OPEN-END SPINNING DEVICE WITH AN OPENING-UP ROLLER

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ABSTRACT

An open-end spinning device with an opening-up roller, normally coaxial with the spinning turbine, for spinning staple fibers, according to which an axial adjustment of the opening-up roller can be effected while the spinning device is in operation, while an axial change in the cross section of the fiber conveying passage means is possible and the opening-up roller can be made accessible to the operator without disconnecting the opening-up roller from the device.

11 Claims, 6 Drawing Figures
OPEN-END SPINNING DEVICE WITH AN OPENING-UP ROLLER

The present invention relates to an open-end spinning device with an opening-up roller for spinning staple fibers, the opening-up roller having a conical contour and being arranged coaxially with regard to the spinning turbine.

A device has become known according to which a rotatable body for the opening up of a sliver is arranged coaxially with regard to a so-called centrifugal drum. This device has the drawback that the rotatable body required for the opening up of the sliver is fixed as to its position with regard to the centrifugal drum so that the gap between the rotatable body required for the opening up of the sliver and the housing cannot be varied.

This defect permits the spinning of fibers with regard to their length only within narrow limits because the constant or fixed air gap between the rotatable body required for the opening up of the fibers and the stationary housing does not permit to take into consideration the different conditions which prevail when spinning fibers of differing lengths and of greatly differing fiber numbers, in conformity with the respective yarn number to be produced, which fibers have to be conveyed to the centrifugal drum (spinning turbine) in a certain time unit.

Furthermore spinning devices with opening-up rollers have become known according to which the cleaning or exchange of the rollers involves relatively high assembly and disassembly costs and can be carried out only when the machine is not in operation.

It is, therefore, an object of the present invention to provide an open-end spinning device with an opening-up roller for spinning staple fibers, which will overcome the above mentioned drawbacks.

This object and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

FIG. 1 illustrates a device according to the invention and, more specifically, shows the working position of the opening-up roller.

FIG. 2 illustrates the opening-up roller of FIG. 1 in disengaged position.

FIG. 2a diagrammatically shows the mechanism for folding back the spinning turbine.

FIG. 3 shows the position of the driving belt when the opening-up roller is in operative position.

FIG. 4 shows the position of the driving belt when the opening-up roller is in its disengaged position.

The device according to the present invention is characterized primarily in that an axial adjustment of the opening-up roller is possible during the operation of the spinning machine, and also an axial change of the cross section of the fiber conveying passage or a displacement of the opening-up roller toward the operator's side can be effected, without having to remove the opening-up roller, while the machine is in operation. In other words, the opening-up roller can be adjusted in axial direction in conformity with the respective fibers being processed, and for purposes of cleaning and for repair work can axially be displaced to the operator's side while the spinning turbine is folded back to such an extent that the entire opening-up device which serves for carding the fibers is accessible to the operator. Furthermore it will be possible in this way to remove the opening-up roller while the machine is in full operation.

The arrangement according to the present invention also makes it possible to remove any fiber lap or deposit, which collect on the opening-up member and interfere with the carding and spinning process, without having to stop the spinning machine. To this end, the present invention includes the possibility to disengage the driving belt from the opening-up roller while the latter is in its displaced position.

Referring now to the drawings in detail, FIG. 1 shows the working position of the opening-up roller 4 and the corresponding resulting position of the pertaining adjusting device.

The device for axially adjusting the opening-up roller 4 comprises an adjusting lever 7 which is connected to a two-sectional linkage system 9, 9a. The linkage system 9, 9a is through the intervention of bolts 14 connected to an adjusting fork 13 which is firmly arranged on the adjusting shaft 12. The adjusting shaft 12 has journaled thereon the opening-up roller 4. By actuating the linkage system 9, 9a, it is possible to axially adjust the conical opening-up roller 4. A lever 9b which is laterally offset with regard to the pivot point 8 of the part 9 of the linkage system 9, 9a, is through a bolt 23 connected to the adjusting carriage 17 having mounted thereon a lifting roller 15.

