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PATENT SPECIFICATION (11) 1 557 471

(21) Application No. 29518/76 (22) Filed 15 July 1976
(31) Convention Application No. 2534330
(32) Filed 1 Aug. 1975 in
(33) Federal Republic of Germany (DE)
(44) Complete Specification published 12 Dec. 1979
(51) INT CL² D01G 25/00
(52) Index at acceptance
D1N 1B11 1B2 1B9
D1D 101 1205 1240 XEC

(19)

(54) METHOD AND APPARATUS FOR INTRODUCING A SLIVER INTO THE COMBING AREA OF A SLIVER OPENER ROLLER OF AN OPEN-END SPINNING APPARATUS

(71) We, SCHUBERT & SALZER MASCHINENFABRIK AKTIENGESELLSCHAFT, of Friedrich-Ebert-Strasse 84, 8070 Ingolstadt, West Germany, a German Company, 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:—

The present invention relates to a method and an apparatus for introducing a sliver into the combing area of a sliver opener roller of an open-end spinning apparatus.

In cases where fibrous material of short staple length is opened, the sliver gripping point between feed groove and feed roller lies in the immediate vicinity of the sliver opener roller (British Patent Specification 1,406,119). However, it has been shown that fibres of medium and longer staple length become damaged when fibre infeeds of this type are used, and yarn quality and appearance are adversely affected by this.

In instances where longer fibre staple lengths are to be treated, the sliver gripping point, located between feed groove and feed roller, has therefore been moved away from the sliver opener roller, and the fibres have been fed to the opener roller in a tangential direction. However, this does not enable a uniform feed of fibres to the sliver opener roller to be achieved. Indeed, shorter, so-called "floating", fibres, tend to be fed in groups to the sliver opener roller.

According to the invention, there is provided a method for introducing a sliver into the combing area of a sliver opener roller of an open-end spinning apparatus which comprises passing a sliver between a feed roller and a feed plate co-operating with the roller, the feed plate having a sliver supporting surface extending from a gripping area between the feed roller and the feed plate to the vicinity of the sliver opener roller, and wherein a straight line extending between the input and output points of a sliver supporting surface makes a fibre deviation angle (α) of between 110° and 150° with the tangent passing through the point of intersection of the straight line with the circumference of the sliver opener roller, so that a minimum restraining force is exerted on the fibres, characterised in that the sliver supporting surface has a length of 30% to 60% of the nominal staple length of the fibres along the straight line. By virtue of this arrangement of the sliver supporting surface, the restraining force exerted on the fibres is not so great that the fibres will be damaged, although it does suffice for exerting a restraining force on the fibres which is such that these fibres will be fed in a controlled manner to the sliver opener roller.

Apparatus for the performance of this method is characterised in that the end of the sliver supporting surface and the pivot axis of the feed plate lie on the same side of a straight line passing through the axis of the sliver opener roller and through the input point.

The sliver supporting surface may be curved and the contact pressure of the feed plate may be adjustable by means of a polygonally formed cam working directly on a cam.

The invention is further explained by way of example with reference to the drawing, which shows in cross-section a preferred embodiment of the sliver opening apparatus incorporating the invention.

The sliver opener roller 1 is, in a conventional manner, mounted in a housing 10, which comprises a sliver feed opening 11, a separated fibre delivery opening 12 merging into the fibre feed tube 13, and possibly a waste (dirt) discharge opening 14. The end of the sliver supporting surface 20, which is structurally integral with the feed plate 2, projects into the sliver feed opening 11, sliver supporting surface 20 being laterally delimited by side walls 21. Lying contiguously of the sliver supporting surface

20 is a sliver gripping surface 22, which forms a sliver gripping area K with the sliver feed roller 3. The sliver supporting surface 22 is so arranged that the straight line G extending between the end 23 of the sliver gripping area K lying closer to the sliver opener roller 1 and the end 24 of the sliver supporting surface 20 lying closer to the sliver opener roller 1 includes, in the direction of rotation R of the sliver opener roller 1, an angle α between 110 and 150° with the tangent to the opener roller 1 passing through the point P at which the straight line G intersects the circumference U of the sliver opener roller 1. It is possible, by maintaining this angular value, to exert a restraining effect on the fibres which is such that the sliver will be opened in the most uniform possible manner. It may be found advantageous to select, according to sliver material being used, a larger or smaller angle α within the stated angular range of 110° to 150°.

In order to ensure that, with respect to the travel of the sliver, the restraining or braking effect on the fibres is not discontinued too early, so that this restraining effect acts on the fibres while the sliver is being opened up, the precise length given to the section S of the straight line G — which is delimited by the end 23 of the sliver gripping area K lying closer to the sliver opener roller 1 and by the end 24 of the sliver supporting surface 20 lying closer to the sliver opening roller 1 — is of great importance. A length of 30% to 60% of the distance between the sliver gripping region nearer the opener roller and the combing area has been found satisfactory for this section S, such length depending upon the nominal staple length of the fibres.

