

PATENT SPECIFICATION

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(54) A PROCESS AND APPARATUS FOR EVENING SLIVERS

(71) We, ZELLWEGGER USTER LTD., formerly known as ZELLWEGGER LIMITED USTER FACTORIES FOR APPARATUS AND MACHINES, a Swiss company, of 8610

5 Uster, Switzerland, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:

10 This invention relates to a method of, and an apparatus for, evening or regulating slivers in regard to their thickness or their weight per unit length during their formation in a textile machine, more particularly a card.

15 There are already methods and apparatus for evening slivers which function on one of the following principles:

20 1. The quantity of fibre material delivered to the textile machine is measured and the signal generated by measurement is used to regulate the quantity of fibre;

25 2. The thickness of the sliver produced is measured, the measured value controlling the quantity of fibre delivered;

30 3. The thickness of the sliver produced is measured and the measured value regulates the output rate of the sliver delivered in such a way that it is evenised.

35 4. A regulating arrangement, generally in the form of a drawing arrangement, is situated at the output end of the textile machine. A measuring element preceding this regulating arrangement measures the thickness of the sliver and controls the draft of the drawing arrangement in such a way that the thickness of the sliver is evenised at the output end.

40 The four regulating systems have the following fundamental properties:

45 Regulating systems functioning on the first principle involve the use of a complicated and expensive measuring element. Considerable difficulties are involved in

achieving the requisite long-term stability and adequate independence of the properties of the fibre material. It is not possible with systems of this kind to correct brief fluctuations and irregularities which can be caused by the textile machine itself.

Although regulating systems functioning on the second principle enable simple measuring elements to be used, it is only possible with regulating systems of this kind to correct extremely long-term inconsistencies.

Regulating systems functioning on the third principle enable short fluctuations to be regularised whilst those functioning on the fourth principle enable even extremely short fluctuations (a few centimetres in length) to be regularised. Unfortunately, the principle disadvantage of these two systems is the variable output rate of the sliver delivered. This calls for a high-performance regulating unit because the sliver-deposition unit (the so-called can stock) also has to be driven at this variable rotational speed. Since production also fluctuates with the variable output rate, the capacity of the textile machine cannot be fully utilised, in other words its efficiency diminishes.

75 The present invention provides a method for evening the cross section or weight per unit length of the sliver produced by a textile carding and drawing apparatus wherein long term fluctuations in the supply of material are corrected by a first regulating unit at a feed end of the apparatus and short term fluctuations are corrected by altering the draft, of the material at a second regulating unit, wherein in order to keep the speed of a sliver-deposition unit at a constant level, the material is supplied to a sliver reservoir arranged in a following section of the apparatus, the filling level of the sliver reservoir being monitored and

such monitoring being used to influence one or both of the regulating units, wherein the difference between the variable feed input or output rate of the second regulating unit and the rate of travel of the sliver is corrected and the average filling level of the sliver reservoir remains constant.

The invention also provides a textile carding and drawing apparatus having means for evening the cross-section or weight per unit length of the sliver produced by the apparatus, the said means comprising a first regulating unit arranged at the feed end of the apparatus for correcting long-term fluctuations in the supply of material and a second regulating unit for altering the draft of the material to correct short term fluctuations in the supply of the material, a sliver reservoir arranged in a following section of the apparatus, means for monitoring the filling level of the sliver reservoir and for obtaining a signal from such monitoring, and means responsive to the signal for influencing one or both regulating units in such a way that the filling level of the reservoir remains constant.

Some embodiments of the invention will now be described by way of example with reference to the accompanying drawings, wherein:

Figure 1 shows a regulating system in a card with a sliver reservoir following a regulating unit at the output end,

Figure 2 shows a regulating system in a card with a sliver reservoir preceding the regulating units at the output end, and

Figure 3 shows a controlled sliver reservoir.

Figure 1 diagrammatically illustrates a card consisting of a main cylinder 1 which is preceded by a licker-in 2 and a feed roller 3 acting as a regulating unit. A film of fibre is removed by way of a doffer 4 and a doffing comb 5. Instead of the otherwise usual calender rolls there is a drawing arrangement or second regulating unit 7 with a rear cylinder 8 which is driven at a constant rotational speed and a front cylinder 9 which is driven at a variable rotational speed controlled by elements known *per se*, namely an element 6 for measuring the thickness of the sliver, a speed regulator 12 and a variable drive 10. The measuring element 6 can be arranged in front of, inside or behind the drawing arrangement 7. A measurement-induced signal or a manipulated variable from the speed regulator 12 controls the rotational speed of the feed roller 3 through a controller 13 provided with an integrating component and a variable drive 17, in the sense that, if the output rate of the sliver 14 is too high, the quantity of material delivered is reduced and *vice-versa*. Through

the reduction in the quantity of material supplied, a thinner film of fibre is formed at the output end of the card, with the result that the drawing arrangement is switched to a lower draft, i.e. to a lower output per unit of time. In order to correct differences in speed occurring briefly between the front cylinder 9 and a can stock or coiler 16, there is provided a sliver reservoir 11 known *per se* the filling level of which is monitored at at least one point (for example, by means of a photocell 15).

