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METHOD AND APPARATUS FOR HANDLING FILAMENTARY MATERIAL

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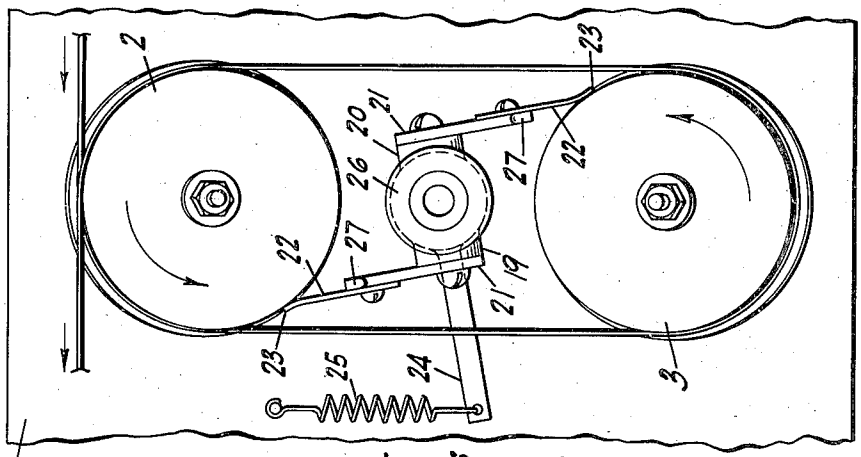


Fig. 1.

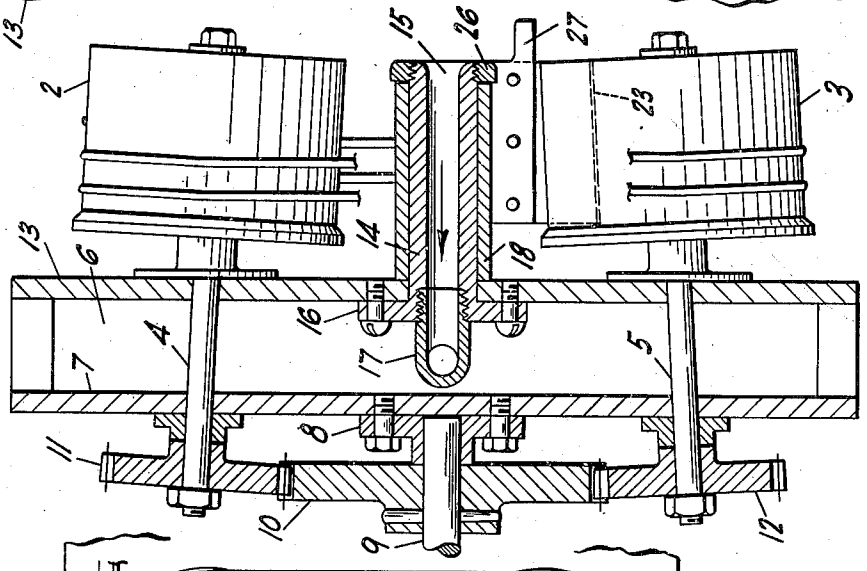


Fig. 2.

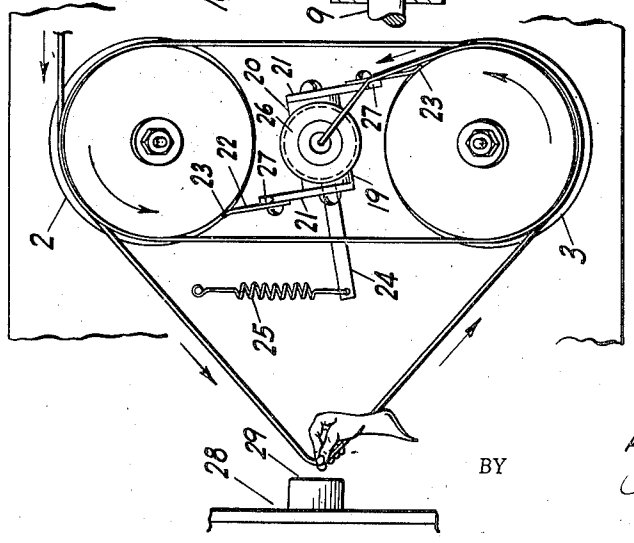


Fig. 3.

