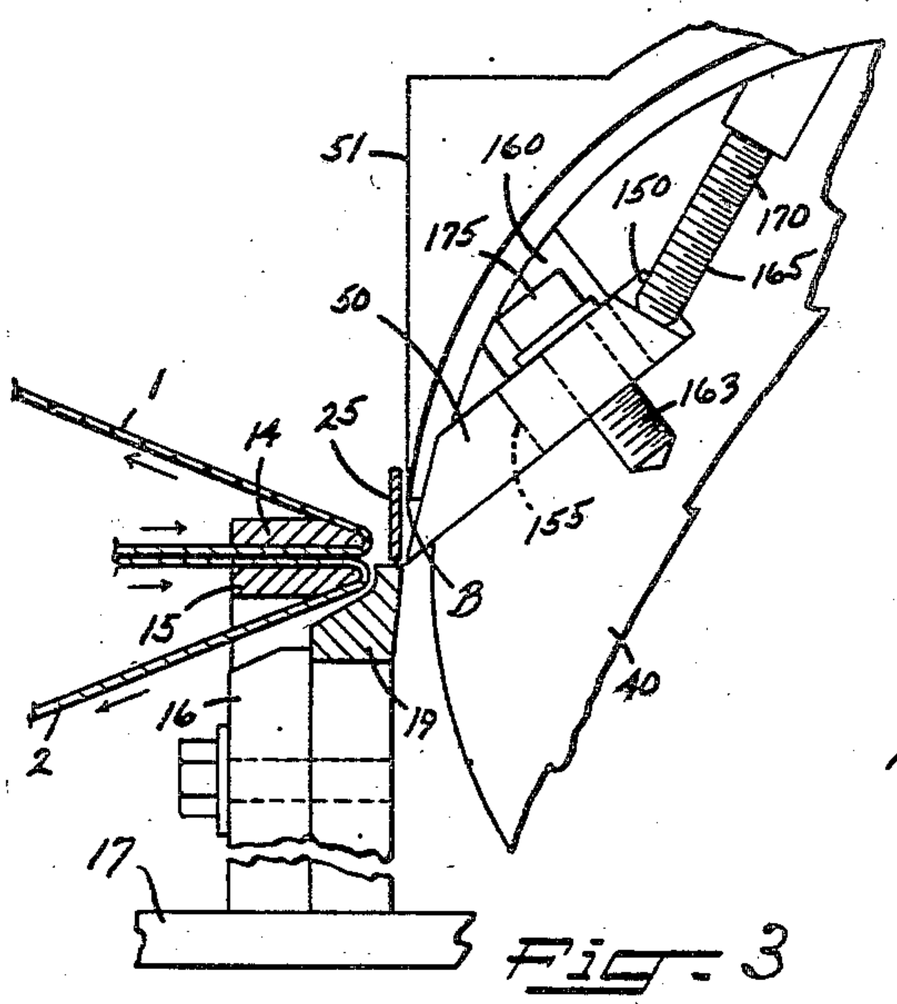

Fig. 3

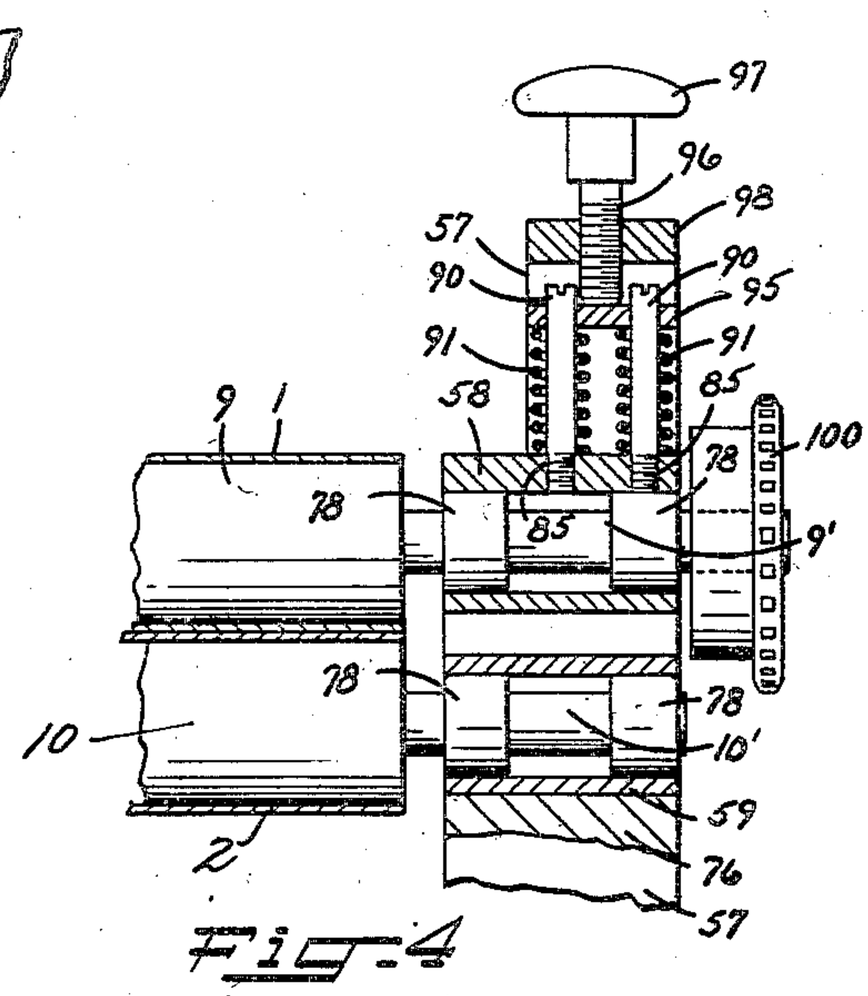

Fig. 4

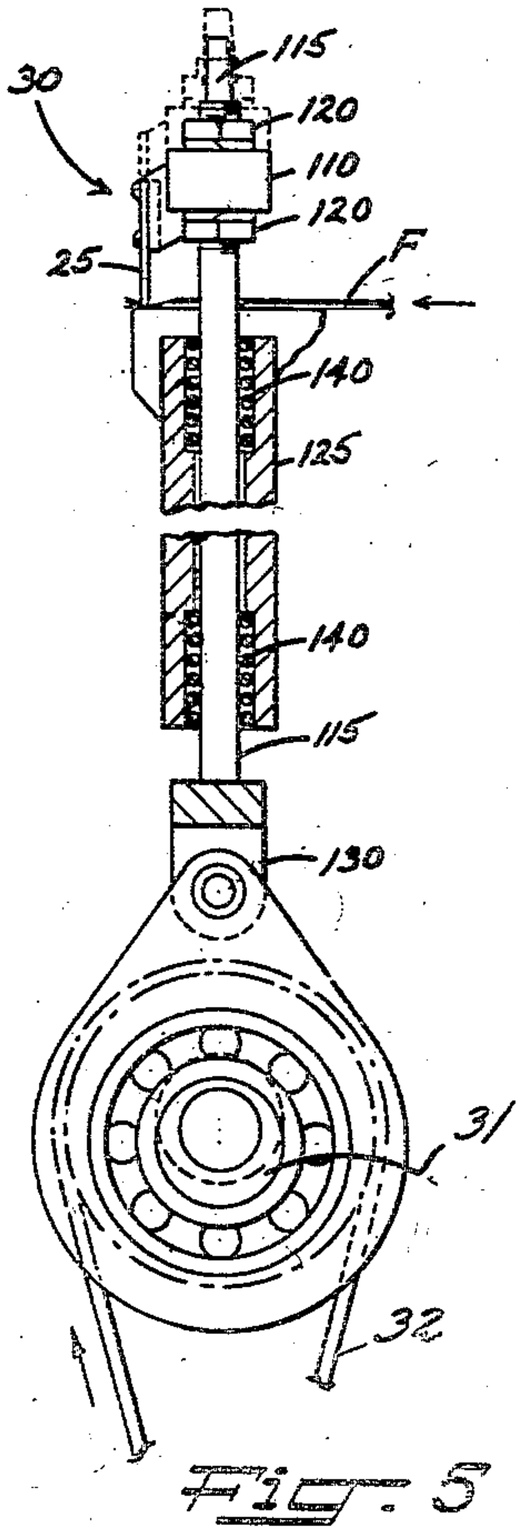

Fig. 5

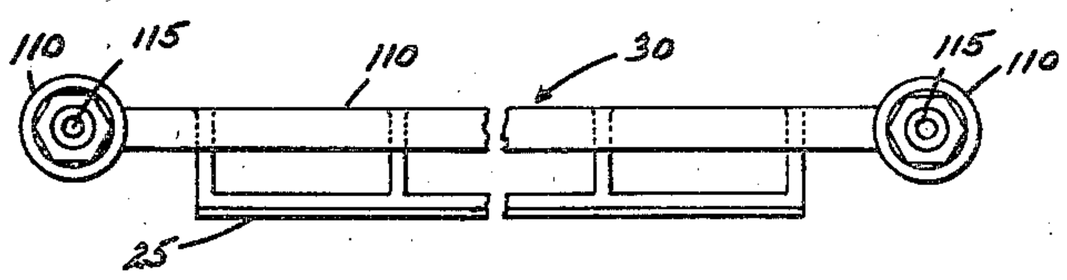

Fig. 7

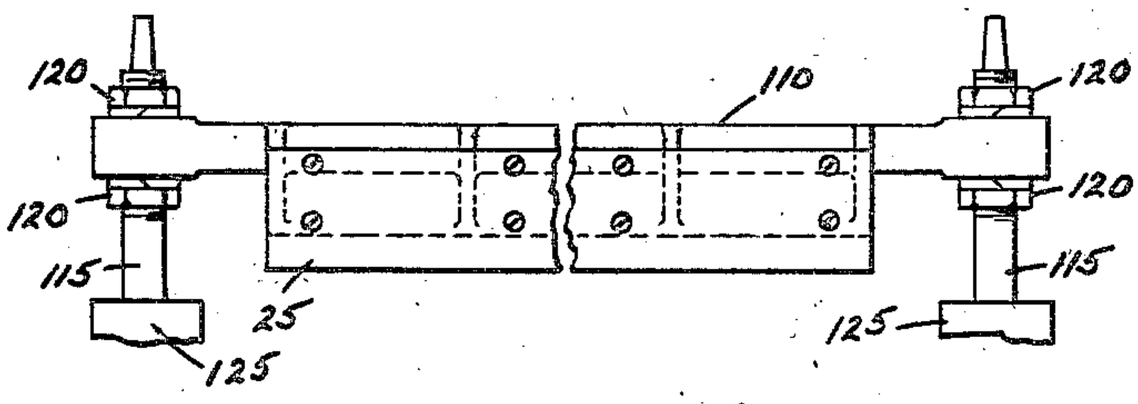

Fig. 6

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FIBER CUTTER

Robert D. Heffelfinger, Lansdowne, and Richard MacHenry, Prospect Park, Pa., assignors to American Viscose Corporation, Philadelphia, Pa., a corporation of Delaware

Application April 14, 1955, Serial No. 501,224

3 Claims. (Cl. 164—68)

The present invention relates to a cutting apparatus for producing fibers such as staple fiber or flock material from supply bundles of fibers or filaments. In particular, the invention relates to an apparatus for producing flock material or staple fiber of accurate length from supply bundles of textile filaments or fibers which are fed to the cutter.

The main difficulty encountered in cutting supply bundles of filaments or long length fibers to produce fiber flock material or staple fiber is that it is difficult to obtain accurate and uniform cut fiber lengths. Such nonuniformity in the cut fiber length occurs because the arrangement of the individual yarn filaments or fibers within the supply bundle are disarrayed as the bundle approaches the cutting blade. The disturbance of the supply filaments or fibers results from a turbulent air condition adjacent the cutting point which turbulence is set up or created by rapid rotation of the cutter head having one or more cutting blades mounted therein which cooperate with a stationary blade to cut or shear off the supply fibers or filaments. The air turbulence causes the filaments or fibers adjacent the cutting edge of the stationary blade to fan out, curl up, flutter or otherwise become disarranged.