The feed plate 2 is mounted on a swivel pin 25, and is resiliently urged against the feed roller 3 by a spring 4. Various types of spring 4 may be used, for example a compression spring. In the embodiment illustrated spring 4 is a torsion spring, which is swivellably mounted on a pin 40. Associated with spring 4 is an adjusting cam 41 which can be pivoted into different positions by means of the pin 42, whereby the biasing force exerted by the torsion spring may be altered. The adjusting cam 41 is preferably of polygonal shape, for example hexagonal, so that the adjusting cam 41 may be easily secured in each desired position.

Conveniently, the feed plate 2 is so constructed and assembled that the end 24 of the sliver supporting surface 20 closer to the sliver opening roller 1, and the swivel pin 25, lie on the same side of the straight line L, which passes through the axis 15 of the sliver opener roller 1 and the end 23 of the sliver gripping area K lying closer to the sliver opener roller 1. By means of this expedient, when the thickness of the sliver increases, the end 24 of the sliver supporting surface 20 moves away from the sliver opener roller 1, as a result of which the opening of the sliver will be increased. The more rapid opening out of the sliver thus occasioned will counteract any tendency of the sliver to accumulate, thus compensating to some extent for fluctuations in sliver thickness. Conversely, when the sliver thickness decreases, the end 24 of the sliver supporting surface 20 moves a short distance closer to the sliver opener roller 1, again contributing towards compensating for the fluctuations in sliver thickness.

Since the sliver is delivered by means of a feed plate 2, the infeed of sliver to the apparatus may be effected, in a simple manner, by means of a gripper lever 5, which is arranged on the same swivel pin 25 as the feed plate 2. When an electromagnet 6—which is controlled, in a known manner, by the thread monitoring device (not shown) — is energised, the gripper nose or lug 50 of gripper-lever 5 is pressed against the feed plate 2, thereby gripping the sliver and pushing the feed plate 2 away from the feed roller 3, so that the sliver will no longer be gripped in the area K between feed plate 2 and feed roller 3. The gripper lever 5 may, in a known way, incorporate a feed funnel 51, while the feed plate 2 may comprise guide walls 26 in front of the sliver gripping area K.

The invention makes it possible in a simple manner, for fibres of the middle and larger nominal staple length ranges to be fed, with the assistance of a feed plate 2, to a sliver opener roller 1. In this way an appreciably simpler form of feed apparatus is achieved as compared with those apparatuses which comprise a pressure roller. Also, pressure on the sliver being fed can be varied — and the feed of the sliver can be discontinued—with relatively simple means. The fibres are controlled, in their path of travel between the sliver gripping area K, where the sliver is gripped between feed roller 3 and feed plate 2, and the end 24 of the feed plate 2 located closer to the sliver opener roller 1, by the orientation given to the sliver supporting surface 20, so that the sliver is efficiently retained or held back also during the work performed by the opener roller 1 in opening up this sliver. The feed plate may extend in a straight direction along the straight line G or may depart from such an elongate form and present for example an arcuate sliver supporting surface 20. Where an arcuate sliver supporting surface 20 is employed, the sliver is restrained or braked and guided by the wrap-round effect. When this particular embodiment is adopted, better control may

be exercised over the "floating" fibres under certain circumstances. However, the sliver supporting surface 20 may also be planar, and this may be found advantageous for some textile materials. It may be found advantageous if the feed groove 2 is interchangeably arranged on the swivel pin 25 so that, when there is a change in the material being treated, it will be possible to select a feed plate 2 having the shape giving best results having regard to the sliver supporting surface 20 and the angle α. However, the feed plate 2 may be mounted in other ways, for example in the manner indicated in U.S.A. Patent Specification 4,024,699.

WHAT WE CLAIM IS:—

1. A method for introducing a sliver into the combing area of a sliver opener roller of an open-end spinning apparatus, which comprises passing a sliver between a feed roller and a feed plate co-operating with the roller, the feed plate having a sliver supporting surface extending from a gripping area between the feed roller and the feed plate to the vicinity of the sliver opener roller, and wherein a straight line extending between input and output points of a sliver supporting surface makes a fibre deviation angle (α) of between 110° and 150° with the tangent passing through the point of intersection of the straight line with the circumference of the sliver opener roller, so that a minimum restraining force is exerted on the fibres; characterised in that the sliver supporting surface has a length of 30 to 60% of the nominal staple length of the fibres along the straight line.

2. Apparatus for performing the method of Claim 1, characterised in that the end of the sliver supporting surface and the pivot axis of the feed plate lie on the same side of a straight line passing through the axis of the sliver opener roller and through the input point.

3. Apparatus according to Claim 2 characterised in that the sliver supporting surface is curved.

4. Apparatus according to any of Claims 2 or 3 characterised in that the contact pressure of the feed plate is adjustable by means of a polygonally formed cam working directly on a spring.

5. Apparatus for introducing a sliver into the combing area of a sliver opener roller substantially as hereinbefore described with reference to the accompanying drawing.

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