Abstract

The invention relates to a method for operating a textile machine, particularly a spinning preparation machine, preferably a drawing frame, carding machine, or comber, wherein fiber material (5) is stored into a can (8) at a defined feed rate in the region of an outlet of the textile machine by a storage device, such as a coiler plate (7). According to the invention, an electrical signal is generated during the storage of the fiber material (5) by means of a sensor (11) as soon as a contact is made between the fiber material (5) present in the can (8) and the storage device, and the feed rate of the storage device is controlled using the signal. The invention further relates to a corresponding textile machine having an outlet for a fiber material (5) and a storage device disposed in the region of the outlet, such as a coiler plate (7), for storing the fiber material (5) into at least one can (8) at a predefined feed rate, wherein the storage device according to the invention is associated with at least one sensor (11), said sensor being implemented for generating an electrical signal as soon as contact is made between the fiber material (5) present in the can (8) and the storage device, wherein the sensor (11) is connected to a controller implemented for controlling the feed rate of the storage device using the signal.

(Figure 2)

Claims

1. A method for operating a textile machine, particularly a spinning preparation machine, preferably a drawing frame, carding machine, or comber, wherein fiber material (5) is stored in the region of an outlet of the textile machine by a storage device, such as a coiler plate (7), at a defined feed rate into a can (8), characterized in that an electrical signal is generated by means of a sensor (11) during the storage of the fiber material (5) as soon as contact is made between the fiber material (5) stored in the can (8) and the storage device, and that the feed rate of the storage device is controlled using the signal.

2. The method according to the preceding claim, characterized in that the feed rate is increased as soon as contact is made between the stored fiber material (5) and the storage device.

3. The method according to one or more of the preceding claims, characterized in that the signal is generated by means of a force sensor, a pressure sensor, a contact sensor, a proximity sensor, an optical sensor, and/or a sensor for detecting friction between the fiber material and the storage device.

4. The method according to one or more of the preceding claims, characterized in that the contact force exerted by the stored fiber material (5) on the storage device is used for controlling the feed rate.

5. The method according to the preceding claim, characterized in that the contact force is captured continuously or at defined time intervals, particularly by means of the sensor (11).

6. The method according to one or more of the claims 4 and 5, characterized in that the contact force is averaged over a particular period of time and the resulting average value is used as the basis for controlling the feed rate.

7. The method according to one or more of the claims 4 through 6, characterized in that the captured contact force is processed by means of a controller and a corresponding progression of the feed rate is calculated therefrom.

8. The method according to one or more of the claims 4 through 7, characterized in that the feed rate is reduced or the storage of the fiber material (5) is stopped when a defined contact force is reached.

9. The method according to one or more of the preceding claims, characterized in that additional parameters, such as the type and/or dimensions of the can (8), the type of fiber material (5), the length and/or mass of the fiber material (5) stored in the can, the production speed of the textile machine, and/or environmental conditions such as temperature or humidity are used for controlling the feed rate.

10. A textile machine, particularly a spinning preparation machine, preferably in the form of a drawing frame, carding machine, or comber, having an outlet for a fiber material (5) and a storage device disposed in the region of the outlet, such as a coiler plate (7), for storing the fiber material (5) into at least one can (8) at a defined feed rate, characterized in that the storage device is associated with at least one sensor (11) implemented for generating an electrical signal as soon as contact is made between the fiber material

(5) stored in the can (8) and the storage device, wherein the sensor (11) is connected to a controller implemented for controlling the feed rate of the storage device using the signal.

11. The textile machine according to the preceding claim, <u>characterized in that</u> the control is implemented to increase the feed rate as soon as contact is made between the stored fiber material (5) and the storage device.

12. The textile machine according to one or more of the claims 10 and 11, <u>characterized in that</u> the sensor (11) is implemented for capturing the contact force exerted by the stored fiber material (5) on the storage device.

13. The textile machine according to one or more of the claims 10 through 12, <u>characterized in that</u> the control is implemented for reducing the feed rate or stopping the storage of the fiber material (5) as soon as the stored fiber material (5) exerts a defined contact force on the storage device.

14. The textile machine according to one or more of the claims 10 through 13, <u>characterized in that</u> the sensor (11) is a force sensor, a pressure sensor, a contact sensor, a proximity sensor, an optical sensor, and/or a sensor for detecting the friction between the fiber material and the storage device.

15. The textile machine according to one or more of the claims 10 through 14, <u>characterized in that</u> the at least one sensor (11) is disposed in or on a bottom side of a component of the storage device, so that said sensor can be brought into contact with a top layer of the fiber material (5) stored in the can (8).

16. The textile machine according to one or more of the claims 10 through 15, characterized in that the textile machine comprises additional sensors that make contact with the controller and by means of which additional parameters, such as the type and/or dimensions of the can (8), the type of the fiber material (5), the length and/or mass of the fiber material (5) stored in the can, the production speed of the textile machine, and/or environmental conditions such as the temperature and humidity can be detected and used for controlling the feed rate.

17. The textile machine according to one or more of the claims 10 through 16, characterized in that the storage device comprises a drive, the drive speed thereof being continuously or incrementally variable.

18. A method for operating a textile machine, substantially as herein described with reference to accompanying drawings and examples.

19. A textile machine, substantially as herein described with reference to accompanying drawings and examples.

Dated this 10th day of February 2012

Of Anand and Anand Advocates
Agents for the Applicatns

RIETER INGOLSTADT GMBH
Application No.