FIG. 2 shows the displaced or moved-out opening-up roller 4 while the spinning turbine 22 is folded back. By means of the device illustrated in FIG. 2a it is possible to fold back the turbine housing to such an extent that the opening-up roller 4 can be moved out in axial direction. More specifically, the spinning turbine 22 with the driving whorl 22a is by means of the bearing 22b and hood 22c arranged on an arm 22e which is pivotable about the pivot or shaft 22d. Spinning turbine 22 is by means of a locking bolt 22f held in its working position shown in FIG. 1. When locking bolts 22f is withdrawn in the direction of arrow 22g from opening 22h, spinning turbine 22 automatically folds back due to its own weight.

The adjusting lever 7 is adjusted in the direction of the arrow 24 until it hits an abutment so that the two-sectional linkage system 9, 9a can move likewise. A tension spring 10 which is connected to the longitudinal traversing 11 and to the pivot 25 of the two-sectional linkage system 9, 9a will be tensioned in this way.

In view of this actuation of the linkage system 9, 9a and through the intervention of bolt 14 the adjusting fork 13 and thus the adjusting shaft 12 is moved in the direction of the arrow 26 whereby the opening-up roller 4 which is rotatably mounted on the adjusting shaft 12 also moves in the direction indicated by the arrow 26. The device is arrested in this position by any suitable arresting means for the adjusting lever 7, e.g., by engagement of fork 13 with the end face 21a of tubular member 21.

Due to the movement of the adjusting lever 7 in the direction of the arrow 24, the lever 9b is moved in the direction of the arrow 27, and the carriage 17 which is connected at the end of the level 9b to the bolt 23 moved together with the 15 5 likewise in the direction of the arrow 27. During this movement, the roller 15 lifts the driving belt 16 off the driving whorl 18 so that
as a result thereof the drive of the opening up roller 4 is interrupted and the opening-up roller 4 is stopped.

Since the roller 15 through the intervention of the driving belt 16 interrupts the drive for the opening-up roller 4 only after the adjusting shaft 12, by actuation of the previously described linkage system, has completed two-thirds of its adjusting stroke, will the extent of the axial displacement of the opening-up roller 4 as it is required for spin technical reasons be possible without interrupting the drive of the opening-up roller 4.

FIG. 3 shows the driving belt 6 in contact with the driving whorl 18 of the opening-up roller 4.

FIG. 4 shows the disengaged drive. In view of the actuation of the above described linkage system, the roller 15 has lifted the driving belt 16 off the driving whorl 18 of the opening-up roller 4. The return of the roller 4 to its operative position is effected by relaxing the tension spring 10 after making the arresting means for the adjusting lever 7 ineffective.

The stepless or infinitely variable adjustment of the opening-up roller 4 in axial direction can be effected while the machine is running. With reference to FIGS. 1 and 1a, the adjusting shaft 19 is adjusted, for instance, in the direction of the arrow 28 in conformity with the illustration of FIG. 1. The adjusting shaft 19 has fixed mounted thereon an eccentric ring 20 for each spinning passage so that by turning the adjusting shaft 19 in conformity with the eccentricity of the eccentric rings 20, the adjusting shaft 12 and thus the opening-up roller 4 can be axially adjusted. The turning of the adjusting shaft is possible in a stepless manner by 180° as is illustrated by the characterizing adjusting points 20a, 20b and 20c (FIGS. 1 and 2). In view of this adjustment, the fiber conveying passage 1 can be narrowed or widened and can be thus be adapted to the respective spinning requirements. To the same extent also the distance 3 between the needle-free opening-up roller 4 and the stationary guiding housing 2 will be changed. In this way it is assured that the cross sectional conditions once set will be maintained in the fiber conveying passage so that the degree of the air acceleration from the opening-up roller 4 to the spinning turbine 22 will be maintained.

