ARRANGEMENT FOR GUIDING STAPLE FIBERS INTO A SEPARATOR OF A RINGLESS SPINNING MACHINE

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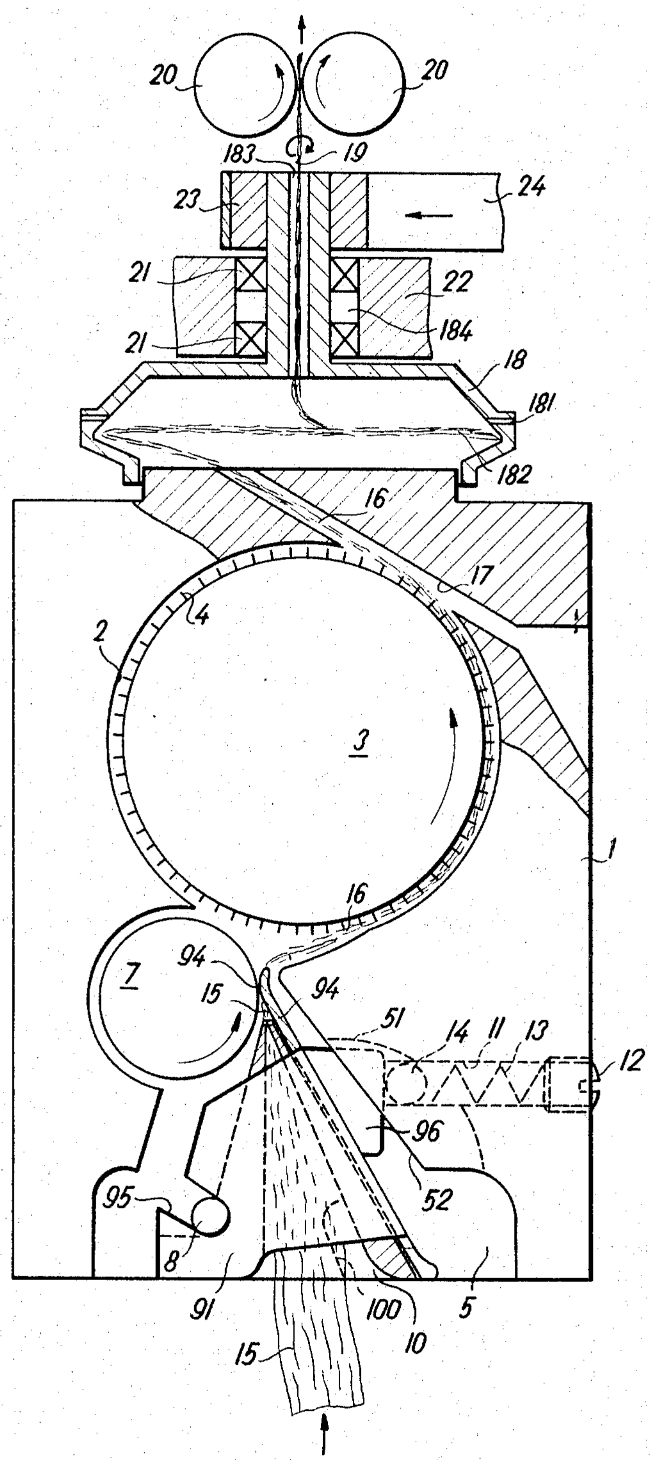