ORIGINAL

6 Sheets
Sheet 1

0380DEL12

10 FEB 2012

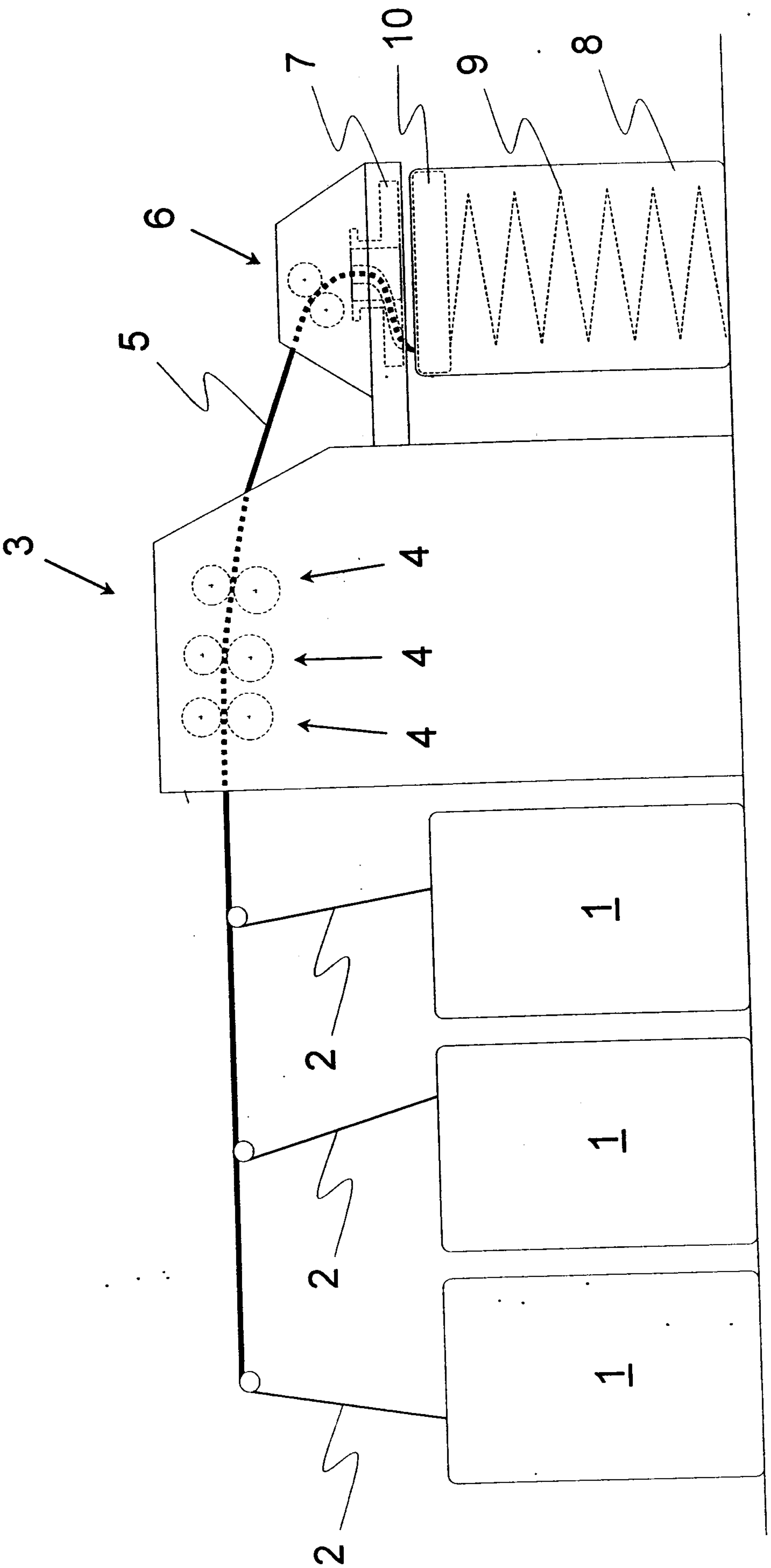

Fig. 1

Archana Shanker
of Anand and Anand Advocates
Agent for the Applicant

RIETER INGOLSTADT GMBH
Application No.

ORIGINAL

6 Sheets
Sheet 2

0380DEL12

10 FEB 2012

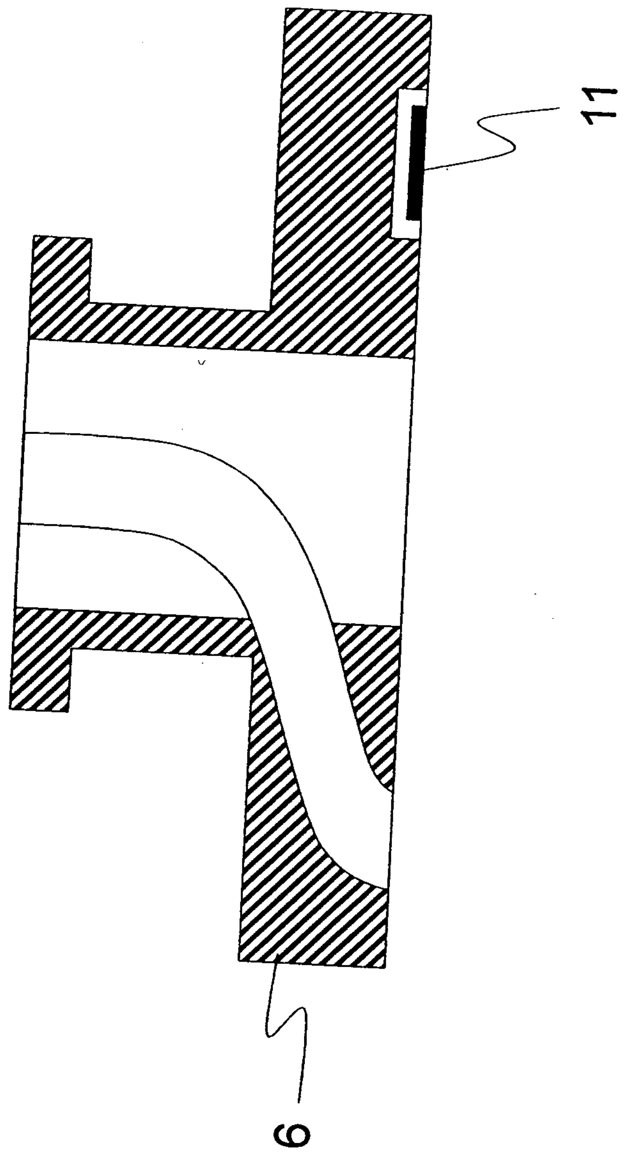

Fig. 2

Archana Shanker
of Anand and Anand Advocates
Agent for the Applicant

RIETER INGOLSTADT GMBH
Application No.