The filling level of the reservoir 11 can alternatively be continuously measured by other means. The signal obtained acts upon the variable drive 10 and 17 in the sense that the filling of the sliver reservoir 11 remains within predetermined limits. This can be achieved, for example, by adjusting an average draft of a few percent between the front cylinder 9 and the coiler 16. In this way, the sliver reservoir is slowly emptied. When the filling level falls below a desired minimum, the photocell 15 responds and increases the rotational speed of the feed roller 3 so that the reservoir is filled again.

In the embodiment shown in Figure 2 the rear cylinder 8 of the drawing arrangement is driven at a constant rotational speed whilst the front cylinder 9 is driven at a variable rotational speed, but in this case, the sliver reservoir 11 is arranged between the drawing arrangement 8, 9 and the calender rollers 18.

It is also possible to control, rather than measure, the filling level of the sliver reservoir 11. Figure 3 shows an arrangement suitable for this purpose. The deviation from the average draft between the drawing cylinders 8 and 9 is integrated by means of a differential mechanism 19 and adjusts a rocker arm 20, on which rollers 21 and 23 are arranged. The sliver is guided over the roller 21, over a fixed roller 22 and over the roller 23 to the coiler 16. The direction of rotation of the rocker arm 20 is selected in such a way that it moves downwards as long as the drawing arrangement 8, 9 is producing more sliver than the can stock 16 is receiving. The sliver delivered in excess is picked up by the increasing length between the rollers. Accordingly, the position of the arm 20 can be directly used to control the regulated drive 17.

WHAT WE CLAIM IS:—

1. A method for evening the cross section or weight per unit length of the sliver produced by a textile carding and drawing apparatus wherein long term fluctuations in the supply of material are corrected by a first regulating unit at a feed end of the apparatus and short term fluctuations are corrected by altering the draft of the

such monitoring being used to influence one or both of the regulating units, wherein the difference between the variable feed input or output rate of the second regulating unit and the rate of travel of the sliver is corrected and the average filling level of the sliver reservoir remains constant.

The invention also provides a textile carding and drawing apparatus having means for evening the cross-section or weight per unit length of the sliver produced by the apparatus, the said means comprising a first regulating unit arranged at the feed end of the apparatus for correcting long-term fluctuations in the supply of material and a second regulating unit for altering the draft of the material to correct short term fluctuations in the supply of the material, a sliver reservoir arranged in a following section of the apparatus, means for monitoring the filling level of the sliver reservoir and for obtaining a signal from such monitoring, and means responsive to the signal for influencing one or both regulating units in such a way that the filling level of the reservoir remains constant.

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WHAT WE CLAIM IS:—

1. A method for evening the cross section or weight per unit length of the sliver produced by a textile carding and drawing apparatus wherein long term fluctuations in the supply of material are corrected by a first regulating unit at a feed end of the apparatus and short term fluctuations are corrected by altering the draft of the



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material at a second regulating unit, wherein, in order to keep the speed of a sliver-deposition unit at a constant level, the material is supplied to a sliver reservoir arranged in a following section of the apparatus, the filling level of the sliver reservoir being monitored and such monitoring being used to influence one or both of the regulating units wherein the difference between the variable feed input or output rate of the second regulating unit and the rate of travel of the sliver is corrected and the average filling level of the sliver reservoir remains constant.

2. A textile carding and drawing apparatus having means for evening the cross-section or weight per unit length of the sliver produced by the apparatus, the said means comprising a first regulating unit arranged at the feed end of the apparatus for correcting long-term fluctuations in the supply of material and a second regulating unit for altering the draft of the material to correct short-term fluctuations in the supply of the material, a sliver reservoir arranged in a following section of the apparatus, means for monitoring the filling level of the sliver reservoir and for obtaining a signal from such monitoring, and means responsive to the signal for influencing one or both regulating units in such a way that the filling level of the reservoir remains constant.

3. An apparatus as claimed in claim 2, wherein a first and second regulating units are controlled by an element measuring the cross-section of the sliver.

4. An apparatus as claimed in either of claims 2 or 3, wherein the second regulating unit has a take-off or front cylinder with a variable rotational speed and

the sliver reservoir is arranged after the said unit.

5. An apparatus as claimed in either of claims 2 or 3, wherein the second regulating unit has a feed or front cylinder with a variable rotational speed and the sliver reservoir is arranged between the said unit and calender rolls of the apparatus.

6. An apparatus as claimed in claim 2, wherein a differential mechanism is provided for integrating the difference in speed between a coiler and a front cylinder of the second regulating unit and wherein means are provided for controlling the filling level of the sliver reservoir and the rotational speed of a feed cylinder of the apparatus on the basis of the integral value obtained.

7. An apparatus as claimed in claim 2, wherein means are provided for adjusting an average draft of a few percent between a drawing cylinder of the second regulating unit and a coiler and the filling level of the sliver reservoir is only monitored at one point by a monitoring unit acting on one or both regulating units in such a way that the filling level does not exceed predetermined limits.

8. A textile carding and drawing apparatus with means for evening the cross-section or weight per unit length of the sliver produced by the apparatus substantially as described with reference to the accompanying drawings.

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