

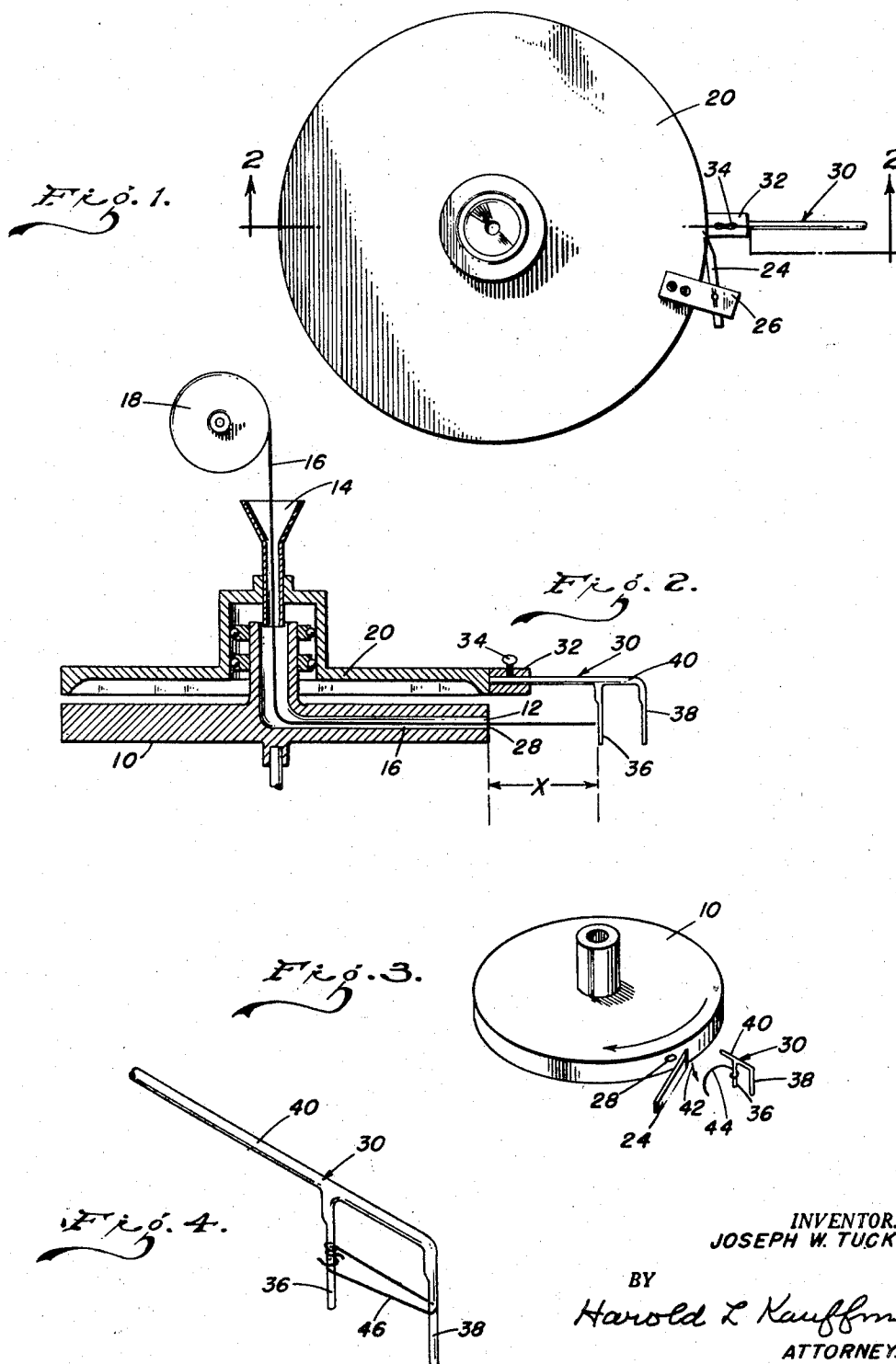
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APPARATUS FOR PRODUCING STAPLE FIBERS

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APPARATUS FOR PRODUCING STAPLE FIBERS

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This invention relates to certain new and useful improvements in apparatus for producing staple fibers. More particularly, it is concerned with a device (so-called "overlength catcher") for use in combination with staple fiber-cutting apparatus and whereby the length of staple fibers cut from continuous filaments is maintained substantially uniform in the collected fiber product; in other words, the overlength catcher separately collects and removes excessively long fibers from the main product during the cutting of staple fibers from a rope or bundle or tow of continuous filaments.