6 Sheets
Sheet 3

ORIGINAL

10 FEB 2012

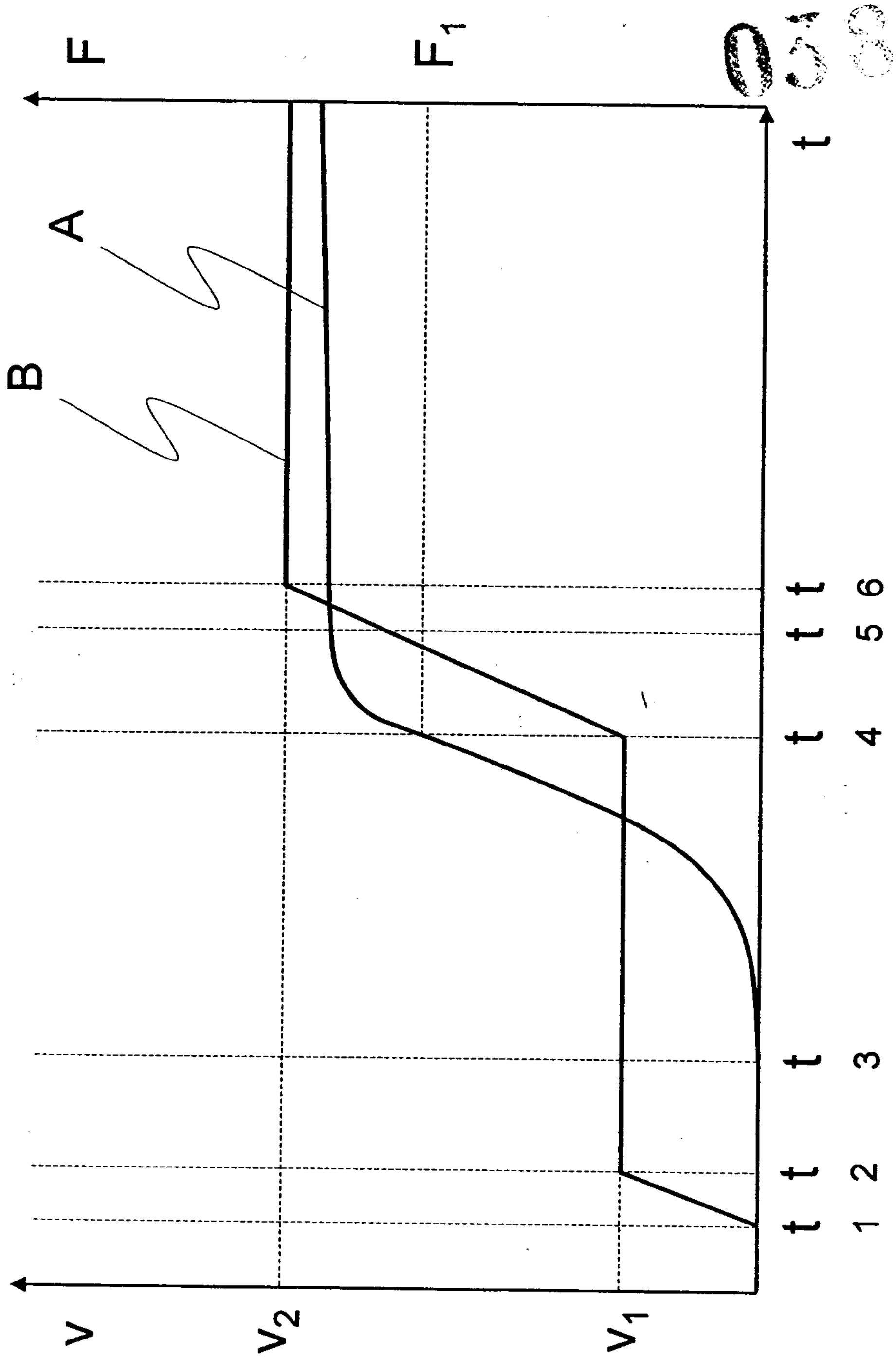

Fig. 3

Archana Shanker
of Anand and Anand Advocates
Agent for the Applicant

RIETER INGOLSTADT GMBH
Application No.

6 Sheets
Sheet 4

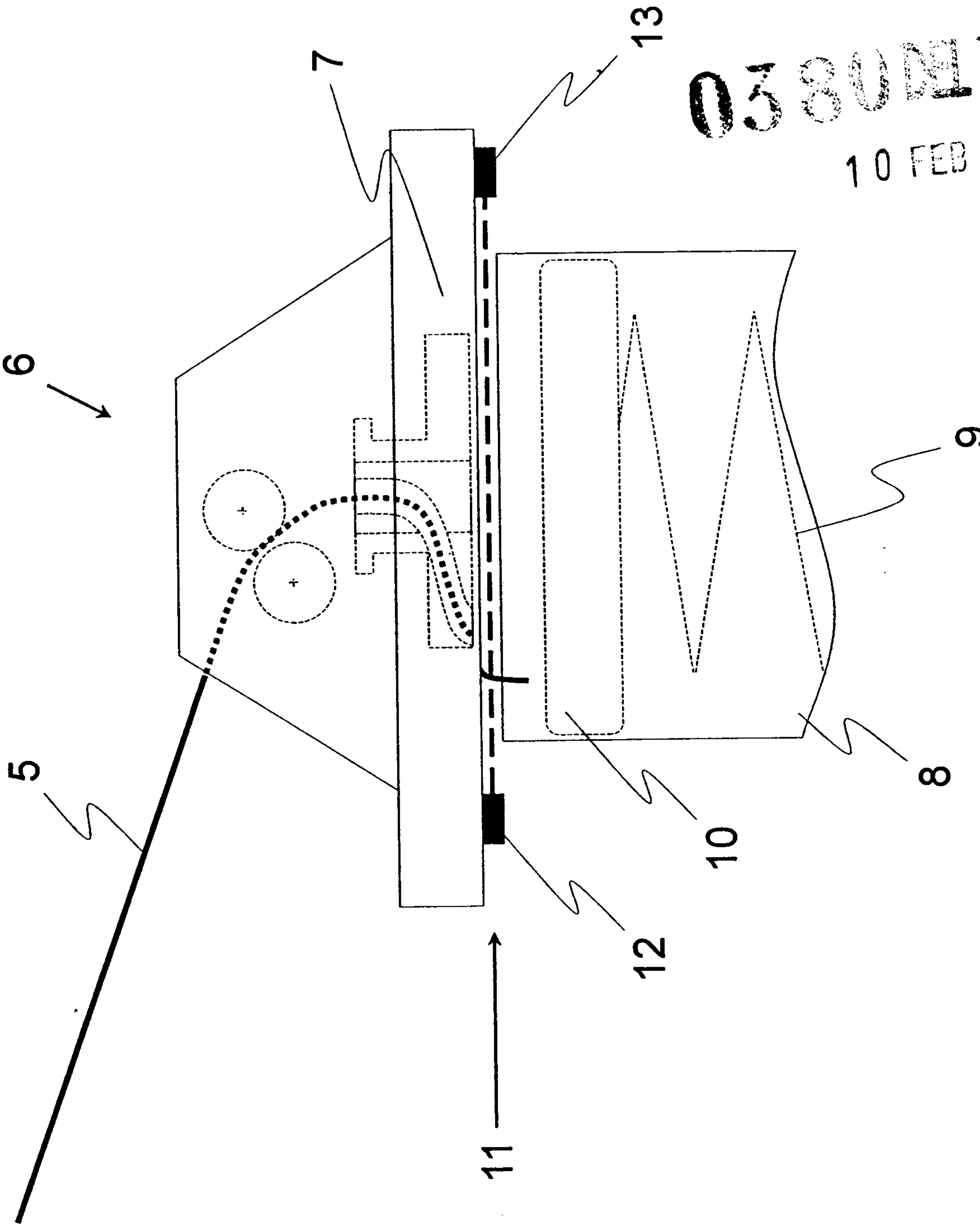

Fig. 4

Archana Shanker
Archana Shanker
of Anand and Anand Advocates
Agent for the Applicant

RIETER INGOLSTADT GMBH
Application No.