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METHOD AND APPARATUS FOR HANDLING FILAMENTARY MATERIAL

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9 Claims. (Cl. 28—71.5)

This invention concerns an improved method and apparatus for handling filamentary material. It is particularly concerned with a two-roll thread-advancing device for withdrawing an aggregate comprising a plurality of individual units of filamentary material from a plurality of sources of supply, such as a creel or an artificial filament spinning machine, to make it available to another device for processing or further handling and with a method of lacing the filamentary material from the sources of supply to the latter device.

In starting the operation of the latter processing or handling device, it is necessary to separately lace or thread a plurality of laterally displaced wraps of the several strands of filamentary material over the two-roll thread-advancing device until the aggregate built up is of sufficient size to be capable of being handled in the processing device. For example, if the processing device is a staple fiber cutter of the type disclosed in Beria Patent 1,723,998 and the sources of supply comprise a hundred or more spinnerets of one or more machines for spinning cellulose acetate, viscose or other materials into artificial filaments, it may be necessary to build up an aggregate of individual multiple-filament units from at least 10 to 20 spinnerets before the filamentary aggregate has sufficient mass to be drawn through the cutter disk by the centrifugal force generated by its rotation. Other processing devices might require an aggregate of greater or less size depending upon the characteristics of the device and the particular conditions of operation in a given plant. Regardless of the particular processing device and the particular sources of supply of the filamentary material, the continuous operation of the two-roll thread-advancing device during the time in which the operator is building up the necessary aggregate of filamentary material thereon causes the accumulation of an excess length of the individual strands which are first placed about the device. This accumulation is generally discharged from the last wrap at the leading off side of the device and interferes seriously with the manual operation of wrapping subsequent individual strands about the thread-advancing device.

It is an object of this invention to provide such a device with means for removing the excess length so arranging the device that the excess length being removed cannot interfere with the subsequent lacing or threading of the filamentary strands about the device. It is a further object of this invention to provide a novel method for lacing the filamentary material from the withdrawing device to the processing device and for removing excess length of filamentary material accumulated on the withdrawing device during its lacing up. Further objects and advantages of the invention will be apparent from the description of the drawing which is illustrative thereof.

Figure 1 is an end elevation of the invention,

Figure 2 is a side elevation, with parts in cross-section, of the invention, and

Figure 3 is an end elevation of the device showing the operation of transferring the filamentary material to a processing device after the thread-advancing device has been laced.

Figures 1 and 2 show the relationship of the filamentary material with respect to the thread-advancing device during its normal operation of withdrawing the filamentary material from a source of supply and delivering it to a processing or other handling device. In these figures, 2 and 3 are godets or wheels which are secured for rotation with shafts 4 and 5 respectively which are mounted in substantially the same plane but with an inclination out of parallel alignment in any suitable supporting structure. The supporting structure shown comprises a double-walled support 6 upon the rear wall 7 of which a suitable bearing 8 is mounted to support for rotation a shaft 9 carrying a driving gear 10 which meshes respectively with gears 11 and 12 which are keyed to the shafts 4 and 5 carrying the godets. The shaft 9 carrying the driving gear 10 may be driven by a motor through a belt and pulley connection or in other conventional way (not shown).

Within the front wall 13 of the supporting structure at a point approximately centrally located with respect to the godets 2 and 3 there is mounted a conduit 14 which presents an opening 15 at a distance from the front plate 13 of the supporting structure approximately the same as that of the front faces of the godets 2 and 3. This conduit may be supported by a suitable flange 16 as shown. A suitable discharge pipe 17 is secured to the conduit, such as by threading, and may be connected to a suction pump.

