

May 5, 1931.

A. KÄMPF

1,803,475

APPARATUS FOR MAKING BANDS OF ARTIFICIAL FIBERS

Filed Feb. 18, 1928

2 Sheets-Sheet 1

Fig. 1

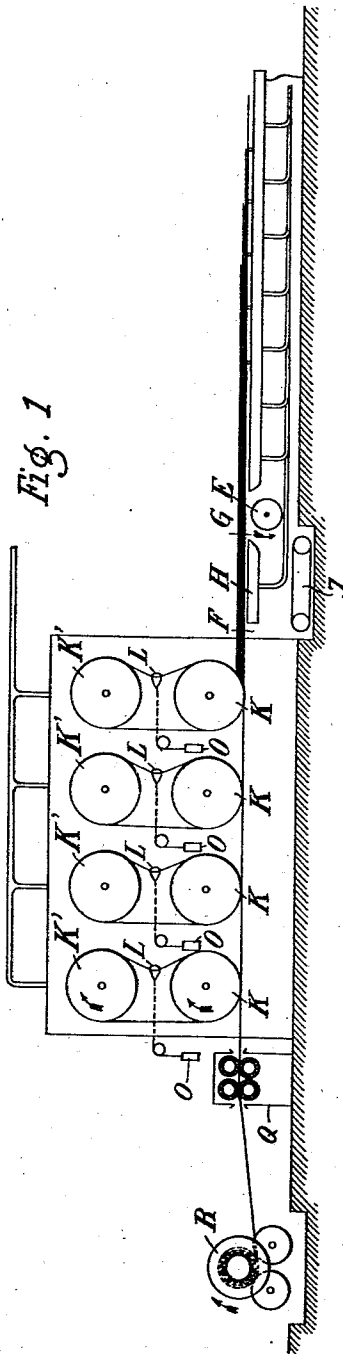
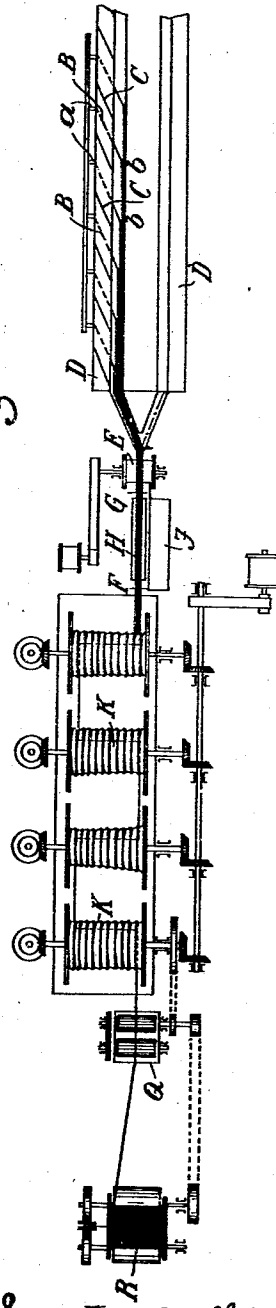


Fig. 2



Inventor: Adolf Kämpf.
By *Byrd & Johnson* & *Brickman*,
Attorneys.

May 5, 1931.