ORIGINAL

6 Sheets
Sheet 5

038[illegible]12

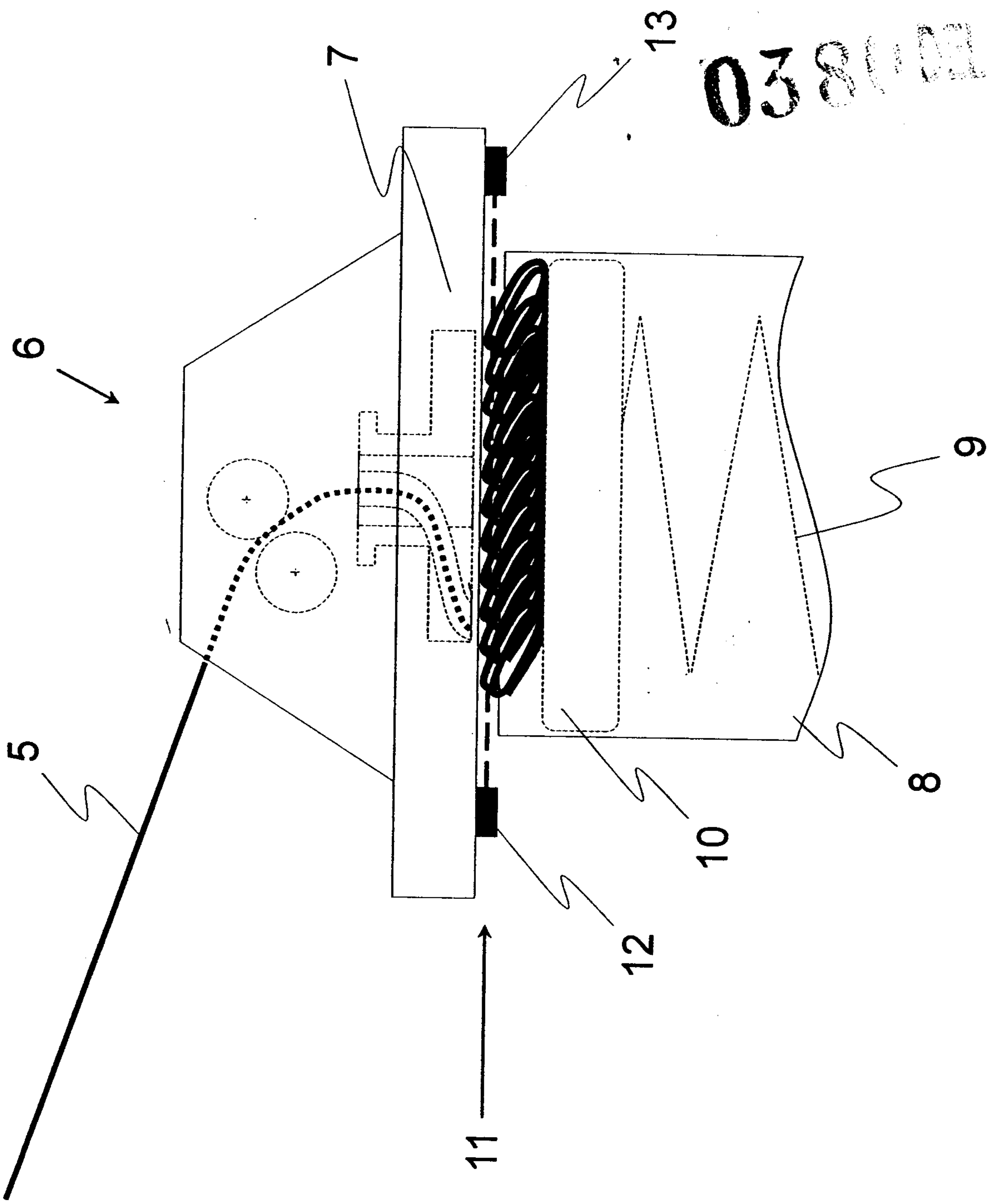

Fig. 5

Archana Shanker
of Anand and Anand Advocates
Agent for the Applicant

RIETER INGOLSTADT GMBH
Application No.