Fig. 1

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Fig. 2

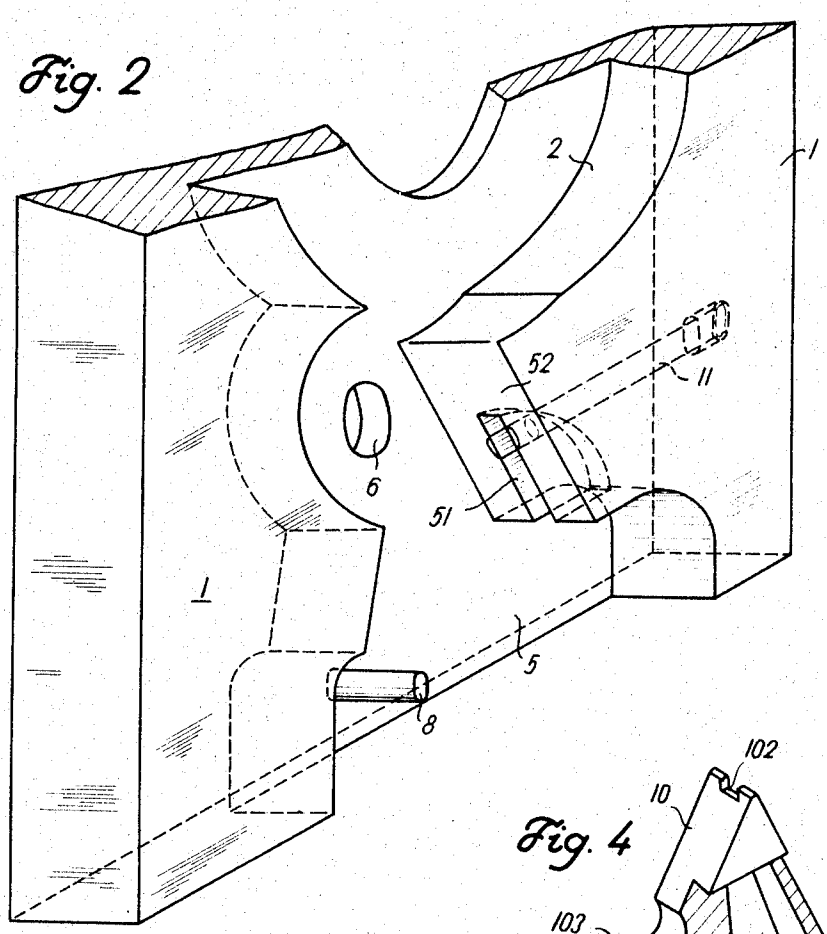
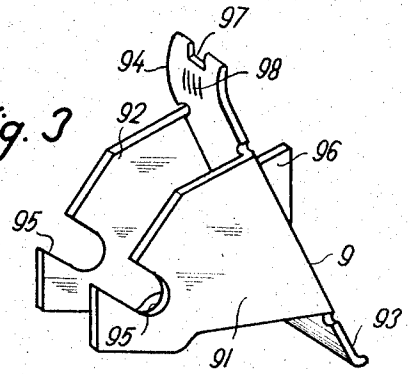


Fig. 4

Fig. 3



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ARRANGEMENT FOR GUIDING STAPLE FIBERS INTO A SEPARATOR OF A RINGLESS SPINNING MACHINE

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12 Claims. (Cl. 57—58.95)

ABSTRACT OF THE DISCLOSURE

An arrangement for guiding staple fibers into a separator of a ringless spinning machine in which the staple fibers or slivers are condensed during passing thereof through a passage of condenser means and in which the condensed staple fibers are at the outlet end of the condenser means resiliently pressed onto the peripheral surface of the feed roller of the separator.

Background of the invention

The present invention relates to an arrangement for guiding staple fibers or slivers into a separator having a feed roller and a combing out roller and in which the fibers after being combed out by the combing out roller are transferred through a passage into the rotating spinning chamber of a continuous ringless spinning apparatus.

In the production of yarn by a continuous ringless spinning process it is necessary to separate the fibers of a processed staple fiber body in a separator in individual fibers and such separated fibers being then processed by the spinning apparatus in a known manner to form yarn. The correct function of the separating mechanism depends on the continuous feeding of material to be processed to the separating parts and the feed-in and guiding arrangement should also be constructed so as to be easily adaptable to various kinds of fibers to be processed.

Various arrangements are known in the art by means of which staple fibers are guided into a separator and in contact with the peripheral surface of the feed roller thereof and in which the fiber body is also condensed during the guiding thereof into contact with the feed roller. The arrangements known in the art are however rather complicated and they cannot be easily adapted for changed conditions during processing of different kinds of fiber material.

It is an object of the present invention to provide for a guiding arrangement for staple fibers of the aforementioned kind which avoids the disadvantages of similar guide arrangements known in the art.

It is a further object of the present invention to provide for a guiding arrangement of the aforementioned kind which is of simple construction and arranged in such a manner that it can be easily adapted for properly guiding of staple fiber material of different characteristics.

Summary of the invention

With these objects in view, the arrangement according to the present invention for guiding staple fibers into a separator having a feed roller and a combing out roller of a ringless spinning machine mainly comprises condenser means having an inlet and an outlet end and being formed with a passage therethrough tapering from said inlet toward said outlet end for guiding staple fibers therethrough. The condenser means being removably mounted on support means tiltable about a tilting axis so that the outlet end thereof is movable toward and away from the peripheral surface of the feed roller, and pressure means engaging the condendser means and having a pressure portion extending beyond the outlet end of the condenser means and being biased for urging the outlet end of the condenser means toward the peripheral surface of the feed roller and for pressing staple fibers passing through the outlet end of the condenser means by means of said pressure portion into engagement with the peripheral surface of the feed roller. The pressure means preferably comprise a saddle shaped member having a pair of side walls and a transverse wall connecting the side walls to each other and having an end portion projecting beyond the side walls and forming the pressure portion of the member, and biasing means biasing the pressure portion towards the peripheral surface of the feed roller. In this arrangement the condenser means is located between the side walls of the saddle shaped member and engages the transverse wall thereof so that the force of the biasing means will also be transferred to the condenser means and the outlet end thereof will be urged against the peripheral surface of the feed roller.

