Dec. 5, 1967 P. VORISEK 3,355,869

TREATING OF FIBROUS MATERIALS

Filed Feb. 21, 1967 2 Sheets-Sheet 1

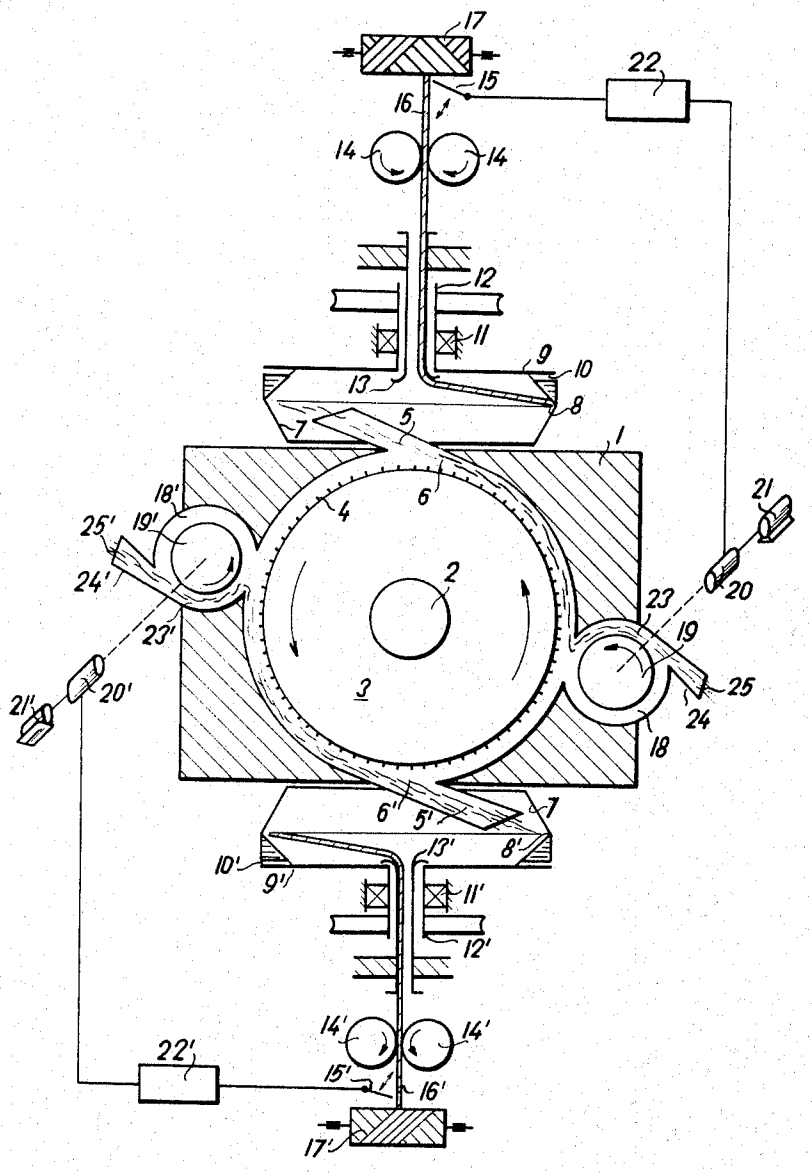

Fig. 1

Dec. 5, 1967 P. VORISEK 3,355,869

TREATING OF FIBROUS MATERIALS

Filed Feb. 21, 1967 2 Sheets-Sheet 2

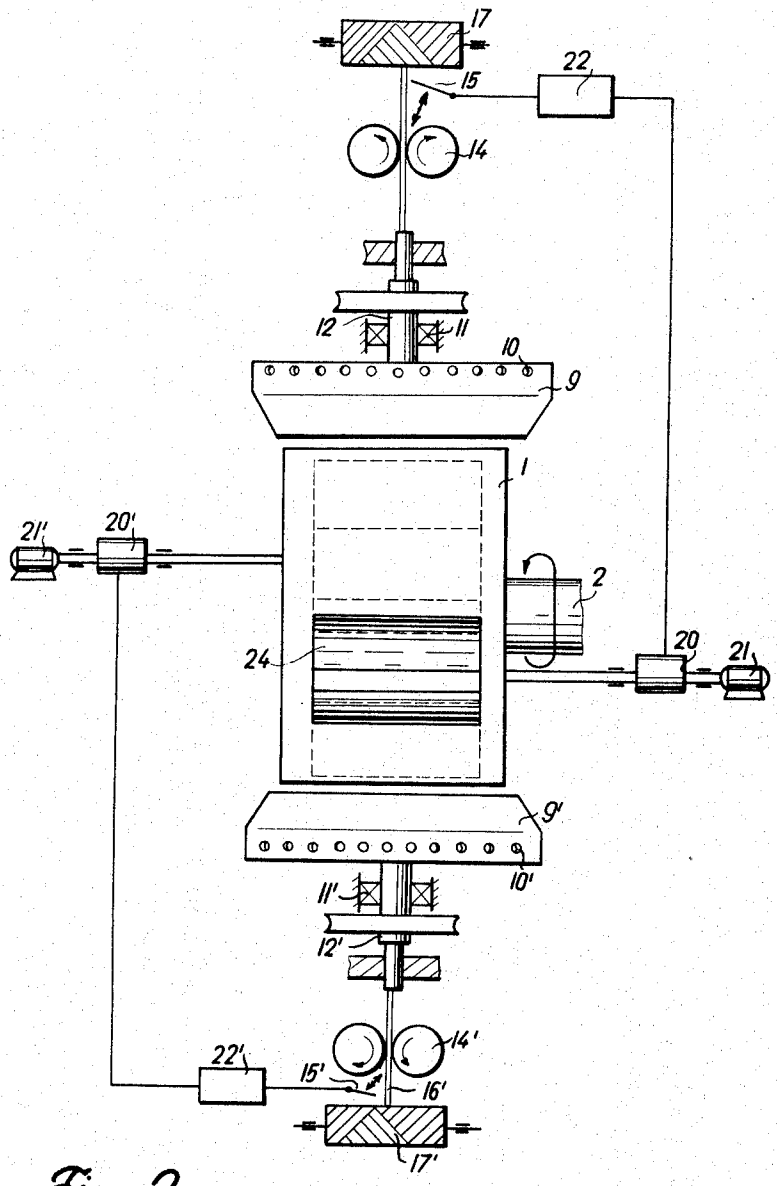

Fig. 2

United States Patent Office

3,355,869
Patented Dec. 5, 1967

3,355,869

TREATING OF FIBROUS MATERIALS

Premysl Vorisek, Chocen, Czechoslovakia, assignor to Vyzkumny ustav bavlnarsky, Usti, nad Orlici, Czechoslovakia

Filed Feb. 21, 1967, Ser. No. 618,301
Claims priority, application Czechoslovakia, Feb. 24, 1966, 1,223/66
10 Claims. (Cl. 57—58.95)

ABSTRACT OF THE DISCLOSURE

A rotary carding roller having a cylindrical peripheral surface, two feed arragements for respectively supplying fibrous sliver onto the surface of the carding roller, two rotary spinning chambers each associated with one of the feed arrangements for receiving oriented fibers obtained from sliver supplied by the respective associated feed arrangement, two thread-break detectors associated with the respective spinning chambers for detecting the breakage of thread issuing therefrom, and two arresting means operatively connected with the detectors and the respective feed arrangement and responsive to signals produced by the detectors for arresting the supply of sliver by the respective feed and response to breakage of the yarn issuing from the associated spinning chamber.

Cross-references to related applications

A rotary spinning chamber of the type discussed hereafter is disclosed in the copending application of Miloslav Kubovy et al., Ser. No. 598,275, and entitled "Device for Guiding Yarn" and filed on Dec. 1, 1966. This application is assigned to the same assignee as the present application.

