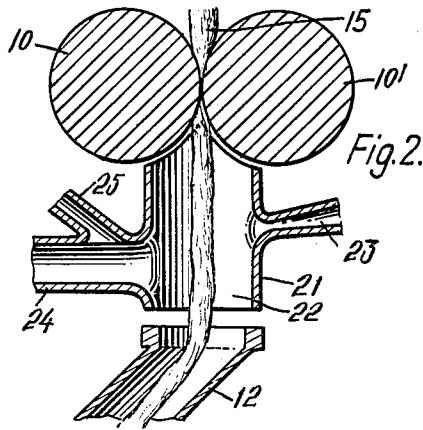
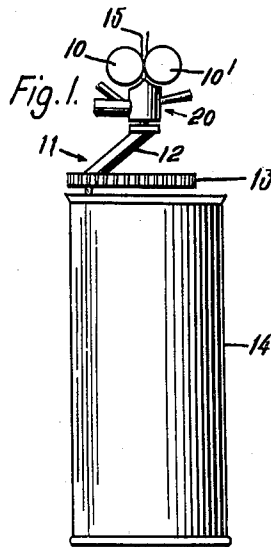
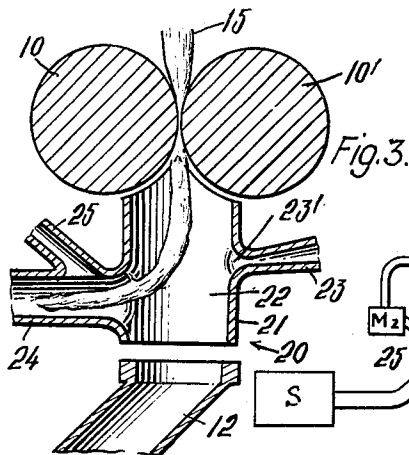
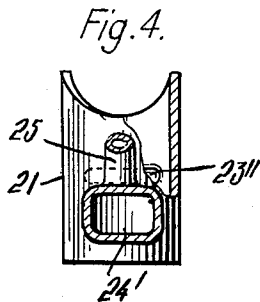
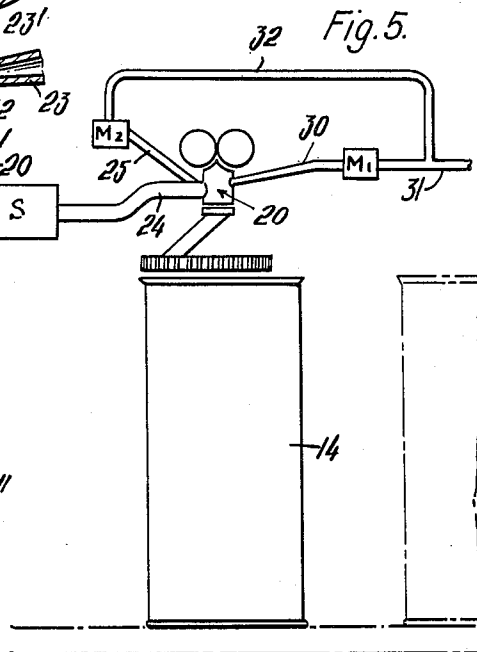


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TSURUYOSHI HASHIMOTO
PNEUMATIC CUTTING AND INTRODUCTION
OF TEXTILE SLIVER INTO CAN
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Inventor
TSURUYOSHI HASHIMOTO

By Wendell Lind
and Porack
Attorneys

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PNEUMATIC CUTTING AND INTRODUCTION OF TEXTILE SLIVER INTO CAN

Tsuruyoshi Hashimoto, Hamamatsu, Japan, assignor to Toyo Boseki Kabushiki Kaisha, Kita-ku, Osaka, and Howa Kogyo Kabushiki Kaisha, Nagoya, Japan
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The present invention relates to a novel sliver cutting and introducing device for use in fore-spinning process, and more particularly to a novel and automatic device adapted for pneumatically cutting or severing a sliver when a sliver can is filled thereby to discontinue the feeding of sliver to the filled can, and thereafter pneumatically introducing the successively fed sliver into another fresh or empty can.