6 Sheets
Sheet 6

ORIGINAL

0380DEL12

10 FEB 2012

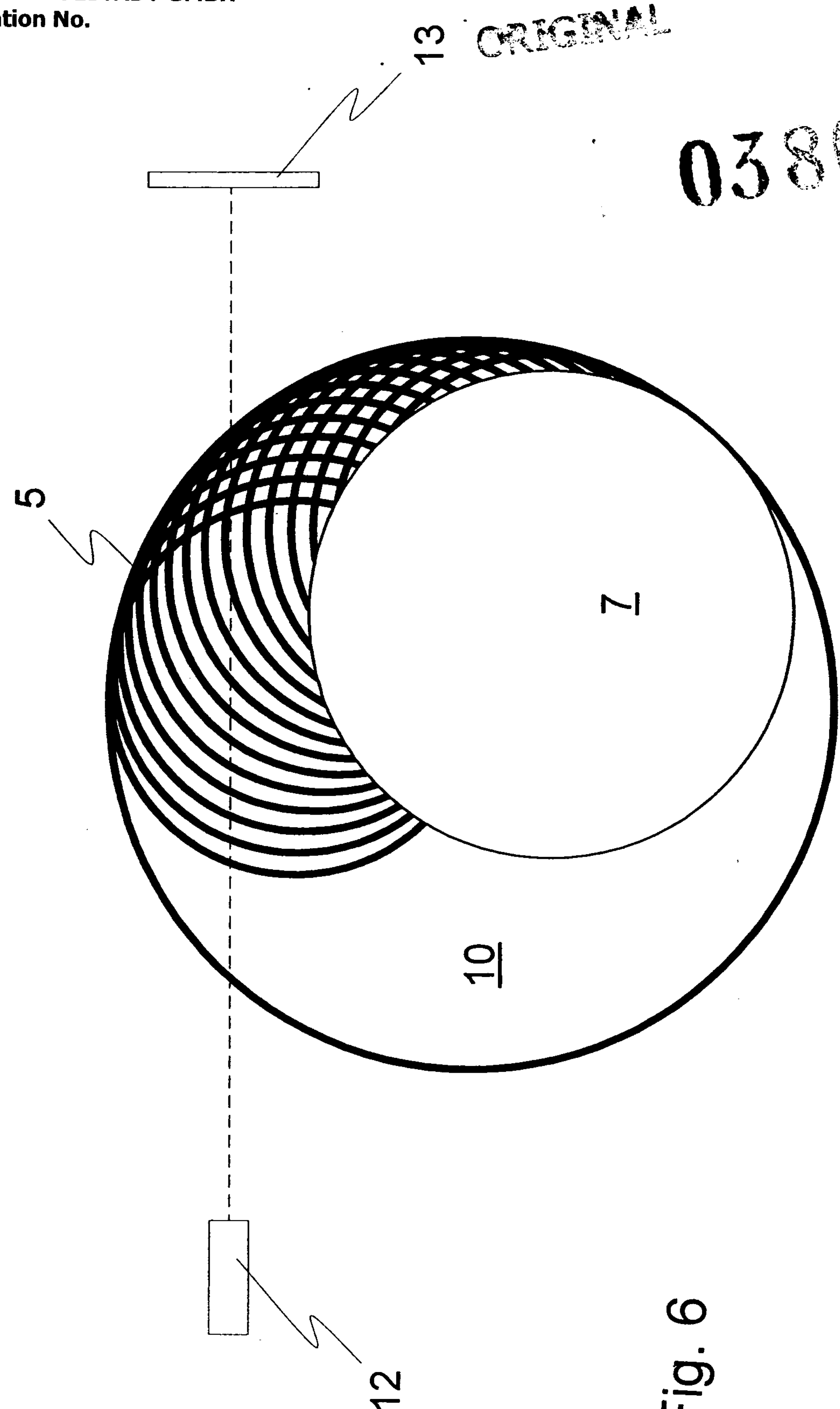

Fig. 6

Archana Shanker
Archana Shanker
of Anand and Anand Advocates
Agent for the Applicant

Textile machine and method for the operation thereof

The present invention relates to a method for operating a textile machine, particularly a spinning preparation machine, preferably a drawing frame, carding machine, or comber, wherein fiber material is stored into a can at a defined feed rate in the region of an outlet of the textile machine by a storage device, such as a coiler plate, and to a corresponding textile machine, particularly a spinning preparation machine, preferably in the form of a drawing frame, carding machine, or comber, having an outlet for fiber material and a storage device disposed in the region of the outlet, such as a coiler plate, for laying down the fiber material into at least one can at a predefined feed rate.

Spinning preparation machines, such as drawing frames, carding machines, or combers are used, among other purposes, to make the incoming fiber material more uniform. To this end, the spinning preparation machine typically has a series of drafting systems, generally in the form of a plurality of rollers disposed relative to each other, between which the fiber material is guided along the so-called nip lines in the direction transverse to the band. The fiber material is ultimately stretched and simultaneously made more uniform between the rollers. After said process, the fiber material, typically now in the form of a sliver, is ultimately stored in a corresponding container, known as a can, wherein the fiber material is looped in a typically circular or elliptical shape by a storage device, such as a coiler plate. The filled cans are then replaced by corresponding empty cans and transferred to a downstream textile machine, such as a spinning machine.

Because, however, a frictional force transfer between the storage device and the fiber material is necessary for satisfactory quality of the storage, complications can occur, particularly at the start of storage into an empty can, typically due to the construction of the cans themselves. The cans used typically comprise one or more spiral springs pressing on the can floor from below and intended to continuously hold the same in the optimal position for storage. Cans with a rectangular cross section are also known, wherein at least two spiral springs are disposed adjacent to each other in the longitudinal direction of the can. In order to stabilize the can floor in the horizontal, a pantograph or folding grate system is typically used in such cans. The spring force acting in the upward direction causes the can floor of an empty can to rise, ideally at least to the upper edge of the can, when storage is started, in order to ensure the cited friction is present for guiding the fiber material. The can floor is then continuously lowered during the storage process by the weight of the product, so that the guiding is maintained.

While the raising and lowering of the can floor as cited works perfectly for new cans, as the duration of service increases, the spring systems wear out or become dirty, so that the remaining spring force is no longer sufficient for raising the can floor of an empty can to the upper filling position thereof. If the can is place at the outlet of a drafting system, for example, then the distance between the discharge unit, in this case in the form of the bottom side of a coiler plate, and the opposite can floor, is ultimately too great. The fiber material is no longer stored in an orderly manner, but slides over the can floor without control, and in the worst case can be flung out over the edge of the can. Tolerances of the springs have similar consequences, and the key parameters of the springs, such as material, length, and spring constant, must be selected relatively precisely in order to apply a precise force to the can floor.

As a result, the fiber material stored at the start of the filling process in the cases cited has a relative low level of quality, because the frictional bond between the fiber material and the storage device or the can is insufficient.

In order to address this problem, for example, DE 36 21 794 A1 proposes gradually lowering the can floor from an upper position during the storage process by means of a vertically displaceable ram. Said lowering is performed such that the compressive force acting on the laid-down web packet, arising from the contact of the most recently stored web cycloids, is approximately constant during the entire storage process. To this end, the compressive force acting on the web packet is captured and the deviation thereof from an adjustable value is determined. The ram is then actively displaced by means of a drive depending on said deviation.

Similarly, DE 196 11 500 A1 describes an active drive device for adjusting the height of the can floor, wherein the lowering of the floor is intended to be controlled by measuring force and/or distance, considering the fill level of the can.

Such systems have the disadvantage, however, that an additional component is present, the drive device, causing increased procurement and maintenance costs.

It is thus the aim of the invention to propose a textile machine and a method for the operation thereof to allow clean and controllable storage of fiber material in conventional and particularly simply spring-supported cans even at the start of the storage process.

The aim is achieved with respect to the method in that an electrical signal is generated during the storage of the fiber material by means of a sensor as soon as a contact is made between the fiber material present in the can and the storage device, and the feed rate of the storage device is controlled by means of a feedback loop using the signal. The fact that controlled storage is possible above a certain feed rate only if contact has been made between the storage device, such as in the area of the underside of the coiler plate, and the fiber material already stored in the can, because the fiber material is first guided correspondingly on all sides as of this point in time, is thereby addressed in a simple but still reliable manner. The point in time that contact is made is thus a critical parameter that can be addressed by means of the method according to the invention directly in the control of the feed rate. In this context, it is noted that detection of the signal does not necessarily have to result in an immediate change in the feed rate. It is also conceivable that the signal strength is considered and a corresponding adjustment is made only after a particular signal strength is reached, or after a certain period of time after the signal is detected. It is thus ensured that the feed rate is not increased too soon and reliable storage of the fiber material can be ensured.