Background of the invention

The present invention relates to the treating of fibrous material in general, more particularly to the treating of fibrous material in continuous ringless spinning of such material.

The continuous ringless spinning of fibrous materials utilizes spinning chambers which rotate about a vertical axis of rotation and which have an inner peripheral surface onto which oriented fibers, obtained by carding fibrous sliver, are fed in a continuous stream. Under the influence of centrifugal action the fibers are deposited on the surface in form of a cohesive ribbon which can be withdrawn, usually in the direction of the axis of rotation of the spinning chamber, in form of a yarn. A spinning chamber of this type is, for instance, described in the above-mentioned copending application of M. Kubovy et al., Ser. No. 598,275.

Spinning chambers for the continuous ringless spinning of fibrous material are in the prior art each associated with a carding roller which cards the sliver, that is which separates the fibers of the sliver and orients them preparatory to their deposition in form of a continuous stream onto the inner peripheral surface of the spinning chamber. Of course, the carding roller alone is not sufficient for this purpose, since additional mechanisms such as feed roller and supporting equipment are used for supplying the sliver to the carding roller and for rotating the carding roller, controlling its speed of rotation, and other functions. Thus, such arrangements are relatively elaborate and therefore also relatively expensive. In fact, arrangements of this type which are known from the prior art are actually even more expensive than would appear at first sight because each of the carding or combing rollers thus provided is very inefficiently utilized. This will be understood if it is considered that the sliver is fed into engagement with the surface of the roller at one point

thereof and that it is removed from the surface of the roller, after having been combed or carded, as soon as this point of the surface of the roller has been angularly displaced through 90 degrees, and sometimes even less. Thus, no more than approximately a quarter of the available surface of the carding roller is used, a utilization which is extremely inefficient.

Summary of the invention

The present invention overcomes the above-mentioned drawbacks of the prior art.

More particularly, the present invention provides an arrangement in which the available circumferential surface of a carding instrumentality, particularly a carding roller is utilized with a high degree of efficiency.

Still more particularly, the present invention provides an arrangement wherein a single carding instrumentality, such as a carding or combing roller, can serve at least two rotary spinning chambers for supplying oriented fibers thereto.

In accordance with one feature of my invention, I provide an apparatus for treating fibrous material comprising carding means which is operative for converting fibrous sliver into oriented fibers. Associated with the carding means is a plurality of feeds arranged for respectively supplying sliver to the carding means. There is further provided a plurality of spinning means each of which are associated with one of the feeds and which are arranged to receive oriented fibers obtained from sliver supplied by the respective feed. Detector means is provided and is associated with the respective spinning means for detecting breakage of yarn issuing therefrom. Finally, arresting means is provided, such arresting means being operatively connected with the detector means and with the respective feeds and being responsive to signals produced by the detector means for the purpose of arresting the supply of sliver by any of the aforementioned feeds in response to breakage of the yarn which issues from the spinning means associated with such feed.

Thus, it will be clear that if the yarn of any one or several of the spinning chambers breaks, this will be sensed by the associated detector means and the latter will, in turn, arrest operation of the feed or feeds associated with the spinning chamber or chambers, whereas the supply of fibers continues uninterruptedly via the remaining feeds and the carding means to such rotary spinning chambers whose detector means have not indicated any yarn breakage. In other words, if one or more of the spinning chambers must be temporarily shut down, the associated fiber feeds can be similarly shut down without any necessity for stopping operation of the carding means and, consequently, without any need for stopping operation of the remaining rotary spinning chambers.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

Brief description of the drawing

FIG. 1 is a vertical sectional elevation of a device embodying my invention; and

FIG. 2 is a side-elevational view of the device shown in FIG. 1.

Description of the preferred embodiment

Discussing now the drawing in detail, it will be seen that there is provided a housing which is generally indicated with reference numeral 1 and which is provided

with an inner chamber wherein there is arranged a combing or carding roller **3** which is fixedly mounted on a rotary drive shaft **2** and which can thus be rotated in the direction of the arrows shown in FIG. 1. The outer circumferential surface of the carding roller **3** is of cylindrical cross section and is provided with a great number of outwardly projecting needles or other suitable projections indicated with reference numeral **4**. It will be understood that these needles **4**, when they engage the fibrous sliver, serve to "comb" or "card" the same so as to orient the fibers thereof preparatory to introduction of the same into a rotary spinning chamber.