The stepless adjustment of the opening-up roller 4 will best be understood with reference to FIG. 1a. The adjusting shaft 19 is journaled near one of its ends by means of a bearing 29 arranged at the driving stock 30. Fixedly mounted on the free end 19a of shaft 19 is a worm wheel 31 which is adapted to be rotated by a worm 32 which is non-displaceably mounted on said driving stock 30. Worm 32 may be turned by means of a handwheel 33 which is located outside the driving stock 30 and is non-rotatably connected to worm shaft 32a so as to rotate therewith. The worm drive 31, 32 is self-locking so that the eccentric rings 20 will be arrested by the drive 31, 32 in their respective set positions. In this way, the position of the adjusting shafts 12 in upward direction is fixed. In downward direction the adjusting shafts 12 are adjusted downwardly by means of worm drive 31, 32 and the pertaining eccentric ring 20, the lever system 9, 9a will be actuated with a corresponding lengthening of tension spring 10. When shaft 12 is adjusted upwardly, tension spring 10 by means of levers 9, 9a will hold shaft 12 against the retracting eccentric disc. As will be seen from FIGS. 1 and 2, the length of the driving whorl 18 of the opening-up roller 4 is greater than the width of the driving belt 16 so that the stepless axial adjustment of the adjusting shafts 12 can be carried out while the machine is in operation.

It is, of course, to be understood that the present invention is, by no means, limited to the particular showing in the drawings but also comprises any modifications within the scope of the appended claims.

What we claimed is:

1. An open-end spinning device which includes: spinning turbine means, opening-up roller means normally coaxially arranged with regard to said turbine means so as to define therewith fiber conveying passage means, driving means drivingly connectable to said roller means, and adjusting means operatively connected to said roller means for selectively axially adjusting the same, said spinning turbine means being moveable out of the axially outwardly adjusting path of said opening-up roller means to thereby make said roller means accessible from the outside of said device upon outwardly directed axial adjustment of said roller means.

2. A device according to claim 1, which includes self-locking worm gear drive means operatively connected to said adjusting means for an steplessly variable axial adjustment of said opening-up roller means.

3. A device according to claim 1, in which said opening-up roller means has associated therewith a needle field, and in which said adjusting means for the axial adjustment of said roller means includes adjusting shaft means and eccentric ring means operatively connectable to said roller means.

4. A device according to claim 1, in which said driving means include whorl means drivingly connected to said opening-up roller means, driving belt means operable to drivingly engage and disengage said whorl means, and control means operable selectively to lift said belt means off said whorl means.

5. A device according to claim 4, in which said control means includes pulley means and actuating means operatively connected to said pulley means so as to cause said pulley means to lift said belt means off said whorl means only after said roller means has completed approximately two-third of its axial outward adjusting stroke.

6. A device according to claim 1, in which said adjusting means include an adjusting shaft arranged in axial alignment with and having rotatably mounted thereon said opening-up roller means and also include lever means operatively connected to said adjusting shaft for selectively axially moving the same axially in either direction.

7. A device according to claim 6, which includes abutment means for limiting the stroke of said adjusting shaft.

8. A device according to claim 6, in which said lever means include control handle means, a multi-lever system operatively connected to said handle means, and adjusting fork means connected to said lever system and said adjusting shaft.

9. A device according to claim 5, which includes carriage means reciprocably arranged for movement in a direction transverse to the direction of axial adjustment of said opening-up roller means, and in which said adjusting means includes multi-lever means operatively connected to both said carriage means and said opening-up roller means.
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10. A device according to claim 5, which includes spring means operatively connected to said multi-lever means and continuously urging said opening-up roller means toward its working position.

11. A device according to claim 8, which includes tubular means surrounding said shaft means and forming abutment means for engagement with said fork means to limit the axial outward movement of said opening-up roller means.

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