In this connection, it is particularly advantageous if the feed rate is increased as soon as contact is made between the stored fiber material and the storage device. As previously cited, the fiber material is guided substantially on all sides as of this point in time, so that the sliver can no longer slide within the can in an uncontrolled manner, or, in the worst case, be flung out of the can during the storage. The storage device is advantageously operated at a first feed rate at the start of storage of the fiber material, particularly into an empty can, and at at least one second feed rate after the detection of the contact, wherein the first feed rate is lower than the at least one second feed rate. Particularly at the beginning of the storage process, such as after a can change or when starting up the textile machine, problems with web storage often occur if the spring system of the can is no longer able to raise the can floor to the highest filling position. If the feed rate of the storage device is selected to be too high during this stage, then a storage error can occur, wherein the fiber material is either unevenly stored or can even be drawn over the edge of the can. The result is a machine stoppage and/or poor quality of the fiber material. It is indeed already known that the feed rate at the beginning of storage is held at a lower level for a constant period of time. This time, however, is often not sufficient for poorly maintained cans, or is too long for new cans, so that the textile machine is run more slowly than necessary. For the method according to the invention, the feed rate of the storage device is maintained at the first lower level only until contact between the stored fiber material and the storage device has actually been detected. Achieving this contact serves as a trigger signal for increasing the feed rate to a second value, which ultimately allows the maximum possibly production speed for the textile machine. While operation at only two different feed rates is indeed possible, the feed rate can, of course, also be increased to the final level in individual steps that are divided as finely as desired. It is conceivable, for example that the sliver is stored at the beginning at a first, low feed rate, in order to increase the feed rate gradually or incrementally until the sensor signals contact between the storage device and the fiber material. After this point in time, an increase to the maximum feed rate is ultimately possible, because the necessary guiding of the sliver has been established.

It is also advantageous if the change in the feed rate is made smoothly, because a particularly gentle storage of the fiber material is thereby ensured. It can also, however, be advantageous if the change in feed rate is made in stages, wherein the type of controller depends or can depend not least of all on the existing drive of the storage device.

It is also advantageous if the signal is generated by means of a force and/or pressure sensor, a contact sensor, a proximity sensor, an optical sensor, and/or a sensor for detecting friction between the fiber material and the storage device. Such sensors are available in a wide range of versions, and can thus be selected to suit the type of the textile machine. Of course other sensors, such as probes that react to bending, are also conceivable if they are compatible with the design of the storage device. Different sensors can also be used in conjunction, in order to increase the reliability of detection. With respect to the sensors, it should be further clarified that they send a signal for controlling the feed rate to the controller when the fiber material makes contact with the storage device, because this is an indication that the sliver is or is just about to be guided by the storage device. After this point in time, it is thus advantageous to control the feed rate according to the invention. It is ultimately also conceivable, in this context, that the control engages only after a certain time delay after the first contact. It should further be clarified that the sensors can be implemented for generating a signal as soon as they make contact with the fiber material stored in the can. Non-contacting controlling of the fiber material is also possible. For example, corresponding transmitting and/or receiving units of an optical sensor, preferably a light curtain, can also be placed just above the can or just below the outlet of the storage device. As soon as the sensor generates a continuous signal, this is an indication that the fiber material stored in the can has made contact with the storage device.

It is further advantageous if the contact force exerted by the stored fiber material on the storage device is considered in the control of the feed rate. As cited above, a certain frictional connection must exist between the fiber material and the can floor or storage device for high quality of the storage and thus the stored fiber material. This frictional connection, however, is proportional to the contact force exerted by the stored fiber material on at least one component of the storage device, wherein the contact force in turn is derived from the spring force by which the can floor is pressed in the direction of the storage device. If this contact force is then measured, then a parameter is available that considers the individual state of the can, so that signs of wear or contamination of the can or the spring system thereof are not actually eliminated, but can be effectively taken into account as the can is filled. To this end, only a certain contact force reflecting the frictional connection between the fiber material, can floor, and storage device, such as a coiler plate of a drawing frame, must be associated with a particular feed rate of the storage device at which a clean storage is still ensured, in order to be able to ultimately operate the storage device at the optimal feed rate.

It is further advantageous if the contact force is determined continuously or at defined time intervals. While a continuous measurement allows the most precise adaptation of the feed rate, in some cases it can also be sufficient to capture the contact force only at the beginning or end of the storage, in order to control these critical phases in particular. It is further advantageous if the sensor detecting the contact between the fiber material and the storage device is implemented for capturing the contact force, so that the measurement of this parameter does not require an additional sensor. For example, in this case, a pressure sensor could be used. This sensor, in turn, provides a signal as soon as the sliver makes contact with the storage device, wherein the signal strength or type also changes proportionally to the contact force of the fiber material, thus allowing the contact force value to be inferred.

The contact force is advantageously averaged over a particular period of time and the resulting average value is used as the basis for controlling the feed rate. Because the fiber material is typically stored in loops, it has an uneven surface in the can, so that the contact force at the sensor is also subject to fluctuation. If, however, the contact force is averaged over a certain time, then a number of measured values are obtained that can be averaged so that an indicative measurement variable is available.

In a particularly advantageous refinement of the invention, the captured contact force is processed by means of a controller and used to calculate a corresponding progression for the feed rate. In contrast to a direct adaptation of the feed rate to the detected contact force, this has the advantage that the control of the feed rate can be implemented as smoothly as possible. It is thus conceivable, for example, that the feed rate for a certain time is calculated in advance depending on the increase of the contact force. This prevents the feed rate from being continuously adjusted only as a response to the previously captured contact force. Previously calculated values can also be corrected using the instantaneous captured contact force, so that the feed rate can always be adapted as precisely as possible.

It can also be advantageous if the feed rate is reduced again when a defined contact force is reached. The contact force will increase significantly as the maximum fill level of the can is approached, so that this is a sign for reaching the end of the storage. In this stage, as well, it can be advantageous to throttle the feed rate in order to cleanly terminate the storage process. A stepwise increase in the contact force, or a particular maximum value of the same, can be selected as the triggering event.