In the fore-spinning process, a sliver delivered from a sliver processing machine such as carding machine, comber or drawing frame is usually passed through a pair of calender rollers associated with a coiler responsible for depositing the sliver in overlapping circles in the interior of the container or can.

In view of the recent developments in the textile industry, particularly a speed-up in the fore-spinning process, the surface velocity of the calender rollers has been raised to reach as high as 100 m./min. at present. In addition, textile manufacturers have come to adopt the so-called "automatic can exchanger."

However, there have been encountered with some difficulties in cutting the sliver which is running at such a high velocity and introducing the cut-off or leading end of the same into an empty can every time a full can is replaced by the new empty can automatically or manually. To overcome these difficulties, there have been made two proposals. One is such that two pairs of calender rollers are employed, which normally are rotated at the same rate, but when it is required to cut the sliver one pair positioned nearer to the can is caused to rotate at a higher rate than that of the other, thereby breaking the sliver due to the surface velocity difference between the two pairs. However, this arrangement has drawbacks in that it is very difficult to properly handle the sliver being continuously discharged from the calender rollers after the sliver cut until the completion of the exchange of can and the introduction of said sliver to the new or empty can, and further in that an undesirable excessive sliver draft results from the velocity difference between the pairs of the rollers at the time of sliver cut. The other proposal is such that a mechanical cutter lever is employed and arranged to cut the sliver by rapidly moving the cutter lever across the sliver. This also has drawbacks that, in view of the necessity of swift cutting of sliver, the mechanical cutter lever is inevitably provided with extremely quick moving parts which are apparently subjected to abrasion and wear and that the same trouble in properly handling the sliver also occurs.

It is an object of this invention to eliminate all of these drawbacks.

It is a more particular object of this invention to provide a very simple pneumatic and automatic sliver cutting device to be positioned between a pair of conventional calender rollers and coiler.

It is a more specific object of this invention to provide a device comprising a main tubular body arranged between a pair of calender rollers and coiler and having a longitudinal sliver passage, an air nozzle provided on the wall of the main body to pneumatically cut the sliver passing through the said passage, an exhaust pipe provided on the wall of the main body substantially diametrically opposite to said air nozzle for temporarily receiving the

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sliver continuously discharged from the calender rollers after the sliver cut, and an air pipe provided in such a position that the sliver received in the exhaust pipe may be conveyed and introduced into the coiler tube by the air blown from said air pipe.

These and other objects and features of the present invention will become apparent from the following detailed description made referring to the attached drawings wherein;

FIG. 1 is a view schematically showing a novel sliver cutting and introducing device embodying this invention and arranged between a pair of calender rollers and coiler, with a sliver can below said coiler;

FIG. 2 is an enlarged sectional view of said device, with the sliver being delivered into the coiler tube through said device from the calender rollers;

FIG. 3 is a view similar to FIG. 2, but showing the state wherein the sliver, after being cut, is received in the exhaust pipe;

FIG. 4 is a side view, partly in section and partly broken away, of the device of this invention showing the arrangement of the air nozzle, exhaust pipe and sliver introducing air pipe in respect of the main tubular body;

FIG. 5 is a diagram showing a pipe line for operating the device of this invention.

Referring to the drawings, more particularly to FIG. 1, generally indicated with the reference numeral 20 is a sliver cutting and introducing device embodying the present invention associated with conventional calender rollers and coiling means. A pair of calender rollers 10 and 10', a coiler 11 having a coiler tube 12 secured on a coiler gear 13, and a can 14 positioned below the gear 13 so as to receive a sliver 15 are all conventional and well known in the art. The sliver 15 delivered from a carding machine, comber or drawing frame (not shown) is passed through the calender rollers 10, 10', the device 20 of this invention and coiler 11 to the can 14 and is deposited in overlapping circles in the interior of the can. The deposition of the sliver in overlapping circles in the can 14 is effected, for example, by the fact that the coiler 11 is rotated by engagement of the driven gear 13 with a usual driving gear while the can 14 is placed on a usual can dish plate which rotates together with the can, although such driving gear system and can dish plate are eliminated from the drawings for the purpose of simplification.