A. KÄMPF

1,803,475

APPARATUS FOR MAKING BANDS OF ARTIFICIAL FIBERS

Filed Feb. 18, 1928

2 Sheets-Sheet 2

Fig. 3

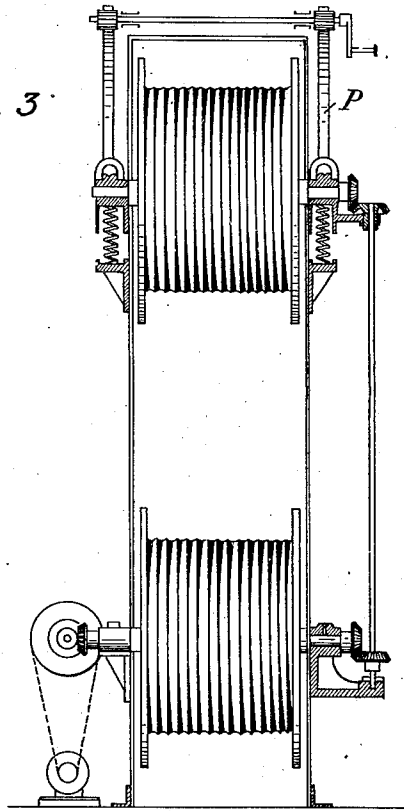


Fig. 4

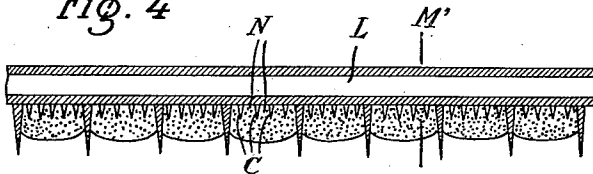


Fig. 5

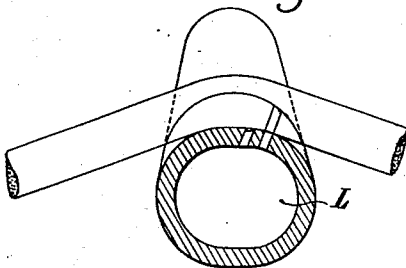


Fig. 6



Inventor: Adolf Kämpf,
By Byron Townsend & Bruckenstein,
Attorneys.

UNITED STATES PATENT OFFICE

ADOLF KÄMPF, OF PREMNITZ/WESTHAVELLAND, GERMANY, ASSIGNOR TO I. G. FARBEN-INDUSTRIE AKTIENGESELLSCHAFT, OF FRANKFORT-ON-THE-MAIN, GERMANY, A CORPORATION OF GERMANY

APPARATUS FOR MAKING BANDS OF ARTIFICIAL FIBERS

Application filed February 18, 1928, Serial No. 255,473, and in Germany March 5, 1927.

In the artificial fiber industry attempts have been made to make products from staple fiber on the usual machinery used for mass production, but no commercial result has been attained. The reason for this is that the apparatus which has been used for the purpose is inappropriate and that, in part dependent on this, the product is of defective quality.

In the processes proposed there have been used as drawing devices winding reels, centrifugal drums, bobbins, or draft rollers, by means of which the threads or groups of threads ejected from the individual spinning nozzles have been drawn from the precipitation bath for subsequently reeling or deposition in a collecting vessel.

From a commercial point of view there is the objection that the collecting devices must be changed in comparatively rapid succession. For this purpose and for the further transfer of the collected mass of fiber to the next operation, manipulation by hand is required: With regard to the quality of the fiber, the arrangements generally adopted render it impossible to produce directly a free finished fibrous material from fibers of different thickness which are produced owing to the necessary exchange of spinning nozzles during the spinning operation. In all known arrangements, the time during which the thread is passing from the bath to the reels or the like is too short for the attention needed for cleaning a newly spun thread of unequally thick constituent fibers. An uncleaned thread is only useful to the spinner, particularly the spinner of the finest yarns, after careful and costly selection by hand on the part of expert women, and even then a satisfactorily clean material cannot be guaranteed.

A further disadvantage belongs to those fibrous products which have been obtained by cutting the hanks collected on reels or drums and subsequently manipulating them in the form of lengths, namely that it is impossible to avoid fraying and felting together of the ends of the lengths. There follows in the carding machine a series of obvious disadvantages.

If the spinner wants a band which can be

progressively fed to the preparatory textile machine, for instance the carding machine, he must have a titer (thickness) as far as possible constant. To this requirement for quality must be added the necessity for the cheapest possible conditions for mass production, involving, among other things, the elimination of wages as far as possible.

The present invention solves the problem of attaining the aforesaid requirements. The essentials of the invention may be stated as follows, with reference to the accompanying drawings in which Fig. 1 is a diagrammatic elevation and Fig. 2 a plan of a machine for making the primary fibrous product. Fig. 3 is a detail view; Fig. 4 is a sectional elevation of a pair of winding drums drawn to an enlarged scale, and Figs. 5 and 6 are detail sectional views also drawn to an enlarged scale.

(1) A strong band of fibers is formed by leading the bundles of threads issuing from the several spinning nozzles on their way through the spinning bath as nearly as possible parallel to the series of spinning tubes (the longitudinal axis of the spinning table) in order that they may be further conducted in roomy, open, stationary thread guides (A in Figure 3), arranged substantially parallel to the longitudinal direction of the spinning tubes. Very long partitions (C, C) are provided between the spinning nozzle (B, B) in order that imperfect fibers issuing from improperly operating nozzles may be separated from the fibers issuing from the adjacent nozzles. The desired length is afforded by the arrangement of the partitions as parallel as possible to the longitudinal direction of the spinning table.