In staple fiber-cutting apparatus of the type in which the rope or tow of continuous filaments is advanced and held taut (generally under the influence of centrifugal force) during the cutting thereof, the continuous filamentary material is fed to a rotating member (rotor) having a radial channel or tube through which the material is directed outwardly. The rope of material protrudes from the radial channel of the rotating member until it is cut by a knife or cutting member which co-operates with the periphery of the rotating member. At the instant the rope is being cut it extends out of the radial channel exactly as far as the desired staple length. (The general form of this type of cutting apparatus is shown in, for example, Beria U. S. Patent No. 1,723,998, dated August 13, 1929.) Sometimes the fibers protruding from the rotating member are not completely severed for various reasons; for instance, the knife or other cutting member may be dull, or there may be improper co-action between the rotating member and the cutting member. Also, when first starting to cut staple lengths, the first end of the rope may extend further from the rotor tube (radial channel) than the desired staple length. For these and other reasons it frequently happens that the rope or tow of continuous filamentary material (e. g., filaments of rayon, nylon, cellulose ester, polyacrylonitrile or other continuous filamentary material) will not all be cut into the desired staple lengths; but instead the staple fiber product will contain a certain proportion of overlength fibers which may be 2, 3, 4 or even 10 or 20 times or more the fiber length desired.

The contamination of the staple-fiber product with such overlengths cannot be tolerated; for even though it may constitute only a small amount (e. g., 1% or 2%) of the total product, it will either render the product unsuitable or of little value for making spun yarn, or it can be sold only as a product of inferior quality and at a reduced price.

An electrical controlling system which detects and then obviates overlengths by initiating the operation of means for interrupting the cutting and indicating the interruption is suggested in Curtis U. S. Patent No. 2,424,555, dated July 29, 1947; and a cardwheel device positioned adjacent the cutting knife is disclosed in Thompson U. S. Patent No. 2,232,496, dated February 18, 1941, for the purpose of collecting and removing excessively long fibers from those which are of the desired length.

It is a primary object of the present invention to provide, in combination with a staple-cutting apparatus of the

type in which a rope or tow of continuous filaments is advanced and held taut during the cutting thereof, by means of centrifugal force, a device or overlength catcher for collecting and removing excessively long (that is, objectionably long) lengths of fibers during the cutting of staple from the aforesaid rope or tow.

Other objects of the invention will be apparent to those skilled in the art from the description which follows.

The novel features that are characteristic of my invention are set forth in the appended claims. The invention itself, however, will best be understood from reference to the following more detailed description when considered in connection with the accompanying drawing, which is illustrative of a preferred embodiment of the invention, and wherein

Fig. 1 is a top plan view of staple-cutting and overlength fiber-collecting apparatus embodying my invention;

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1;

Fig. 3 is a somewhat schematic perspective view of apparatus embodying my invention, including an overlength catcher; and

Fig. 4 is a perspective view of a preferred overlength catcher of the invention.

For additional details concerning the construction of staple-cutting apparatus of the type herein involved, see the descriptions and accompanying drawings of the aforesaid U. S. Patents 1,723,998 and 2,232,496.