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

It is a further object of our invention to provide a flock or staple fiber cutter wherein the filament or fiber supply bundle is firmly held against the stationary blade as it is being cut whereby disturbance of the fiber or filament arrangement within the bundle adjacent the cutting edge of the stationary blade is prevented.

It is still a further object of our invention to provide in a fiber or flock cutter a vertically reciprocating hold-down or pressing unit for holding the supply bundles or tows of fibers against the stationary blade during the cutting operation.

Still another object of my invention is to provide in a fiber or flock cutter a feeding means which feeds a supply bundle of filaments or fibers to the cutting station and which maintains the supply bundle in a confined path until the bundle reaches the exact point of cutting whereby the fiber or filament arrangement within the bundle traveling to the cutting point is not disturbed by the air turbulence adjacent the cutting point as created by the rapid rotation of the cutter head.

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

Figure 1 is a side view of the fiber cutter assembly;

Figure 2 is a top view of the fiber cutter;

Figure 3 is an enlarged detail showing the cooperating relationship between the elements of the cutter assembly adjacent the cutting area;

Figure 4 is an enlarged fragmentary view taken along lines IV—IV of Figure 1;

Figure 5 is an enlarged end view of the reciprocating hold-down unit for the supply fiber bundle;

Figure 6 is a front view of the hold-down or pressing unit; and

Figure 7 is a top view of the reciprocating hold-down or pressing unit.

Briefly, our fiber cutter comprises a rotatable cutter head or disc with at least one cutting blade secured thereto. A stationary cutting blade mounted adjacent the path of the rotating blades cooperates with the rotating blades to shear off the fiber or filament bundle supply in a scissor-like manner. Cooperating endless belt conveyors feed the fiber or filament bundle to the stationary cutting blade, the supply bundle passing between the nip formed by the belts whereby the fiber or filament arrangement within the bundle traveling to the cutting point is not disturbed by the turbulent air adjacent the cutting point as set up or created by the rapidly rotating cutter head. A vertically reciprocating hold-down unit including a presser bar operates to press or hold-down the supply fiber bundle against the stationary blade as the bundle emerges from the belt feed thereby also preventing disarrangement of the individual fibers or filament ends lying over and against the cutting edge of the stationary blade.

Referring now to the drawings and more particularly to Figures 1, 2 and 3 wherein is shown a preferred embodiment of our invention, the fiber cutter comprises a pair of cooperating upper and lower endless belts **1** and **2** which feed the supply bundle of fibers or filaments F to the cutting area. Belt **1** is positioned around drive roll **9** and plate **14** while belt **2** is positioned around drive roll **10** and end plate **15** (see Figures 1 and 3). The plates **14** and **15** are affixed to the support **16** which is in turn secured to the primary support **17** (Figure 3). The fiber or filament supply budle F is conveyed or fed to the cutting area through the nip formed by the traveling belts 1 and 2. and emerges from between the belts at a point immediately adjacent the cutting point.

As the fiber or filament bundle F emerges from the nip formed between belts **1** and **2**, it passes over the cutting edge of the stationary blade **19** also secured to the support **16** (Figure 3). As mentioned above, the cutting edge of the stationary blade lies immediately adjacent the discharge end of the nip formed by the cooperating belts **1** and **2**. To prevent the individual fiber or filament arrangement from being disturbed as the bundle lies in position adjacent the cutting edge of the stationary blade **19**, a pressing bar or foot **25** secured to a vertically reciprocating unit **30** is provided (Figures 1 and 3). When the reciprocating unit **30** is in its down position the presser bar **25** firmly presses or holds the supply tow against the cutting edge of the stationary blade **19**. The reciprocating motion is imparted to the bar **25** by eccentric **31** driven by chain **32**.