When air pressure is used for causing the viscose to flow there is no continuously rotating part in the spinning apparatus. The spinning machine is reduced merely to the spinning bath (D, D). By the parallel guiding it is intended and attained that the bath shall be very narrow, whereby both the bundle of fibers and the spinning table are made as easily accessible as possible. The spinning tables may be constructed of any length and very close to each other, for ex-

ample at a distance of 1 metre. At each head end of a spinning table or in common to a whole group of spinning tables, or at both places, there is an auxiliary draft reel (E), on which merely at the starting of the whole system or of a single series of nozzles the spinning is conducted until all the fiber bundles of the corresponding spinning table or tables have become united to a band on the reel.

(2) The fiber runs throughout the whole progress of the manufacture from the exit of the nozzles to the delivery of the band in a purified and dried condition as an endless band composed of parallel and, as far as possible, endless fibers, in one uninterrupted course, any check or stopping of the band being avoided as far as possible.

(3) Correspondingly to the high mechanical exertion the band is submitted to as well as to make the most of an economical utilization of the apparatus a relatively high titer is produced, for example of 50,000 to 100,000 or more deniers. Such is possible because no accumulation occurs.

(4) A further new feature of the invention resides in the fact that between the auxiliary draft wheel and the subsequent washing bath there is a comparatively long distance (F—G) through which the band must run. This distance, in which the band runs over a suction and draining trough (H) at a height suitable for manipulation above the floor, is provided for the purpose of giving the spinner, both when the whole apparatus is started and also during the changing of the several groups of nozzles, time and opportunity to clean the newly arriving threads, either directly or after previous short draft on the auxiliary draft roller, from all portions of fiber of varying titer which are unavoidable in the spinning operation, and to splice this bundle of threads with the main threads in order that it may share the forward movement without in any way being damaged. It is especially necessary for this purpose that the splicing should be possible with avoidance of free projecting ends. A travelling platform J is provided for the operator.

Besides affording the possibility for this manual treatment the long stretch of the fibers has also an important effect on the properties of the product and the considerable tension exerted on this long stretch promotes uniformity of the finished thread.

The thick band thus produced continuously must now receive a thorough washing and subsequent treatment.

It is a special feature of the invention that this washing follows automatically on the formation of the endless bundle of fibers without any other manipulation than that which is necessary for the continuous preparation of

the washing liquid and for superintending the apparatus.

The said automatic washing operation according to the invention occurs essentially while the band is passing in numerous turns over pairs of drums (K, K) or quite generally groups of drums, made of enameled iron or the like. The band is led over or around the drums or pulleys with a speed suited to the spinning operation and increased or diminished in limited degree only by shrinkage and stretching (stretching is to be avoided as far as possible). In this manner the band is brought into intimate contact with the washing liquid in general on the tangential portions of the path, and the liquid taken up is in part again expressed on the peripheral portions of the path owing to the pressure of the band against the surface of the drum. In this manner there is produced a very vigorous alternating action of the liquid on the fibers.

The peculiar and novel action of the washing and drying device is as follows:—

(5) The drums or pulleys have a large diameter, for example 80 centimetres or more. The effect of this is that a chance adhering thread end, before it arrives at the tangential path leaving the drum, has time to be torn loose on the periphery of the drum.

In order to prevent adhesion and twisting, the drums are internally heated by steam or a liquid. By means of the steam thus generated on the heated wall of the drum, any serious adhesion of the threads is prevented. The further advantages of the large drum are as follows:—

Owing to the large diameter of the drum the total heating effect within the washing and drying apparatus is increased. The number of rotations is diminished, as is desirable, and slipping of the band on the drum is avoided. A still more important good effect of the large diameter drum is that the curvature of the band is comparatively small, so that the band can be kept in the desired stretched condition. Repeated passing of the band over rollers or the like of small diameter produces an objectionable buckling and entangling of the mass of fibers.