The aforementioned side walls of the saddle shaped member and the condenser means are preferably formed with corresponding notches and the support means preferably include a pin coaxial with the tilting axis and extending through the notches in the side walls of the saddle shaped member and the condenser means so that the condenser means and the saddle shaped member are tiltable about a common tilting axis while being removably mounted on the pin. The support means may further include a block formed with an inlet recess into which the pin projects, with one end of the pin fastened to the block, and the block and the saddle shaped member are preferably provided with cooperating means for limiting movement of the saddle shaped member about the axis of the pin as well as movement of the saddle shaped member in direction of the pin axis.

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 drawings.

Brief description of the drawings

FIG. 1 is a schematic, partially sectioned side view of a ringless spinning apparatus, the separator thereof and the means for feeding staple fibers into the separator;

FIG. 2 is a partial, perspective view drawn to an enlarged scale of a portion of the supporting block for supporting the feed and combing out rollers of the separator and for supporting the elements of the guide arrangement;

FIG. 3 is a perspective view of the saddle shaped member; and

FIG. 4 is a partially sectioned, perspective view of the condenser means.

Description of the preferred embodiment

FIG. 1 schematically illustrates a ringless spinning apparatus provided with a guide arrangement according to the present invention for feeding staple fibers to be processed into the separator of the spinning apparatus. As can be seen from FIG. 1, the apparatus includes a support block **1** formed with a substantially cylindrical recess **2** in which a combing out roller **3** is arranged turnably about its axis, which combing out roller is provided on the periphery thereof with a plurality of spaced needles or teeth **4** projecting toward the peripheral surface of the

recess 2. The block 1 is further formed with an inlet recess 5 extending between the bottom face of the block and the recess 2. A feed roller 7, preferably of a diameter smaller than that of the combing out roller 3, is turnably arranged in the upper portion of the inlet recess 5, and the drive shaft of the roller 7 extends through a bore 6 (FIG. 2) of the block. The feed roller 7, as well as the combing out roller 3, are driven in the same direction as indicated by the arrows in FIG. 1 about their axes by means not shown in the drawing.

The guide arrangement according to the present invention for guiding staple fibers 15 into engagement with the peripheral surface of the feed roller 7 and for condensing the body of staple fibers during such guiding includes condenser means 10, of a configuration as best shown in FIG. 4. The condenser means 10 are provided with a passage 100 therethrough tapering from the low inlet end 101 of the passage 100 toward the upper outlet end 102 thereof. The condenser means is formed at the left side thereof, as viewed in FIGS. 1 and 4, with a notch 103 through which a pivot pin 8 extends, which is fixed at one end thereof to the block 1 and which projects from the fixed end thereof substantially parallel to the axes of feed roller 7 and combing out roller 3 into a portion of the inlet recess 5, downwardly spaced from the feed roller 7, so that the condenser means 10 is pivotally and removably mounted on the pivot pin 8 in such a manner that the outlet end 102 of the passage 100 may move toward and away from the peripheral surface of the feed roller 7. The guide arrangement includes further presser means 9, preferably in the form of a saddle shaped member having a pair of side walls 91 and 92, and a transverse wall 93 extending between and connecting the side walls to each other and having an upwardly extending portion 94 projecting beyond the upper edges of the side walls 91 and 92, and being preferably formed from resilient material. The slide walls 91 and 92 are formed with inclined notches 95 which are aligned with each other in direction transverse to the side walls and through which the pivot pin 8 likewise extends so that the saddle shaped member 9 is pivotally and removably mounted on the pivot pin 8. The condenser means 10 is pivotally mounted on the pin 8 between the side walls 91 and 92 of the saddle shaped member and the right face, as viewed in FIG. 1, of the condenser means 10 engages the transverse wall 93 of the saddle shaped member. As clearly shown in FIG. 1 the presser portion 94 of the transverse wall 93 of the saddle shaped member projects beyond the outlet opening 102 of the compressor means 10.