The sliver cutting and introducing device 20 of the present invention is arranged close to and between the calender roller 10, 10' and the coiler 11. As seen in FIGS. 2 and 3, the device 20 takes the appearance of a manifold or multibranched tube, including a main vertical tubular body 21 having a longitudinal passage 22, an air nozzle 23 provided on the wall of the main body 21 to cut the sliver passing through said passage by the force of air jet from said nozzle 23, an exhaust pipe 24 provided on the wall of said main body 21 substantially diametrically opposite to the air nozzle 23 for temporarily receiving (FIG. 3) the sliver continuously discharged from the calender rollers 10, 10' after the pneumatic sliver cutting, and an air pipe 25 so positioned and adapted that the air stream from said air pipe 25 may entrain the sliver received in the exhaust pipe 24 for conveying and reintroducing the said sliver into the coiler tube 12, as more fully described hereinafter.

The air nozzle 23 is preferable to be slightly inclined downwardly as shown in the drawings, but the relative arrangement of said air nozzle 23 to the main body 21 is not limited to the particular one and is such as to enable an air jet from said nozzle 23 to cut the sliver (passing through the passage 22) and entrain the same into the exhaust pipe 24. Thus, for example, the nozzle 23 may be substantially perpendicular to the tubular body 21. In the embodiment shown, the air pipe 25 is provided on the upper

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wall of the exhaust pipe 24 as a preferable arrangement, but its position is not limited to the particular one shown so far as an air stream from the air pipe 25 may flow against or preferably across the sliver being received in the exhaust pipe 24 and pneumatically convey the said sliver toward and into the upper opening of the coiler tube 12 through the lower opening of the tubular body 21. Thus, if desired, the air pipe 25 may be provided on the tubular body 21 instead of on the exhaust pipe 24.

Each of the air nozzle 23, exhaust pipe 24 and air pipe 25 communicates with the interior 22 of the tubular body 21. The device 20 may be made of any suitable material, such as metal, synthetic resin, etc.

The upper edge of the tubular body is archedly or arcuately shaped so as to be as close to the calender rollers 10 and 10' as possible. The air nozzle 23 is throttled or provided with an orifice shown at 23' for effectively cutting the sliver. When the device 20 is associated with a conventional coiler the cross-section of the main body 21 is usually circular as the upper opening of the coiler tube is generally circular in cross-section, while the air nozzle 23, air pipe 25 and exhaust pipe 24 may have, in principle, any desired cross-sectional shape such as circle, oval, rectangle, etc. It will be noted that in FIG. 4 the air nozzle 23, at the junction with the wall of body 21, is formed with a somewhat transversely elongated orifice partly shown at 23'' preferably extending substantially throughout the inner diameter of the tubular body 21 for the purpose of wider distribution of air jet thereby to ensure cutting of the sliver at any position in the passage 22. Also, in FIG. 4 the exhaust pipe 24 is shown as having a substantially rectangular cross-section as indicated at 24'.

In FIG. 5 there is shown diagrammatically an example of an air circuit for operating the device 20 of this invention. A pipe 30 connected at its one end to the air nozzle 23 is connected, through a magnetic valve M_1 , at the other end to a pipe 31 which, in turn, is connected to a suitable compressed air source (not shown). A pipe 32 branched from the pipe 31 is connected to the air pipe 25 through a magnetic valve M_2 . The air pipe 24 is connected to a suitable separator S.

Normally or while the sliver is delivered and successively deposited in the interior of the can, the magnetic valves M_1 and M_2 are kept closed so that there is no air flow through the sliver passage from the air nozzles 23 and air pipe 25.