The housing **1** is provided with an outlet channel **5** and, diametrally opposite the outlet channel **5**, with a similar outlet channel **5'**. Each of the outlet channels **5**, **5'** extends into the inlet of a respective rotary spinning chamber **9**, **9'** and these spinning chambers are respectively provided with guide surfaces **7**, **7'** which extend to and terminate at collecting surfaces **8**, **8'**. Each of the spinning chambers **9**, **9'** is further provided with one or more exhaust passages **10**, **10'** and with a tubular shank, respectively designated with reference numerals **12** and **12'**, which are supported in respective bearings **11**, **11'** for rotation therein. In the illustrated embodiment the rotary spinning chambers **9**, **9'** are arranged on diametrally opposite sides of the carding roller **3** so that they rotate about an axis which is common to both. A stationary yarn-withdrawing tube **13**, **13'** is provided in the respective spinning chambers **9**, **9'** and passes through the respective hollow shanks **12**, **12'**.

Downstream of the respective spinning chambers the yarn **16**, **16'** being withdrawn from the respective chambers passes between a set of positively driven withdrawing rollers, identified in the case of spinning chamber **9** with reference numeral **14** and, in the case of spinning chamber **9'**, with reference numeral **14'**. The rollers **14**, **14'** rotate in mutually opposite directions as indicated by the respective arrows.

The yarn **16**, **16'** being withdrawn by these sets of rollers **14** and **14'** is checked for breakage by yarn detectors **15** in the case of the yarn **16**, and **15'** in the case of the yarn **16'**. After passing the respective detectors **15**, **15'** the yarn is then wound onto bobbins **17** and **17'**, respectively.

Located in a recess of the housing **1** which is upstream of the rotary spinning chamber **9** is a feed roller **19** which is driven, via a suitable clutch **20**, by a drive means **21** of any well known type. The clutch **20** is controlled by an impulse device **22** which in turn is operatively connected with the yarn-breakage detector **15** so that, when the latter detects a breakage in the yarn **16**, the signal generated by the detector **15** will cause the impulse device **22** to disengage the clutch **20** so as to thereby interrupt drive of the feed roller **19** in the absence of yarn **16**. A funnel-shaped inlet **24** discharges into a clearance established between the outer circumferential surface of the feed roller **19** and the surrounding wall of the housing **1** and sliver **25** which is fed into the inlet **24**, passes into the clearance **23** wherein it is conveyed by the feed roller to pass into engagement with the teeth **4** of the carding roller **3** so that the fibers of the sliver **25** are then separated and oriented. Such separation and orientation takes place during passage of the fibrous material from the feed roller **19** to the outlet **5** which it leaves in form of a stream **6** of oriented fibers. Of course, the shape and length of this path between the feed roller **19** and the outlet **5** must be so chosen as to insure satisfactory separation of the fibers.

A sensing, coupling and impulse-providing arrangement similar to that just described in conjunction with feed roller **19** is also provided in conjunction with a second feed roller **19'** which is also arranged in a recess of housing **1**, such recess for the feed roller **19'** being located downstream of the rotary spinning chamber **9** but upstream of the rotary spinning chamber **9'**. The elements of this arrangement associated with the feed roller **19'** are identified with reference numerals identical with those used to identify the elements associated with feed roller **19**, but are each provided with a "prime."

It will be understood that the stream **6** of oriented fibers can be separated from the surface of carding roller **3** in various ways, which are of no consequence in connection with the present invention, but which may primarily include the suction effect which is obtained when air is exhausted from the interior of the respective rotary spinning chambers **9**, **9'** through the exhaust passages **10**, **10'** thereof. If some of the fibers should nevertheless pass beyond the respective outlets **5**, **5'** and not be doffed, then they will pass on to the next-following outlet, that is if they have passed the outlet **5** they will move onto the outlet **5'**, and will then be added to the stream of fibers which enters into the spinning chamber associated with that particular outlet.