The saddle shaped member 9 and the block 1 are preferably provided with cooperating means to limit transverse movement of the saddle shaped member, that is movement of the latter in direction of the axis of the pin 8 and to limit also tilting movement of the saddle shaped member about the axis of the pin 8. The cooperating means may include an arcuate slot 51, as best shown in FIG. 2, extending from the inclined right face 52, as viewed in FIG. 2, of the inlet recess 5, into the block 1 and a plate shaped portion 96 integral with and projecting from the rear face of the transverse wall 93 into the slot 51.

The presser means include further biasing means cooperating with the saddle shaped member 9 for pressing the presser portion 94 toward the peripheral surface of the feed roller 7 and to urge thereby also the upper end of the condenser means 10, in which the outlet opening 102 is formed, toward the peripheral surface of the feed roller 7. The biasing means may comprise, as best shown in FIGS. 1 and 2, a compression spring 13 housed in a bore 11 formed in the block 1, engaging with its outer end a screw plug 12 screwed into a correspondingly threaded portion of the bore 11 and with its inner end a ball 14 guided in the bore 11 and sandwiched between the inner end of the spring 13 and the right edge, as viewed in FIG. 1, of the projecting plate shaped portion 96. As clearly shown in FIG. 1 the spring 13 will act on the member 9 between the upper presser portion 94 thereof and the pivot pin 8.

The presser portion 94 of the saddle shaped member 9 is preferably formed with a substantially rectangular cutout 97 (FIG. 3) extending from the upper end edge of the presser portion into the latter. The width of the cutout 97 is substantially equal to the outlet end 102 of the passage 100 through the condenser means 10 and this width is substantially equal to the width of the peripheral surface of the combing out roller 3 which is provided with the teeth 4. The surface of the presser portion 94 facing the feed roller 7 is preferably provided with a plurality of substantially parallel grooves 98 extending in longitudinal direction of the transverse wall 93.

As can be seen from FIG. 1, an upper cylindrical portion of the block 1 projects into and substantially closes the open bottom end of the spinning chamber 18, of known construction and configuration as shown in FIG. 1. A coaxially arranged upwardly projecting tubular member 184 is fixed to the top wall of the spinning chamber 18 and is turnably mounted in the machine frame 22, only partially shown in FIG. 1, by means of bearings 21 for rotation about its axis. A pulley 23, fixed to the upper end of the tubular member 184 in any convenient manner, is driven by a belt 24 from a prime mover, not shown in the drawing, to thereby rotate the spinning chamber 18 about its axis. The spinning chamber 18 is formed with a plurality of substantially radially extending air outlet bores 181 so that, during fast rotation of the spinning chamber 18 about its axis, air is discharged by centrifugal force through the air outlet bores 181 and so that a sub-atmospheric pressure is created in the interior of the spinning chamber. A transfer passage 16 extending substantially tangential to an upper portion of the peripheral surface of the combing out roller 3 through the block 1 communicates with its right flaring end, as viewed in FIG. 1, with the outer atmosphere and with its opposite end with the interior of the spinning chamber 18.

The condenser means 10 is preferably molded from plastic material and the saddle shaped member 9 may be made from sheet material.

The above described arrangement may be operated as follows:

Before the spinning process is started, the saddle shaped member 9 and the condenser means located therein are removed from the block 1 by pulling the same downwardly and toward the right, as viewed in FIG. 1, whereby the pressure of the pressure spring 13 is preferably relaxed by screwing the screw plug 12 outwardly. The end portion of a staple fiber body 15 is then manually introduced into the passage 100 through the condenser means 10 until the upper end of the fiber staple fiber body 15 extends through and beyond the upper outlet end 102 of the aforementioned passage. Then, the saddle shaped member 9 with the condenser means 10 located therein is again pushed into the inlet recess 5 until the notches 95 in the side walls of the saddle shaped member 9 and the notch 103 in the condenser means 10 are properly engaged with the pivot pin 8. The compression spring 13 is then tightened so that the end of the sliver body 15 projecting beyond the outlet opening 102 is pressed by the presser portion 94 of the saddle shaped member against the peripheral surface of the feed roller 7. Subsequently thereto the feed roller 7, the combing out roller 3, and the spinning chamber 18 are rotated about their respective axes. During rotation of the combing out roller 3, the teeth 4 thereof will grip the upper end of the staple fiber body 15 and pull the staple fiber body through the passage 100 of the condenser means so that this body is condensed during its passage through the tapering passage and pressed by the presser portion 94 of the saddle shaped member continuously onto the peripheral surface of the feed roller 7. During rotation of the combing out roller 3, the staple fiber body will be

combed out into individual fibers 17 and, due to the subatmospheric pressure created in the spinning chamber 18, the individual fibers 17 will be passed through the transfer passage 16 into the interior of the spinning chamber to be spun therein in a known manner into a yarn 19, which is pulled out through the passage 183 in the tubular member 184 by pulling rollers 20 located above the pulley 23 and rotated by means not shown in the drawing in opposite directions, as indicated in FIG. 1, to be subsequently wound on a bobbin, not shown in the drawing.

