June 18, 1940. E. HAMEL 2,205,036

METHOD AND DEVICE FOR SEPARATING AND UNITING ARTIFICIAL FIBROUS STRUCTURES TO FORM A CONNECTED FIBROUS BAND

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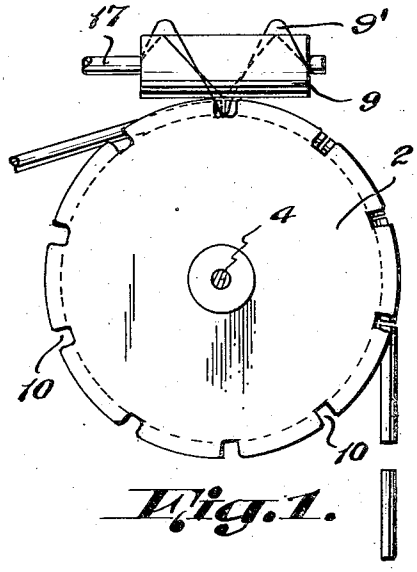


Fig. 1.

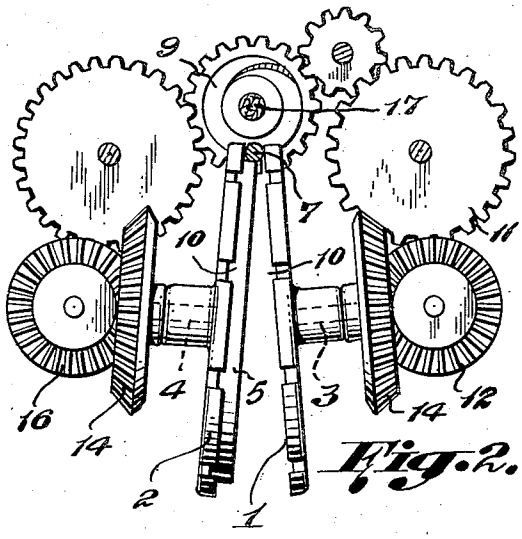
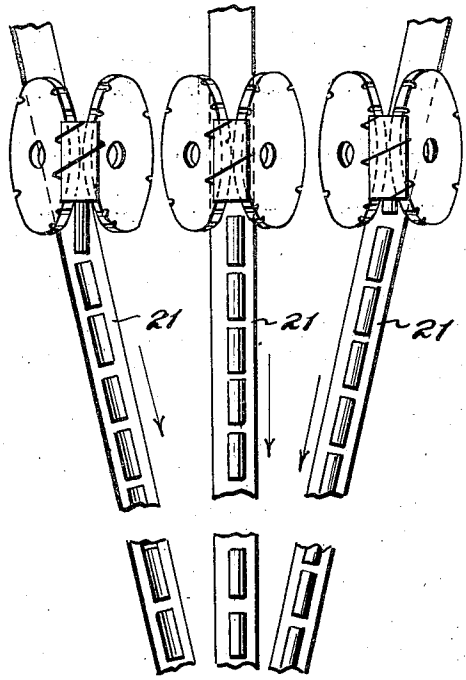


Fig. 2.

Fig. 3.



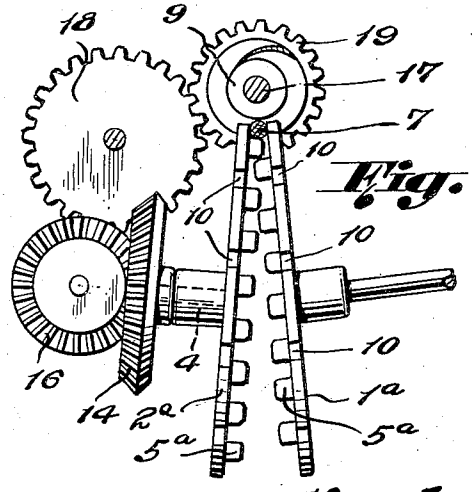


Fig. 6.

Fig. 4.