The operation of the apparatus will now be described. Now assuming that the can 14 has been filled with the sliver 15, then the magnetic valve M_1 is opened so that a jet of air is allowed to flow into the sliver passage 22 (for a few seconds) from the source of air and through the pipe 31, magnetic valve M_1 , pipe 30 and air nozzle 23, thereby to cut the sliver passing through said passage 22. The leading portion of the sliver still continued to be delivered from the calender rollers 10, 10' after the above mentioned pneumatic cutting or breaking is entrained on the air stream from the nozzle 23 and conveyed into the exhaust pipe 24 as well shown in FIG. 3. The broken and scattered fibres of the sliver are carried by the air stream to the separator S through the exhaust pipe 24, so as to separate the fibres from the air for collection and to prevent the fibres from directly escaping into the room and contaminating the atmosphere. During this operation the filled can with its sliver severed is replaced by a new empty can automatically (or manually), and upon the completion of such replacement the air stream from the air nozzle 23 is automatically interrupted by closing the magnetic valve M_1 . Simultaneously with the closing of the valve M_1 , the valve M_2 is opened to allow another air stream from the air pipe 25 (for a few seconds) to flow across the sliver being deflected into the pipe 24 and to convey or reintroduce the said sliver into the coiler tube and hence into the newly supplied empty can, thereby automatically

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permitting the next cycle of sliver coiling operation. Then the valve M_2 is closed. The air nozzle 23 is so arranged that the air jet therefrom is directed toward the exhaust pipe 24 so that the sliver does not tend to escape from the lower end of the tubular body 21.

As mentioned before, the valve M_1 is adapted to be opened when the can 14 is filled, and this can be accomplished by any suitable system such as by associating the magnetic valve M_1 with a switch and relay system (not shown) which is to be actuated when the calender rollers have completed a predetermined number of revolutions. The closing of the valve M_1 and simultaneous opening of the valve M_2 may be accomplished by a suitable switch and relay system (not shown) which is to be actuated when the replacement of the can is completed. The closing of the magnetic valve M_2 may be accomplished by a suitable switch which is adapted to be actuated when the introduction of the sliver into the new empty can has been completed. It will be understood that such electrical circuit adapted to actuate the magnetic valves M_1 and M_2 in the above mentioned timing relation may be apparent and easily constructed by those skilled in the art.

From the foregoing description, it will now be understood that the present invention is useful for effectively cutting the sliver particularly when the sliver is running at higher speed owing to the fact that in this invention the sliver is pneumatically cut and is then pneumatically introduced to the coiler, in sharp contrast to the conventional sliver cutting means which necessarily adopt mechanical cutting systems, thereby effectively avoiding any troubles otherwise encountered with.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims.

What I claim is:

1. A device adapted to be positioned between calender rollers and a coiler for receiving a sliver delivered from the calender rollers and depositing the same into a can, said device comprising a vertical tubular body having a longitudinal passage through which the sliver delivered from the calender rollers is passed into the coiler, an air nozzle provided on the tubular body directed substantially diametrically of said passage and adapted to blow an air jet into the said passage, an exhaust pipe provided on the tubular body and substantially diametrically opposite to the air nozzle, and an air pipe connected to said device for directing a stream of air into said passage substantially diametrically opposite to said air nozzle and in downward direction, the arrangement being such that when the can is filled an air jet is blown from the air nozzle into the said passage to cut the sliver passing through the passage, and the leading portion of the sliver still continued to be delivered from the calender rollers is entrained on the air stream from the air nozzle and into the exhaust pipe, and then when a new empty can is substituted for the filled can an air stream is allowed to flow from the air pipe to entrain the sliver being received in the exhaust pipe and reintroduce the same into the coiler.

2. A device as claimed in claim 1, wherein the air nozzle, at the junction thereof with the wall of the tubular body, has an opening elongated transversely of the tubular body.

3. A device as claimed in claim 1, wherein the air pipe is provided on the exhaust pipe adjacent the tubular body.

4. A device as claimed in claim 1, further comprising a separator to which said exhaust pipe is connected and where the fibres carried by the air stream through the exhaust pipe are separated and collected.