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VARIABLE FEEDER FOR STAPLE CUTTERS

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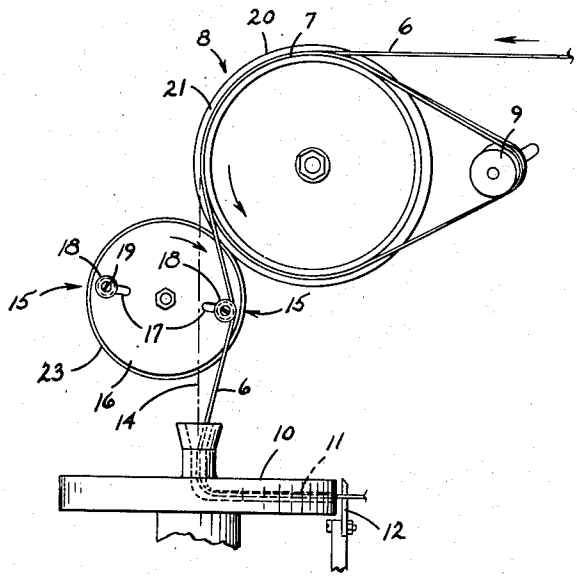


Fig. 1

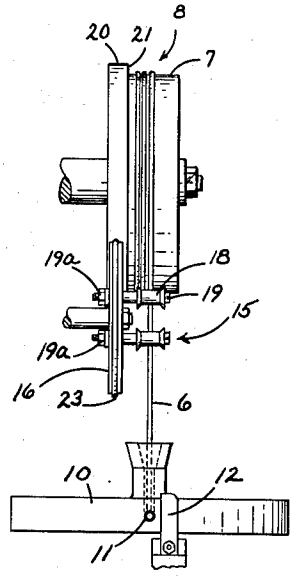


Fig. 2

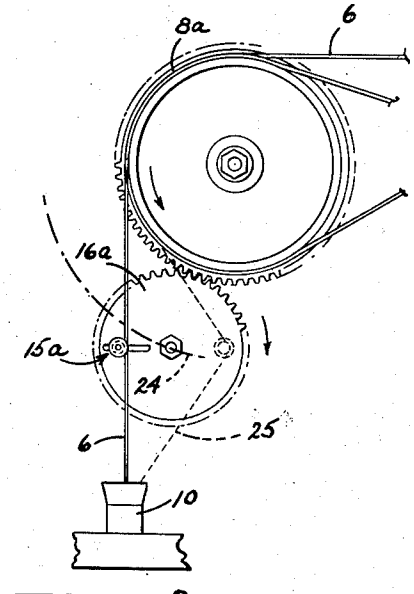


Fig. 3

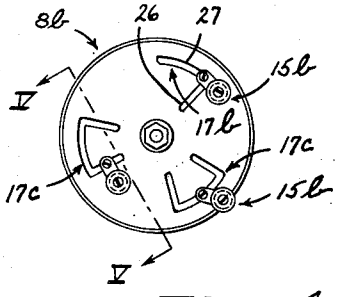


Fig. 4

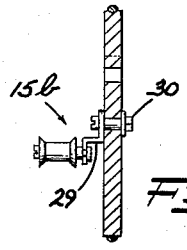


Fig. 5

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VARIABLE FEEDER FOR STAPLE CUTTERS

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3 Claims. (Cl. 203—110)

This invention relates to the production of staple fibers of non-uniform lengths from long fiber or filamentary materials of indefinite length.

It is an object of the invention to provide a feeding system for a staple cutter through which the passage of strand into the cutter may be controlled to obtain any desired variation in the length of the staple fiber within a substantial range of length. Another object is to provide apparatus which is simpler and less costly in construction and easier to maintain and adjust than prior staple-cutting devices. Other objects, features and advantages will be apparent from the following description of the invention and the drawing relating thereto in which

Fig. 1 is a diagrammatic elevation of a cutter and a strand-feeding apparatus therefor;

Fig. 2 is a side view of the apparatus of Fig. 1;

Fig. 3 illustrates a modified strand-feeding apparatus for the cutter;

Fig. 4 illustrates a modified strand-engaging rotor; and

Fig. 5 is a section of the rotor of Fig. 4 taken along line V—V.

An apparatus in accordance with the present invention comprises a positive yarn delivery device comprising a driven rotor, a cutting device or means associated therewith which yieldably or impositively pulls a yarn or other continuous multiple filament bundle or strand from the delivery device under tension but does not engage the yarn in a manner to positively forward it, and a rotor connected in drive relationship with the yarn delivering device and having one or more guides which extend in a direction substantially parallel with the axis of the rotor and dispose at least a part of respective paths of revolution of such guides athwart a normal straight line path between the yarn delivery device and the means associated therewith for urging the yarn through the cutter.