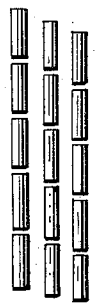
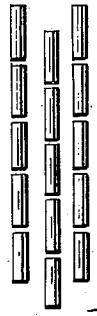


Fig. 5.



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METHOD AND DEVICE FOR SEPARATING AND UNITING ARTIFICIAL FIBROUS STRUCTURES TO FORM A CONNECTED FIBROUS BAND

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6 Claims. (Cl. 164—61)

This invention relates to a method and device for continuously separating, in the wet or dry state, smooth or curled fibrous structures composed of artificial filaments and bringing the separated sections together to form a connected fibrous band.

It is known to separate artificial fibrous strands by means of star-shaped rotating knives or cutters and companion cutters producing a scissor-like cut. The application of this latter method involves, however, the serious drawback that the fibrous material is compressed during the cutting operation so that the fibers stick together after separation. Furthermore, the separated pieces frequently differ in length.

It is one of the objects of the invention to provide for staples having practically the same length.

Another object is to provide for a drawing cut to prevent compression of the fibers and their sticking together at the cutting edges.

Still another object is to deliver the separated fibrous sections so as to produce a connected fibrous band which will facilitate further working.

According to the invention, these ends are attained by bringing an endlessly fed artificial fibrous structure within range of a rotating screw-like knife having high cutting edges in such manner that the cutting edge on the outer circumference passes through the fibrous matter in an oblique direction thereto and thus separates the fibers. The cutting depth may be so adjusted that some of the lowest threads are not separated but form a connection between the staple pieces.

The device for carrying out the method according to the invention comprises two discs whose rotation axes are inclined relative to one another and whose plane faces face each other. One of the discs has an inwardly projecting edge serving as bearing surface for the fibrous matter, and both discs possess circumferential recesses which are engaged by the upright cutting edge of a rotary screwlike knife. It is possible to provide both discs with an inwardly projecting bearing edge formed as teeth that will mesh.

To produce a broad fibrous band suitable for further working several cutting devices are preferably arranged side by side or superposed, the cutting operation and the delivery of the separated pieces being regulated so that the juxtaposed cutting devices operate in succession and not at the same time and the separated pieces are delivered to moving bands which are convergent. Cutting is, moreover, carried out in such manner that the separated pieces are delivered side by side and the pieces of each strand cover the cutting points or the spaces between the pieces of the adjacent strand. For this purpose the recesses at the circumference of the holding discs for the passage of the cutting edges and the knives themselves are so adjusted that the cutting points of adjacent cutting devices do not coincide.

The invention is illustrated by way of example in the accompanying drawing, in which:

Figure 1 is a front view of a cutting device;

Fig. 2, a side view thereof;

Fig. 3, a plan of a plurality of juxtaposed cutting devices showing the manner of bringing the separated staple pieces together;

Fig. 4 shows diagrammatically how the staple pieces can be delivered side by side; and

Fig. 5 is another diagram.

Fig. 6 is a side view illustrating a modification of the apparatus shown in Fig. 2.

As shown particularly in Fig. 2, the device substantially comprises two discs 1 and 2 which are inclined relative to one another and face each other with their plane inside surfaces. The discs 1 and 2 are arranged on the shafts 3 and 4, and one of the discs possesses near the circumference an inwardly projecting annular shoulder 5 for supporting a fibrous strand 7 which is gradually clamped due to the relative inclined position of the discs 1 and 2. To increase the clamping effect a layer of soft rubber may be provided on the inside of the disc. Where the edges of the discs are in closest proximity the windings of a rotary screwlike knife 9 are provided whose upright cutting edges 9' engage the recesses 10 at the circumference of the discs 1 and 2.

The discs 1 may be driven by means of a gear 11 which meshes with a gear wheel secured to a shaft on which a beveled gear 12 is mounted and the beveled teeth thereof engage a beveled pinion 14 secured to the shaft 3. The disc 2 is rotated in synchronism with the disc 1 by means of similar bevel gears 14 and 16 positively driven by the gear 11 through intermediate gears.