If fibers of different characteristics have to be processed, the condenser means 10 may be exchanged for a condenser means having a differently tapered passage 100 formed therethrough. Likewise the pressure at which the fibers leaving the outlet end of the passage through the condenser means 10 are pressed by the presser portion 94 of the saddle shaped member 9, against the peripheral surface of the feed roller 7, may be adjusted by adjusting the tension of the spring 13.

The guiding arrangement according to the present invention includes only parts of extremely simple configuration so that the whole guiding arrangement may be manufactured at reasonable cost and will stand up perfectly under extended use. The elements of the guiding arrangement can be easily inserted and removed from the block 1 so that introduction of staple fibers into the apparatus at the start of the spinning process is greatly simplified. The guide arrangement can also be easily adapted for processing of fibers having different characteristics.

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 arrangement for guiding staple fibers into a separator of a ringless spinning machine differing from the types described above.

While the invention has been illustrated and described as embodied in an arrangement for guiding staple fibers into contact with the peripheral surface of a feed roller of a separator of a ringless spinning machine while simultaneously condensing the fiber body, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

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. An arrangement for guiding staple fibers into a separator having a feed roller and a combing out roller of a ringless spinning machine, comprising, in combination, support means; condenser means having an inlet end and an outlet end and being formed with a passage therethrough tapering from said inlet toward said outlet end for guiding staple fibers through said passage, said condenser means being removably mounted on said support means tiltable about a tilting axis so that the outlet end thereof is movable toward and away from the peripheral surface of the feed roller; and presser means engaging said condenser means and having a presser portion extending beyond said outlet end of said condenser means, said presser means being biased for urging said outlet end of said condenser means toward said peripheral surface and for pressing staple fibers passing through said outlet end of said condenser by means of said presser portion into engagement with the peripheral surface of said feed roller.

2. An arrangement as defined in claim 1, wherein said presser means comprises a member mounted on said support means tiltable about said tilting axis and biasing means biasing said presser portion toward said peripheral surface of said feed roller.

3. An arrangement as defined in claim 2, wherein said member is a saddle shaped member having a pair of side walls and a transverse wall connecting said side walls to each other and having an end portion projecting beyond said side walls and forming said presser portion.

4. An arrangement as defined in claim 3, wherein said end portion of said transverse wall is resilient.

5. An arrangement as defined in claim 4, wherein said end portion of said transverse wall is formed on the face thereof facing said feed roller, with a plurality of spaced substantially parallel grooves extending in longitudinal direction of said transverse wall.

6. An arrangement as defined in claim 3, wherein said condenser means is located between said side wall of said member and engaging said transverse wall thereof.

7. An arrangement as defined in claim 6, wherein said end portion of the transverse wall has an end edge facing said combing out roller and being formed with a cutout extending from said end edge into said end portion and having a width substantially equal to that of said outlet end of said condenser means.

8. An arrangement as defined in claim 6, wherein said side walls of said saddle shaped member and said condenser means are provided with notches and wherein said support means comprises a pin coaxial with said pivot axis and extending through said notches so that said saddle shaped member and said condensed means are removably mounted on said pin and tiltable about the axis thereof.

9. An arrangement as defined in claim 8, wherein said biasing means comprises spring means acting on said saddle shaped member between said end portion and said notches thereof.

10. An arrangement as defined in claim 9, wherein said support means comprises a block formed with a first recess in which the combing out roller is turnably arranged and an inlet recess having a portion open toward said first recess in which said feed roller is turnably arranged adjacent said combing out roller, said pin being fastened at one end thereof to said block and projecting in said inlet recess, said saddle shaped member and said condenser means housed therein being located in said inlet recess tiltable about the axis of said pin.

11. An arrangement as defined in claim 10 and including cooperating means on said block and said saddle shaped member for limiting movement of the latter about the axis of the pin and in direction of the pin axis.

12. An arrangement as defined in claim 11, wherein said cooperating means comprise a slot extending substantially in a plane substantially normal to the axis of said pin from said inlet recess into said block and a plate shaped portion projecting from said transverse wall of said saddle shaped member into said slot.

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