For cutting the supply bundle F of fibers or filaments, a rotatable cutter head **40** is mounted on drive shaft **45** and is positioned immediately opposite the stationary blade **19**. Gear **45'** of shaft **45** is driven by gear **46** mounted on shaft **47** driven by chain **48** laced over the opposite end of shaft **47**. The cutter head **40** is preferably of the side cutter type having cutting blades **50**, **50** mounted therein with the cutting edges extending through the periphery of the head or disc. The path of the cutting blades **50, 50** lies immediately adjacent and opposite to the cutting edge of the stationary blade **19** and cooperates therewith to shear or cut the fibers or filaments of the supply bundle F in a scissor-like manner. A housing **51** is positioned over the cutter head

40 and is supported by the primary support or table 17. The face of the housing 51 is broken as at B (Figure 3) to permit the rotating blades 50. 50 to extend through the housing to cooperate with the cutting edge of the stationary blade 19. The cut fibers are caught by the inclined plate 53 and are collected as they slide off the lower end of the plate. The drive chain 48 for the cutter head 40 and the drive chain 32 for the reciprocating unit 30 are driven from the same shaft. The timing between the reciprocating unit 30 and the cutter head 40 is adjusted so that the presser bar 25 reaches its lowest point of descent just before one of the rotating blades 50 meets the stationary blade 19.

With the arrangement described above, the fiber or filament ends of the supply bundle F approaching the cutting edge of the stationary blade are prevented from fanning out, curling up, fluttering and otherwise becoming disarranged due to turbulent air conditions adjacent the stationary blade which turbulent condition is set up by the rotating cutter head. Such an advantage, of course, permits cutting the fibers in accurate desired lengths which may be as low as one-half millimeter in length. By timing or correlating the rate of reciprocation of the unit 30 with the rate of travel of the tow feeding conveyor belts 1 and 2, the desired length of the cut fibers may be predetermined.

As stated above, the endless belts 1 and 2, which feed the supply bundle F to the cutting edge of the stationary blade 19, rotate around the drive roll 9 and plate 14 and drive roll 10 and plate 15 respectively. In the preferred embodiments shown in Figures 1, 2 and 4, the upper and lower rolls 9 and 10 are mounted in end frames 57, 57 secured to the primary or table support 17. The shafts 9' and 10' for the rolls (Figures 1 and 4) are supported at each end thereof in bored blocks 58 and 59 respectively, the bottom block 59 for shaft 10' resting upon the lower cross strut 76 of end frame 57. Each shaft 9' and 10' is supported by bearings 78, 78 positioned within the blocks 58 and 59. To prevent the belt 1 from being raised or separated from belt 2 by the action of the supply bundle F of filaments or fibers passing between the belts 1 and 2, the top of block 58 has threaded holes 85, 85 therein which support pegs 90, 90 having tension springs 91, 91 fitted thereover. A plate 95 having holes drilled therein fits over the pegs 90, 90 and a threaded member 96 having a knob control 97 secured thereto is threaded through a tapped hole in the top cross strut 98 of the end frame 57. When the knob control 97 is rotated in a clockwise direction the plate 95 is forced downward compressing the springs 91, 91 which in turn force the roll 9 and belt 1 down against belt 2 and roll 10. The above structure is, of course, duplicated at the opposite ends of the shafts 9' and 10'. The roll 9 is driven through chain sprocket 100 of roll 9. The roll 10 is driven through a belt drive leading from the opposite end of roll 9 (not shown). With this arrangement, the belts are urged into cooperating relationship and yet will give or separate by virtue of tension springs 91, 91 to accommodate any varying thickness in the supply bundle F passing between the belts. As mentioned above, the tension on springs 91, 91 may be adjusted by the knob control 97.

The specific make up and structure of the reciprocating hold-down or pressing unit 30 for firmly holding down the bundle F against the stationary blade 19 as the bundle is being cut is shown more clearly in Figures 5, 6 and 7. The reciprocating hold-down or presser unit 30 comprises a pressing bar 25 secured to a casting or arm 110. The arm 110 has holes drilled through its extremities by which the arm is fitted over rods 115, 115. The arm 110 is supported and held in place on rods 115, 115 by lock nuts 120, 120 threaded over complementary threaded portions cut into the upper portions of the rods 115, 115. The pressing bar 25 is of a length sufficient to hold down a plurality of supply bundles F passing over the stationary

blade in side by side relationship. As seen more clearly in Figure 5 which shows the presser bar in its down position (solid lines) and in its raised position (dotted lines), each rod 115 is supported in a bearing 125 within which the rod reciprocates vertically. The vertical reciprocating motion is imparted to the rods 115 through connections 130 affixed at one end to the bottom of each rod 115 and affixed at the other end to an eccentric 31. Instead of the eccentric drive system, the rods 115, 115 may, if desired, be reciprocated by the use of suitable cam mechanisms. When in the down position, the bar 25 holds the supply bundle or bundles F in place against the cutting edge of the stationary blade 19 as the fibers or filaments are being cut. As seen in Figure 5, ball bushings 140, 140 as manufactured by the Thomson Industries, Inc. are provided for the reciprocating rods 115, 115.