A cylindrical sleeve 18 is mounted rotatably upon the exterior surface of the conduit 14 and carries at opposite sides thereof supporting bases 19 and 20 upon which the plates 21 may be fastened. These plates may have a width corresponding approximately to the width of the thread-engaging portion of the neighboring godets and each of the plates carries a flexible

scraper blade 22 having a leading edge 23 adapted to cooperate with the peripheral surface of the adjacent godet. This edge makes an angle with the adjoining edges of the scraper so that its full length bears against the peripheral surface of the godet. The sleeve 18 with its supporting bases 19 and 20 for the scrapers 22 is adapted to be swung into engagement with the godets by means of the lever arm 24 secured thereto and the spring 25 secured at one end to the lever 24 and at the other to the wall 13 so that it tends to swing the structure in a clockwise direction as viewed in Figure 1. A collar 26 may be screwed upon the outer end of the conduit 14 to retain the sleeve 18 thereupon. Either or both of the plates 21 may have an outwardly projecting finger 27 which is rounded off and serves to guide the filamentary material from the last wrap on one or the other of the godets into the opening 15 of the conduit 14 in the manner and for the purposes hereinafter described.

Assuming for the moment that the withdrawing device of Figures 1 and 2 is being used to deliver the filamentary material from the spinnerets of one or more artificial filament spinning machines directly, or indirectly through a series of suitable guides, and thence to a staple fiber cutting device 28 of the Beria type mentioned above (see Figure 3), two complete laps of the filamentary tow about the rolls are generally adequate to supplement the centrifugal force exerted by the cutter head to assure the continuous passage of the filamentary material through the cutter at a constant rate of speed and without any tendency of the filamentary material to slip with respect to the godets of the withdrawing device and thereby impart irregularity or loss of speed to the traveling filamentary material. However, more or less wraps than two may be used depending upon the particular constitution and surface characteristics of the filamentary material and the friction characteristics of the surfaces of the godet as well as the conditions under which they operate, that is whether or not the filamentary material contains processing liquids at the time it passes about the periphery of the godet.

While relatively few wraps of the filamentary material about the godets are ordinarily needed to assure adequate tractive force to deliver the material from the source of supply to the processing device, such is not the case when starting operations because of the fact that the processing device, such as the staple fiber cutter, is not operating upon the tow and hence cannot exert its tractive force thereupon. For this reason in starting the device, a greater number of wraps, at times as many as five or six, are required upon the godets to assure the elimination of slippage of the filamentary material thereon. In lacing up the device, therefore, the operator takes one or two of the individual multiple-filament units issuing from a corresponding number of spinnerets or supply packages of the filamentary material and wraps them five or more times about the two godets. This is done quickly with an excess length of the filamentary material and the tail left after the wrapping procedure is conducted over the guide 27 to the open end 15 of the conduit 14 where suction serves to continuously withdraw it from the scene of operation. This suction may be controlled by suitable valves to be in effect only during the lacing operation. While the first ends are continuously being fed into the suction conduit 14, additional ends from other spinnerets or other supply packages may be brought to the godets, wrapped thereabout, and then introduced into the suction conduit 14. This may proceed until the tow built upon the godets is of sufficient size to enable it to be handled by the processing device. When this has been accomplished, the operator has merely to insert a finger under one of the courses of yarn bridging the gap between the godets adjacent the processing machine 28, draw the filamentary material thus hooked by the finger into the mouth 29 of the staple fiber cutter as shown in Figure 3 or to the receiving end of any other processing or handling device. In the mouth of the staple fiber cutter or at the receiving end of any other processing or handling device, the filamentary tow is cut. Assuming that the course of tow bridging the two godets to be thus hooked by the finger and drawn to the processing device were selected so that only two complete wraps would be left upon the godet and there were five wraps thereon to start with, the course brought to the cutter opening would be the middle one of the five and an excess of two wraps would be left upon the godets after the tow is cut and the leading end is introduced to the mouth 29 of the cutter head. However, these two wrappings are rapidly removed by the suction conduit 14 which continually withdraws the wraps which remain beyond the point of cutting of the tow. It is thus seen that the suction discharge device 14 is so arranged that it not only continuously prevents the accumulation of excessive lengths of the filamentary material during the time that the operator is building up the filamentary material aggregate upon the device and the discharge of the excess from the godets in a manner which would interfere with the manipulations of the operator during that period but it also serves to remove the surplus wrappings left upon the godets after the cutting of the tow at an intermediate point of the wrappings to serve the cutter or other processing device.