(6) As regards the variations of the length of the band which occur during the washing and drying operation, the invention provides that the peripheries of the drums over which the endless band passes in succession shall increase or diminish at the places where the changes of length occur, that is to say, particularly during the removal of acid and drying, this change of periphery being in proportion to the variation of length. For this purpose, however, the change of length is taken into consideration only in part and in respect of the peripheral speed. Any injurious effect of the shortening or stretching of the band is compensated in accordance with the invention by subjecting the thread in the

tangential parts of its path, in which parts there is shrinkage or stretching, to an increasing or decreasing bending, having regard to the breaking angle. This bending may be produced by a roller system arranged in the manner of a belt tightener. According to the invention, however, there are used, with advantage to the washing effect, rails having ribs which act on the band like a comb, these rails (L, L, Figs. 1, 5 and 6) having smooth surfaces (for instance of porcelain or enameled iron). On these rails the travelling band is subdivided throughout its cross section very favourably for interpenetration of the washing or other liquid (Fig. 5, c, c, c). Preferably the rails are hollow and the projections or ribs (N, N Fig. 5) are formed as spraying nozzles. These comb bars are provided laterally with spring balances which show the tension exerted on the band, or instead of such spring balances the rails may be connected with counter-weights (O, O, Fig. 1) suspended over rollers.

The upper drum of a pair of drums or the topmost drum of a group of drums may be capable of a rising and falling movement, as illustrated in Fig. 4, accordingly as the pair or group of drums is exerting too high or too low a tension on the band.

According to the invention there is provided a control of the drive, such that it is possible to start the whole installation by means of a single starter. Moreover, for preparing for starting, the whole apparatus can be brought into a uniformly slow motion. This point will be enlarged upon hereinafter.

(7) A further feature of the invention is that the band is conducted, after the drying operation, directly to a heckling apparatus (Q).

(8) As the last member of the chain of apparatus and as the last feature of the invention is to be mentioned a winder (R) following directly on the heckling apparatus. This is arranged in known manner so that it winds the running band constantly without slack, so that the band is maintained under gentle tension but such as will not injure it. Any roller, drum, or reel may be used as the receiving device of this winder.

The starting and stopping of the apparatus is as follows:—

The whole of the path for the band of fibers over the drums is mapped out by a strong elastic stretched cord or band, for instance of rubber, before the spinning nozzles are set in action. This band must be elastic so that it can suffer the stretchings and shrinkings which occur in the band of fibers and are calculated for in the apparatus.

The end of this elastic band extends to the auxiliary draft reel (E). When there has been applied to this auxiliary reel the whole or a sufficient portion of the spun thread the

complete washing and drying portions of the apparatus are put gradually into motion, and the collected bundle of fibers after the cutting are brought together with the end of the elastic band as smoothly and firmly as possible. The operator must have the necessary manipulatory skill for this operation. When it has been completed the whole of the drum apparatus is brought to normal speed by one and the same starter. At the same time, the feed of the treatment liquids for removing water, desulphurizing and the like, and the suction, as far as it is used, and the heating of the drying apparatus are started.

The further attendance upon the apparatus consists in:—

1) Supervising and exchange of the spinning nozzles.

2) The observation of the tensions which occur in the band between the drums.

3) The general superintendence necessary for machinery, such as controlling the supply of steam and liquid, oiling and cleaning.

4) The attention required by the final winder or winders.

What I claim is:—

1. A device for guiding and washing a continuously spun moving bundle of artificial fibers on its way from a plurality of spinning nozzles to the drying device comprising a rail, said rail being provided with projections adapted to subdivide said bundle of filaments when travelling across said rail, means for discharging a fluid along the surface of said rail contacting with said bundle, and a conduit within said rail for leading said fluid to said discharging means.

2. Apparatus for washing and drying a continuously spun untwisted bundle of artificial fibers, comprising, in operative combination, at least one pair of rotatable drums or pulleys capable of being heated from within and adapted to receive said bundle and to carry it forward in a helical path, at least one comb rail placed in an intermediate position between said pair or pairs of drums in such a manner as to engage the projections of said comb rail with said bundle when moving, means for supplying a fluid through said comb rail, means for discharging said fluid through at least some of the projections of said comb rail into said moving bundle and means for pressing said comb rail against said moving bundle so as to maintain a predetermined tension in said bundle.

In testimony whereof, I affix my signature.

ADOLF KÄMPF.