By adjusting the rate of travel of the feed belts 1 and 2, the operator may regulate the length of the supply bundle passing over the stationary blade 19 between successive down positions of the presser bar 25, thereby controlling the length of the cut fibers. For optimum results, the presser bar 25 when in its down position is approximately one-eighth of an inch from the cutting edge of the stationary blade 19 and approximately one-sixteenth of an inch from the exit end of the nip formed by belts 1 and 2.

As mentioned above, when the pressing bar 25 is in its down position, it is pressing the supply bundle F against the stationary blade thus preventing the fiber or filament ends of the bundle which are about to be cut from curling, fluttering, flaring up, or otherwise becoming disarranged by the air turbulence created by rotation of the cutter head 40. In addition, since the supply bundle or bundles are confined between the feed belts 1 and 2 as they travel toward the cutting station, the bundles are sheltered or shielded from the turbulent air condition adjacent the cutter head whereby any disarranging of the fiber or filament order of the bundles is prevented as the bundles approach the cutting point.

For mounting the rotatable blades 50 in the cutter head 40 (Figure 3), upwardly inclined blade receiving channels 150 which extend lengthwise of the disc are cut into the disc periphery. The blade 50 has a number of slots 155 extending therethrough which extend through the blade thickness. Holes 160 are cut into the periphery of the head or disc 40 which intersect the channels 150 at substantially right angles thereto. Threaded holes 163 in alignment with the holes 160 lie on the opposite side of holes 160. Additional threaded holes 165, which accommodate blade adjusting threaded members 170, are cut into the disc through the peripheries thereof to angularly intersect the rear walls of channels 150.

To affix the blade 50 in place, it is inserted within the channel 150 after which the adjusting members 170 are adjusted to set the clearance, as desired, between the cutting edge of blade 50 and the cutting edge of the stationary blade 19. To firmly hold the blade in its adjusted position a screw 175 is inserted within the hole 160, through the blade slot 155 and into the threaded hole 163. When the threaded member 175 is tightened, the blade 50 is firmly locked in position within the cutter head 40.

With our fiber cutter as described above, staple fiber or flock material may be produced in accurate and uniform lengths.

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.

We claim:

1. A fiber cutter comprising a rotatable cutter head mounted on a drive shaft, at least one cutting blade secured to the cutter head, a stationary blade mounted adjacent the cutter head, the cutting edge of the stationary blade cooperating with the cutting edge of the rotatable

cutter blade, a lower endless rotatable belt mounted for rotation opposite to and in alignment with the stationary blade, an upper endless rotatable belt which cooperates with the lower belt to form a nip therewith through which nip the supply bundle of fibers is fed to the stationary blade, means for urging the belts together, the discharge end of said cooperating belts terminating at a point immediately adjacent the cutting edge of the stationary blades, and means mounted adjacent the cutter head for holding down the supply bundle of fibers or filaments against the stationary blade as the bundle is being cut, said feeding means and holding down means operating to prevent disarrangement of the fiber or filament arrangement within the supply bundle as the bundle travels toward the cutting edge of the stationary blade and as the bundle is being cut by the cooperating blades.

2. A fiber cutter according to claim 1 comprising a table support, vertical side frames supported by the table, a lower drive roll for the lower belt, means for mounting the lower roll in the vertical frames, an upper drive roll for the upper belt, means for mounting the upper roll in the vertical frames, and means for urging together the upper and lower rolls.

3. A fiber cutter according to claim 2 comprising upper and lower plates over which the belts travel for supporting the upper and lower belts at stations opposite the drive rolls, and means secured to the primary table support for supporting the plates.

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