At the time the cut tow is served to the cutter or other processing device it may be receiving only a small proportion of the total filamentary aggregate which it is desired to process. However, all that is necessary to serve additional individual units of the filamentary material to the aggregate is to bring such additional units to the traveling aggregate at any convenient point along its length in advance of the thread-advancing device. If the individual units are moist, they will adhere directly to the aggregate; otherwise, it may be necessary to catch or to somewhat entwine the additional units in the traveling aggregate.

In the claims, the expression "generally helical" is intended to include not only a strictly helical relation but also minor deviations, such as the configuration of the laterally displaced wraps of the filamentary material about the two godets described herein.

While a preferred embodiment of the invention has been disclosed, the description is intended to be illustrative only, and it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. An apparatus for withdrawing an aggregate of continuous filamentary material from a supply thereof comprising a pair of godets arranged to cause lateral displacement of successive wraps of the continuous filamentary material traveling thereabout, means for driving the godets and

means disposed between the godets for removing the excess filamentary material as it is discharged from the wrappings about the godets.

2. An apparatus for withdrawing an aggregate of continuous filamentary material from a supply thereof comprising a pair of godets arranged to cause lateral displacement of successive wraps of the continuous filamentary material traveling thereabout, means for driving the godets and suction means disposed between the godets for continuously removing the excess filamentary material as it is discharged from the wrappings about the godets.

3. An apparatus for withdrawing an aggregate of continuous filamentary material from a supply thereof comprising a pair of godets arranged for rotation about axes inclined with respect to each other to cause lateral displacement of successive wraps of the continuous filamentary material traveling thereabout, means for driving the godets and suction means disposed between the godets for continuously removing the excess filamentary material as it is discharged from the wrappings about the godets.

4. An apparatus for withdrawing an aggregate of continuous filamentary material from a supply thereof comprising a pair of godets arranged to cause lateral displacement of successive wraps of the filamentary material traveling thereabout, means for driving the godets, a suction conduit mounted between the godets, a sleeve rotatably mounted on the conduit, and scrapers carried by the sleeve arranged to cooperate with the circumferential surface of the godets.

5. The method of delivering filamentary material comprising a plurality of continuous multiple-filament units from a supply thereof to a device for handling it comprising the preliminary steps of successively conducting separate portions of a plurality of the units through a generally helical path comprising a plurality of elongated loops or wraps and leading the excess filamentary material discharged from the path during the lacing thereof through the space surrounded by the loops.

6. The method of delivering filamentary material comprising a plurality of continuous multiple-filament units from a supply thereof to a device for handling it comprising the preliminary steps of successively conducting the units through a generally helical path comprising a plurality of elongated loops or wraps to form a filamentary aggregate and leading the filamentary material discharged from the path through the space surrounded by the loops, then drawing one of the loops out to a point adjacent the receiving portion of the handling device, and cutting the latter loop at this point to provide a leading end of the filamentary material aggregate for the handling device.

7. The method of delivering filamentary material comprising a plurality of continuous multiple-filament units from a supply thereof to a device for handling it comprising the preliminary steps of successively conducting the units through a generally helical path comprising a plurality of elongated loops or wraps to form a filamentary aggregate and leading the filamentary material discharged from the path through the space surrounded by the loops, then drawing one of the intermediate loops out to a point adjacent the receiving portion of the handling device, and cutting the latter loop at this point to provide a leading end of the filamentary material aggagate for the handling device.

8. An apparatus for withdrawing an aggregate of continuous filamentary material from a supply thereof comprising a pair of rotatable rolls arranged to cause lateral displacement of successive wraps of the continuous filamentary material traveling thereabout, means for driving at least one of the rolls and means disposed between the rolls for removing the excess filamentary material as it is discharged from the wrappings about the rolls.

9. An apparatus for withdrawing an aggregate of continuous filamentary material from a supply thereof comprising a pair of rotatable rolls arranged for rotation about axes inclined with respect to each other to cause lateral displacement of successive wraps of the continuous filamentary material traveling thereabout, means for driving at least one of the rolls and suction means disposed between the rolls for continuously removing the excess filamentary material as it is discharged from the wrappings about the rolls.

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