As shown in Fig. 1, a strand of filamentary material, such as a yarn **6**, passes from a supply source (not shown) onto a surface **7** of a roll **8** and around a roll **9** having an axis which is canted with respect to the axis of roll **8**. The yarn is thereby advanced lengthwise of the rolls with respect to their axes so that adjacent convolutions of the yarn extending therearound are spaced apart. The yarn makes sufficient passes around the rolls **8** and **9** to establish such frictional contact with the rolls as to overcome any tendency of the strand to slip. Yarn passes from the roll **8** into a centrifugal staple cutter comprising a rotary member **10** which centrifugally forwards the yarn through a radial passageway **11** thereof, and a stationary blade **12** which engages the yarn discharged from the passageway **11**. The rotor **10** exerts by centrifugal force a pull on the portion of the yarn **6** which passes to the rotor from the roll **8** in approximate proportion to the speed of rotation of the rotor. Normally, the rotor **10** is driven at a uniform speed and thus the tension in the yarn between the roll **8** and the rotor is substantially uniform. The normal path which the yarn **6** would follow, were it not intermittently pushed laterally from such path by a pair of guides **15** mounted on a rotary base member **16**, is a straight line (indicated by a broken line **14**). A concentric peripheral surface of the rotor **16** is engaged in driving relationship by a continuous peripheral surface above the roll **8**.

The rolls **8** and **9** are normally driven at a uniform rate and, although the yarn passes off the roll **8** at a

constant rate, the rate of passage of the yarn into the rotor may be varied as the result of lateral movement of the yarn when engaged by the rotor which comprises the guides **15** and the rotary member **16**. The guides **15** are adjustable with respect to radially-extending slots **17**. The guides **15** comprise spools **18** and means for attaching the spools to the rotary member **16**, such as bolts **19** extending therethrough and nuts **19***a*. The nuts may be loosened to effect adjustment of the guides with respect to the slots **17**. The guides may be spaced at equal or unequal radii, as desired, with respect to the axis of rotation of member **16** to obtain any selected range of variation in the feeding of yarn into the rotor **10**. The member **16** may be driven as illustrated by engagement of its periphery with the outer surface **20** of a flange **21** on the roll **8**. To effect efficient frictional driving relationship, the member **16** is preferably provided with a friction ring element **23** comprising, for example, a strip of resilient vulcanized rubber in adhesive relationship with the periphery of the member.

The drive relationship between the metering roll and the rotary member **16** may also take the form shown in Fig. 3 wherein a roll **8***a* is provided with gear teeth which mesh with the toothed periphery of the rotary member **16***a*. This figure also illustrates another modification within the scope of the invention, i. e. a single guide **15***a* mounted on the member **16***a*. With a single guide mounted on the rotary member, the axis of the rotary mmber may be shifted farther to the right as viewed in Fig. 3 to utilize substantially all of the motion of the revolving guide **15***a* made in a direction lateral with respect to the shortest path of the strand **6** between the metering roll **8***a* and the rotor **10**. The path of the strand having the great deviation from the shortest path is indicated by the dotted line **25**. The member **16** of Fig. 1 (or **16***a* of Fig. 3) may be constructed with any desired ratio between its diameter and the diameter of the respective driving roll **8** (**8***a* of Fig. 3). Moreover, the degree of engagement effected by the guides of either embodiment may be determined by the location (as illustrated in Fig. 3 but applicable to other embodiments of the invention) of the axis of member **16***a* along an arcuate path **24** which has its center at the axis of the roll **8***a*.

Figs. 4 and 5 illustrate another rotary member **8***b* having slots **17***b* and **17***c* with respect to which guides **15***b* may be adjusted in a great variety of positions of which some are suggested by the figure. The slot **17***b* has a portion **26** which is radial with respect to the axis of rotation of the member **8***b* and an arcuate portion **27** which is concentric to the axis. The slots **17***c* each have a concentric portion and a plurality of radial portions. The guides **15***b* comprise arms **29** which may be secured in fixed relationship with the member anywhere along their respective slots by bolts **30**. Such an arrangement permits adjustment of the guides **15***b* to an infinite number of positions within the area surrounding their respective slots. By suitable adjustment of the guides **15***b*, the member **8***b* may be used in conjunction with a staple cutter and feed rolls such as shown in Figs. 1 and 2 to obtain any desired variation in the length of the staple fiber produced by the apparatus of this invention.

While preferred embodiments of the invention have been shown and described, it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A system for forwarding a continuous strand comprising rotary means for positively forwarding the strand and means spaced from the rotary means for impositively forwarding the strand under tension from the rotary means; the rotary means comprising a rotor having a drum surface and another circular peripheral drum surface concentric with its axis or rotation; a second rotor comprising a base member and an element mounted on the member in adjustable but normally fixed attachment thereto, the base member having a circular peripheral surface concentric to its axis of rotation, said rotors having approximately parallel axes with said peripheral surfaces extending approximately in a plane perpendicu-

lar to the axis into engaged driving relationship, said element being disposed eccentrically with respect to the axis of the second rotor and extending in an axial direction in offset relation with respect to said member and in generally axial coextensive relation with said drum surface of the other rotor, the axis of the second rotor being positioned relative to the axis of the first rotor and the impositive forwarding means to dispose the path of revolution of the element athwart a straight line path extending between both of said forwarding means whereby the element engages and displaces the running strand in a lateral direction from said path during each rotation of the second rotor to vary the rate of passage of the strand to the impositive forwarding means.

2. A system for forwarding a continuous strand as defined in claim 1 wherein the second rotor comprises a plurality of said elements, at least one of said elements being adjustable with respect to the base member in an angular direction about the axis of the second rotor.

3. A system for forwarding a continuous strand as defined in claim 1 wherein the rotors have gear teeth comprising said engaged peripheral surfaces.

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