Referring to the drawing, there is shown in Figs. 2 and 3 a rotating member or disk 10, which also may be termed a cutting head. This rotating member is provided with a radial channel or tube 12 (Fig. 2) which connects with the axial feeding and guiding member 14 into which the rope or tow of filamentary material 16 may be fed downwardly by means of a delivery roll or godet 18, which is driven by conventional means (not shown), and about which the tow is generally wrapped one or more times to provide a good grip. Instead of such a roll or godet, one can use any equivalent feeding device, e. g., a thread-advancing reel or a thread-advancing device comprising a pair of spaced apart, converging rolls, or the like.

The rotating member or cutting head 10 can be driven by various means. For example, it may be attached to a shaft which is journaled in a base frame (not shown), and both shaft and rotating member 10 can be rotated by any suitable means (not shown), e. g., gears, pulley and belt, etc. Or, in certain types, the cutting head 10 is directly driven through power-driven gears.

A staple-cutting knife 24 (Figs. 1 and 3) held by the knife support 26 (Fig. 1), which latter is attached to the fixed casing 20 as shown in Fig. 1, is positioned closely adjacent to the rotating member 10 so that the tow 16, after passage through the port 28, is cut each time the rotating member 10 carries it in contact with the knife 24, thereby producing short lengths of staple fibers from the filamentary rope or tow 16.

Overlength catcher 30 is removably held in the catcher support 32, and is held in a desired position by suitable means, e. g., by tightening of the thumb screw 34.

The overlength catcher 30 comprises a member having at least one downwardly extending tine or tooth, which member is positioned adjacent the cutting knife 24 with the said tine spaced from the knife a distance approximating the normal length of the staple fibers being cut. Preferably, the catcher 30 comprises, as shown in the various figures of the drawing, a member having a first or inner downwardly extending tine or tooth 36 and a second or outer downwardly extending tine or tooth 38 spaced from the said first tine, e. g., $\frac{1}{2}$, 1, 2, 3, 4 or more inches, as desired or as conditions may require. The tines or teeth 36 and 38 are fixedly attached, as by

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welding or brazing for example, to the longitudinal tine support 40. The tines 36 and 38 may be of any suitable shape, and may be formed of any suitable metal or other material, e. g., stainless steel or other form of steel. For instance, they may be cylindrical in shape, if desired; however, optimum or most generally satisfactory results usually have been obtained when the tines have been semicylindrical in shape, as shown in Figs. 2 and 4, that is, with one side of the tine flat-surfaced instead of rounded as in a cylinder.

Prior to the start-up of operation of the staple-cutting apparatus, the overlength catcher 30 is adjusted in its support 32 so that the distance indicated by X in Fig. 2 will correspond to or approximate the normal length of the staple fibers being cut; in other words, the distance X is adjusted for the desired length of staple to be cut. Having adjusted the catcher 30 so that it is the proper distance from the outer periphery of the rotating member 10 it is then held in its desired position by tightening the thumbscrew 34.

In operation, the rope or tow of filamentary material 16 is passed downwardly into the axial feeding and guiding member 14. The rope is advanced through member 14 and the radial channel 12 by the centrifugal force which results from the rapid rotation of the rotating member or disk 10. The rope 16 is passed, with considerable velocity, against the beveled edge of the knife 24, thereby severing the rope into staple fibers.

In the preferred embodiment of the invention, the overlength catcher 30 is mounted at, or slightly preceding or slightly following, a radial line passing through the cutting edge of the knife 24. In this way the overlengths are caught and then cut off, and/or cut off and then caught, at or almost at the same instant. The arrow 42 (Fig. 3) indicates the normal path of the staple fiber of regular cut, that is, of the desired fiber length. If the cut is overlength, the end thereof starts to wind or wrap on the tine 36 as it is cut, as indicated by overlength 44 in Fig. 3. If the overlength is greater than the distance between the inner tine 36 and the outer tine 38, then it will wrap around both tines 36 and 38 as shown by the overlength 46 in Fig. 4. The outer tine thus prevents an extreme overlength from being carried, after cutting, along the regular tangential path by its own momentum, as frequently happens when a single tine or tooth is used.