The knife 9 is mounted on a shaft 17 which also carries one of the intermediate gears and the knife is thus driven in synchronism with the discs 1 and 2. The shaft 17 may be shifted towards or away from the peripheries of the discs so that the cutting depth of the knife 9 may be adjusted.

A modification of the discs is shown in Fig. 6 wherein each disc 1a and 2a is provided with inwardly projecting teeth 5a which mesh with each other and form a bearing surface for receiving and supporting the fibrous strand 7. In this

arrangement the discs 1a and 2a are rotated in synchronism by a driven gear 18 which meshes with a gear wheel secured on a shaft carrying the beveled gear 16. The geveled gear 14 engages the beveled gear teeth of the gear 16 and thus rotates the shaft 4 and the disc 2a which drives the disc 1a by means of the teeth 5a. The knife 9 secured to the shaft 17 is rotated in synchronism with the discs 1a and 2a by means of a gear 19 which meshes with the driven gear 18.

A plurality of cutting devices such as shown in Figs. 2 and 6 may be arranged adjacent each other as illustrated in Fig. 3 wherein the severed pieces of the fibrous material are delivered onto moving bands 21 which converge so as to group the separated pieces. The timing of the individual cutting devices may be so adjusted that the cuts in the various strands do not conincide but are staggered as illustrated in Figs. 4 and 5.

While detailed structural arrangements have been described for carrying out the invention it is apparent that changes may be made therein and modifications may be adopted without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. Apparatus for cutting fibrous strands of artificial filaments comprising, two discs having circumferentially spaced recesses in the peripheries thereof, said discs being arranged with the faces thereof adjacent each other and with the axis inclined with respect to each other so that the inner faces of the discs adjacent the peripheries thereof engage the fibrous strand, an annular projection carried by one of the discs adjacent the periphery thereof and projecting towards the other disc for supporting the fibrous strand, and a rotating knife having a screw shaped cutting edge arranged to pass through said recesses of both discs and cut said filaments while the strand is engaged by the inner faces of the discs.

2. Apparatus for cutting fibrous strands of artificial filaments comprising, two discs having circumferentially spaced recesses in the peripheries thereof, said discs being arranged with the faces thereof adjacent each other and with the axes inclined with respect to each other so that the inner faces of the discs adjacent the peripheries thereof engage the fibrous strand, a plurality of teeth carried by each disc adjacent the periphery thereof and projecting towards the other disc for supporting the fibrous strand and engaging each other, and a rotatable knife having a screw-shaped cutting edge arranged to pass through the recesses of both discs and cut said filaments while the strand is engaged by the inner faces of the discs.

3. A method of severing fibrous strands of artificial filaments which comprises, continuously moving the strand, bending the strand, clamping the bent strand adjacent a point where the filaments are to be cut, progressively severing the outer filaments and the inner filaments of the bent strand while the filaments are thus clamped.

4. A method of severing fibrous strands of artificial filaments which comprises, continuously moving the strand, laterally gripping the strand adjacent points where the filaments are to be severed, and draw cutting the strand in a direction oblique to the axis of the strand at spaced intervals while the filaments are thus gripped.

5. A method of completely severing fibrous strands of artificial filaments which comprises, continuously moving the strand, bending the strand in an arcuate form during movement thereof, laterally gripping the arched strand adjacent a point where the filaments are to be severed, drawing a cutting edge transversely through the filaments at the outer circumference of the arched strand radially inward through the remaining filaments while the filaments are laterally gripped.

6. A method of severing fibrous strands of artificial filaments comprising, continuously moving the strand, bending the strand along its longitudinal axis in an arcuate shape to tension outer filaments with respect to the inner filaments of the strand, clamping the strand adjacent a point where the filaments are to be cut, and drawing a knife edge obliquely through the outer filaments and moving the knife edge obliquely and radially inward to sever the inner filaments.

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