In case the yarn **16** or **16'** should break, the feed roller **19** or **19'** associated with the respective spinning chamber is stopped, so that no further sliver and thus no further fibrous material passes onto the surface of the carding roller **3** for being conveyed to the spinning chamber whose yarn has broken, whereas the supply of sliver and thereby of oriented fibers to the other spinning chamber, whose yarn is not broken, continues without interruption. Thus, the number of carding rollers which was heretofore necessary is reduced at least by one-half; that is, two spinning chambers can be serviced by a single carding roller with the resultant economies of manufacture and of operation.

It is to be understood, however, that the invention is not limited to the utilization of only two spinning chambers with their associated feed and control arrangements. Rather, a greater number of spinning chambers and associated control arrangements can be provided if desired to thereby utilize the circumferential surface of the carding roller even more fully. Also, it is conceivable to use another type of carding instrumentality instead of a carding roller, and all such modifications are intended to be encompassed by the protection sought herein.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of apparatus for treating a fibrous material differing from the types described above.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. Apparatus for treating fibrous material, comprising, in combination, carding means operative for converting fibrous sliver into oriented fibers; a plurality of feeds arranged for respectively supplying sliver to said carding means; a plurality of spinning means each associated with one of said feeds and arranged to receive oriented fibers obtained from sliver supplied by said one feed; detector means associated with the respective spinning means for detecting breakage of yarn issuing therefrom; and arresting means operatively connected with said detector means and the respective feeds and responsive to signals produced by said detector means, for arresting the supply of sliver by a feed in response to breakage of the yarn issuing from the spinning means associated with said feed.

2. Apparatus as defined in claim **1**, wherein said carding means comprises a rotary carding roller.

3. Apparatus as defined in claim **2**, wherein said carding roller has a cylindrical circumferential working surface, and wherein said plurality of feeds includes a first

and a second feed arranged for supplying sliver onto said working surface at a pair of points spaced angularly with reference to the circumference of said roller.

4. Apparatus as defined in claim 3, wherein said spinning means includes a plurality of rotary spinning chambers.

5. Apparatus as defined in claim 3, wherein said spinning means includes a plurality of rotary spinning chambers each arranged to rotate about an axis normal to the axis of rotation of said rotary carding roller, and each having an inlet proximal to said circumferential working surface thereof.

6. Apparatus as defined in claim 5, wherein said plurality of spinning chambers includes a first and a second spinning chamber respectively associated with said first and second feed, and wherein said inlets of said first and second spinning chambers are angularly spaced from the associated feed and located downstream thereof, so that sliver supplied by the associated feed and converted into oriented fibers by said carding roller is supplied to the respective spinning chamber in response to rotation of said carding roller.

7. Apparatus as defined in claim 6, wherein said detector means includes two detectors each associated with one of said spinning chambers downstream thereof for detecting breakage of yarn issuing therefrom.

8. Apparatus as defined in claim 7, wherein said feeds each comprise a feed roller and a drive for rotating said feed roller about an axis of rotation.

9. Apparatus as defined in claim 8, wherein said arresting means includes actuating means operatively associated with the respective detector and the respective associated drive for arresting the latter in response to receiving a signal from the respective detector indicating yarn breakage at the spinning chamber associated with the respective drive.

10. Apparatus as defined in claim 9, wherein said drives each include clutch means, and wherein said actuating means is arranged to disengage the respective clutch means in response to receiving a signal from the respective detector.

References Cited

UNITED STATES PATENTS

2,911,783	11/1959	Gotzfried	57—58.95
1,307,477	10/1963	Meimberg	57—58.95 XR
3,330,008	7/1967	Schuller	57—58.91 XR

FRANK J. COHEN, *Primary Examiner.*

W. H. SCHROEDER, *Assistant Examiner.*