It is also very advantageous if the storage of the fiber material is stopped entirely if a defined contact force is reached, wherein the corresponding contact force can be determined either in advance as an absolute value, or as a difference from an initial value when the can is filled, so that the actual spring force in each can is considered.

It is further advantageous if additional parameters, such as the type and/or dimensions of the can, the type of fiber material, the length and/or mass of the fiber material stored in the can, the production speed of the textile machine, and/or environmental conditions such as the temperature or humidity are considered in the control of the feed rate. In this manner, the method is adapted as best as possible, because the contact force alone is not sufficient for correctly laying down the fiber material. The cited data can either be input into a controller or can be determined by corresponding sensors once or even continuously.

The textile machine according to the invention is ultimately characterized in that the storage device is associated with at least one sensor implemented for generating an electrical signal as soon as contact is made between the fiber material stored in the can and the storage device, wherein the sensor is connected to a controller implemented for controlling the feed rate of the storage device by means of a feedback loop using the signal. The result is a textile machine allowing particularly efficient and reliable laying down of the fiber material. It is thus possible, using the signal, to maintain the feed rate at the beginning of the storage process at a level that prevents the fiber material from being flung out or stored in an uncontrolled manner, while after contact between the fiber material and the storage device is detected, the feed rate can be adapted, resulting in as rapid and reliable storage of the material as possible.

In this connection, it is particularly advantageous controller is implemented for increasing the feed rate as soon as contact is made between the stored fiber material and the storage device. As cited above, as of this point in time the fiber material is additionally guided by the storage device. An increase in the feed rate therefore does not result in uncontrolled storage, as would be the case at the beginning of the storage process. Rather, the additional guidance allows a significant increase in the production speed of the textile machine, because as of the time of contact, more rapid storage is possible. It is thereby conceivable, for example, that the storage device can be advantageously operated at a first feed rate at the start of storage of the fiber material, particularly into an empty can, and at at least one second feed rate after the detection of contact between the stored fiber material and the storage device, wherein the first feed rate is lower than the at least one second feed rate. The fact that reliable storage requires a particular contact force of the can floor against the fiber material is thereby addressed in a reliable manner. Particularly for old and/or poorly maintained cans, however, the can floor of an empty can can no longer be raised to the highest filling level by the residual spring force of a spring system raising the can floor. If the storage device were to be operated at too high a feed rate in this stage, there would be a risk that the fiber material would slip sideways off of the can floor or even over the edge of the can. In any case, a clean storage would be nearly impossible. If, however, the feed rate is raised gradually at first, and only after contact has been made between the storage device and the stored fiber material, then the disadvantages cited can be prevented and the textile machine can always be operated at the maximum possible production speed.

It is particularly advantageous if the sensor is implemented for capturing the contact force applied by the stored fiber material to the storage device. In this manner, the feed rate can always be adapted to the actual fill height of the can considering the contact force, wherein the counterforce acting on the can floor by a spring system associated with the can floor does not need to be known directly. Rather, said counterforce is considered indirectly by the contact force, wherein the feed rate of the storage device can always be maintained at a maximum value that just allows a clean storage.

It can also be advantageous if the controller is implemented for reducing the feed rate or stopping the storage of the fiber material as soon as the stored fiber material exerts a defined contact force on the storage device. As a result, it can always be ensured in this manner that the feed rate is only high enough to allow clean storage of the fiber material.

It is also advantageous if the sensor is a force and/or pressure sensor, a contact sensor, a proximity sensor, an optical sensor, and/or a sensor for detecting the friction between the fiber material and the storage device, wherein reference is made to the above embodiments with respect to the advantages.

It is not of all least advantageous if the at least one sensor is disposed in or on a bottom side of a component of the storage device, so that it can be brought into contact with a top layer of the fiber material stored in the can. This allows reliable and direct measurement of the contact force, wherein other placement locations are of course also conceivable. It would also be possible to determine the contact force indirectly by measuring the power consumption of the storage device, for example, which increases as the contact force increases.

It is *further advantageous if the contact force can be detected over a certain* time span and can be converted to an average value using the controller, and the resulting average value can be used as the basis for controlling the feed rate. Measurement variations of the sensors can thereby be effectively compensated for, so that particularly reliable values are provided for controlling the feed rate. Statistical data can also be considered, so that the measurement values can be fed into the control of the feed rate over an arbitrarily long time span.

In a further advantageous embodiment of the invention, the textile machine comprises additional sensors that are in contact with the controller and by means of which additional parameters, such as the type and/or dimensions of the can, the type of fiber material, the length and/or mass of the fiber material stored in the can, the production speed of the textile machine, and/or environmental conditions such as the temperature and humidity can be detected and used for controlling the feed rate. Control exclusively on the basis of the contact force is indeed a significant improvement over the state of the art. If, however, further factors are considered, then the control can be further refined and optimally adapted to the present conditions.

It is further advantageous if the storage device comprises a drive, the drive speed of which can be varied continuously or incrementally in order to allow as precise an adaptation of the storage speed as possible.

It is ultimately also advantageous if the at least one sensor can be activated or deactivated. It can be expedient, for example, to deactivate the sensor after a initial filling phase and to reactivate the sensor only after a can change. It may also be redundant to throttle back the feed rate at the start of storage for processing certain fiber materials, so that the textile machine can be operating in this time period without measuring the contact force.

Further advantages of the invention are described in conjunction with the following figures. Shown are:

Figure 1 a side view of a drawing frame,

Figure 2 a section view of a coiler plate of a drawing frame according to the invention,

Figure 3 a potential progression of contact force and feed rate as a function of time,

Figure 4 a side view of a storage device of a drawing frame at the start of the fiber material storage into a can,

Figure 5 a side view of the storage device according to Figure 4 after a certain storage time, and

Figure 6 a schematic plan view of a partially filled can.

Figure 1 shows a schematic side view of a drawing frame as an example of a textile machine according to the preamble of the independent claims. During operation of the drawing frame, a sliver 2 is taken from a plurality of so-called drum cans 1 and fed to the actual drafting system 3 of the drawing frame. The drafting system 3 generally consists of three or more roller pairs 4, each comprising a lower roller and an upper roller, and each bringing about draft and thereby homogenization of the sliver 2 by means of different rotational speeds.

Downstream of the drafting system 3, the drafted fiber material 5 is ultimately fed to a rotating coiler plate 7 by means of a calendar roller pair 6 and thereby stored in loops in a can 8. In order to prevent the fiber material 5 from slipping in the can 8 in an uncontrolled manner, the can has a spring system 9 by means of which the can floor 10 is pressed in the direction of the coiler plate 7. This creates a frictional connection between the fiber material 5 and the adjacent surfaces of the can floor 10 and the coiler plate 7. Said frictional connection causes the fiber material 5 to be guided, ensuring that said material can be stored in uniform loops in the can 8. During the filling process, the can floor 10 is ultimately moved downward continuously by the weight of the fiber material 5, so that the contact force acting on the fiber material 5 and the coiler plate 7 remains constant in the ideal case.