The overlengths that accumulate on tines 36 and 38 either automatically fall off as build-up thereon occurs, or are easily pushed therefrom by the operator of the cutter into a discharge chute or vessel separate from that to which the regular cut staple passes.

The overlength catcher used in practicing my invention is readily and inexpensively fabricated, since its construction is simple; is easy to install and remove; and functions effectively for its intended purpose in the combination hereinbefore described. The catcher may be used with cutters of the type herein described that have only one cutting knife, as shown in the drawing, or with two, three or more cutting knives. In the latter case, at least one overlength catcher is preferably positioned adjacent each cutting knife.

In some cases it may be desirable to position a plurality of overlength catchers, e. g., two or three of them, adjacent each cutting knife. For instance, one catcher can be positioned exactly at the radial line passing through the cutting edge of the cutting knife; another, either slightly preceding or slightly following this radial line; or a second catcher can be positioned slightly preceding the aforementioned radial line while a third catcher is positioned slightly following the said line. The advantages of using a plurality of catchers in this way will be immediately apparent to those skilled in the art.

I claim:

1. In combination with a staple cutting apparatus of the type in which a rope of continuous filaments is advanced and held taut during the cutting thereof, by means

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of centrifugal force, a device for collecting and removing excessively long fibers which comprises a longitudinal tine support having attached thereto a first downwardly extending tine and a second downwardly extending tine separated and spaced outwardly from the said first tine, said tine support being positioned adjacent the cutting knife of said apparatus with the said first tine spaced from the knife a distance approximating the normal length of the staple fibers being cut.

2. In combination with a staple cutting apparatus of the type in which a rope of continuous filaments is advanced and held taut during the cutting thereof, by means of centrifugal force, a device as in claim 1 wherein the first and second downwardly extending tines are each fixedly attached to the said longitudinal tine support.

3. In combination with a staple cutting apparatus of the type in which a rope of continuous filaments is advanced and held taut during the cutting thereof, by means of centrifugal force, a device for collecting and removing excessively long fibers which comprises a longitudinal tine support having attached thereto a first downwardly extending tine and a second downwardly extending tine separated and spaced outwardly from the said first tine, said tine support being mounted at a radial line passing through the cutting edge of the cutting knife of said apparatus and being so positioned adjacent the cutting knife that the said first tine is spaced from the said knife a distance approximating the normal length of the staple fibers being cut.

4. In combination with a staple cutting apparatus of the type in which a rope of continuous filaments is advanced and held taut during the cutting thereof, by means of centrifugal force, a device for collecting and removing excessively long fibers which comprises a longitudinal tine support having attached thereto a first downwardly extending tine and a second downwardly extending tine separated and spaced outwardly from the said first tine, said tine support being mounted slightly preceding a radial line passing through the cutting edge of the cutting knife of said apparatus and being so positioned adjacent the cutting knife that the said first tine is spaced from the said knife a distance approximating the normal length of the staple fibers being cut.

5. In combination with a staple cutting apparatus of the type in which a rope of continuous filaments is advanced and held taut during the cutting thereof, by means of centrifugal force, a device for collecting and removing excessively long fibers which comprises a longitudinal tine support having attached thereto a first downwardly extending tine and a second downwardly extending tine separated and spaced outwardly from the said first tine, said tine support being mounted slightly following a radial line passing through the cutting edge of the cutting knife of said apparatus and being so positioned adjacent the cutting knife that the said first tine is spaced from the said knife a distance approximating the normal length of the staple fibers being cut.

6. In combination with a staple cutting apparatus of the type in which a rope of continuous filaments is advanced and held taut during the cutting thereof, by means of centrifugal force, a device for collecting and removing excessively long fibers which comprises a longitudinal tine support having attached thereto a first downwardly, semicylindrical tine and a second downwardly extending, semicylindrical tine separated and spaced outwardly from the said first tine, said tine support being positioned adjacent the cutting knife of said apparatus with the said first tine spaced from the knife a distance approximating the normal length of the staple fibers being cut.

References Cited in the file of this patent

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