If the spring system 9 is weakened by fatigue or contamination, however, then the can floor 10 can no longer reach the highest fill level thereof as shown in Fig. 1, even when the can 8 is empty. If the fiber material 5 is released into the can 8 at too high of a feed rate, then the fiber material 5 can be stored unevenly, or in the worst case flung out, so that a machine stop becomes unavoidable.

According to the present invention it is therefore proposed that the feed rate of the storage device is controlled by means of a feedback loop using the signal generated by means of a sensor 11, said signal indicating the contact between the storage device and the fiber material 5, and said signal being proportional to the contact force exerted by the stored fiber material 5 onto the bottom side of the coiler plate 7, and thus the storage device, in an advantageous refinement of the invention. The feed rate of the storage device is preferably first maintained at a first lower level by the method according to the invention, until a certain contact force is reached by the initially stored fiber material 5, resulting in a defined signal strength. Achieving this previously defined contact force serves as a start signal for increasing the feed rate to a second value, which ultimately allows the maximum possible production speed for the textile machine. It is also possible, of course, to increase the feed rate in an arbitrary number of individual steps from a first level to the desired final speed, wherein the increase can also take place starting at the point in time of detection of the signal.

The contact force is expediently measured by means of a sensor 11, particularly by means of a force measurement sensor integrated in the bottom side of the coiler plate 7, for example, as shown in Figure 2. Using this sensor 11, it is ultimately possible to capture the contact force either continuously or at defined time intervals by means of a controller, wherein the measured values can also be correlated with other parameters, such as the type or size of can, prior to controlling the feed rate. While Figure 2 shows only one sensor, it is also possible to equip the coiler plate 7 with a plurality of identical or even different sensors.

Finally, Figure 3 shows a possible progression for contact force F (curve A) and feed rate v (curve B) as a function of time t. As the curves indicate, the feed rate of the coiler plate 7 at the start of can filling (t_1) is first raised to a constant value v_1 until a point in time t_2, at which it is ensured that the fiber material 5 is stored cleanly into the can 8, even if the can floor 10 has not yet reached the intended filling height. By laying down the fiber material 5, a point in time t_3 is ultimately reached, at which the fiber material 5 makes contact with the coiler plate 7 and generates a contact force, resulting in a signal detected by the sensor 11. Said contact force, and thus the signal strength, increases continuously from this point in time forward, until the point in time t_5 at which a type of equilibrium is reached between the contact force and the spring force of the spring system 9, wherein the spring force and thus also the contact force increase slightly due to the compression of the spring system 9.

When a previously defined contact force F_1 (time t_4) is reached, at which secure and controlled storage of the fiber material 5 is ensured, then the feed rate of the storage device and thus the production speed of the drawing frame can ultimately be increased by means of the controller, until a level v_2 is reached (time t_6), corresponding to a maximum potential production speed.

Alternatively, it is also conceivable that the feed rate is increased already at time t_3, after the sensor 11 sends a signal to the controller of the textile machine, indicating contact between the fiber material 5 and the storage device, and thus the existence of the required guidance of the fiber material 5 by the storage device.

While Figure 2 shows a linear control of the feed rate of the storage device, this can also take on any other progression in order to ultimately achieve an optimal control.

Figures 4 through 6 conclude by showing a further possibility for monitoring the progress of the fiber material storage and in this connection, a potential contact between the fiber material 5 already stored in the can 8 and the storage device, shown in Figure 5 as a coiler plate 7 (design details of the coiler plate 7, which of course also comprises a corresponding penetration for passing through the fiber material 5 fed from above, have been omitted intentionally.)

As the figures show when viewed together, the sensor 11 can be implemented as a light curtain comprising a light source 12 and a corresponding reflector 13 as in the example shown. The light curtain can thus detect whether fiber material 5 is present in the beam path (dashed line) or not. The light reflected by the reflector 13 is detected by means of a detector (not shown) placed on one side of the storage device together with the light source 12 in the example shown (the reflector 13 can of course also be replaced with a detector, so that the detector and the light source 12 are disposed on different sides of the storage device.)

The method of operation is thus as follows: as soon as fiber material 5 is stored on the can floor 10 from above (see Figure 4, showing the start of storage), the light beam emitted by the light source 12 is interrupted at regular time intervals, because the circular motion of the coiler plate 7 and the intrinsic rotation thereof (see Figure 6: the corresponding motions cause the fiber material 5 to be stored in a spiral) cause the fiber material 5 to always be stored at a different point with respect to the can floor 10. The resulting pulsing signals of the light curtain are thus an indication that fiber material 5 has indeed already been stored in the can 8, but no contact has yet been made between the fiber material 5 and the coiler plate 7.

As soon as this is finally the case (see Figure 5), the light curtain is permanently interrupted, so that contact between the fiber material 5 and storage device that is relevant to controlling the feed rate of the coiler plate 7 can be detected reliably. It would also be possible thereby to forward a signal to the controller only if the light curtain is interrupted for a certain time span. In this manner, the pulsing signals described above that are detected at the start of storage would already be filtered out prior to forwarding to a controller.

Alternatively, it would also be possible to allow the coiler plate 7 to rotate only about a fixed axis of rotation, and to implement the storage of the fiber material 5 by superimposing the rotation of the coiler plate 7 and a corresponding rotation of the can 8. The axis of rotation of the can 8 would, in this case, preferably be parallel to the axis of rotation of the coiler plate 7, resulting in the loop shape of the stored sliver shown in Figure 6.

The advantage of such an embodiment lies in the fact that the coiler plate 7 could be located outside of the beam path of the light source 12, as is the case in the instantaneous view according to Figure 6. The light beam would be interrupted in this case only if enough fiber material 5 has been stored in the can 8, so that contact is made or at least is about to be made between the fiber material 5 and the coiler plate 7.

The invention is also not limited to the embodiments shown. Rather, any and all combinations of the individual features described, as shown in the figure or described in the claims or description, and to the extent that a corresponding combination appears possible and sensible, are subject matters of the invention.

Reference list

1	Feeding can
2	Sliver
3	Drafting system
4	Roller pair
5	Fiber material
6	Calender roller pair
7	Coiler plate
8	Can
9	Spring system
10	Can floor
11	Sensor
12	Light source
13	Reflector