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Sakurai et al.

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[54] **DEVICE FOR PREVENTING ACCUMULATION OF FIBERS IN A SPINNING MACHINE**

[75] Inventors: **Waichi Sakurai; Sadanobu Yoshie,** both of Fukui, Japan

[73] Assignees: **Daiwa Boseki Kabushiki Kaisha,** Osaka; **Kabushiki Kaisha Toyota Jidoshokki Seisakusho,** Kariya, both of Japan

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[51] **Int. Cl.²** **D01H 1/12;** D01H 11/00

[58] **Field of Search** 57/50, 56, 58.89–58.95

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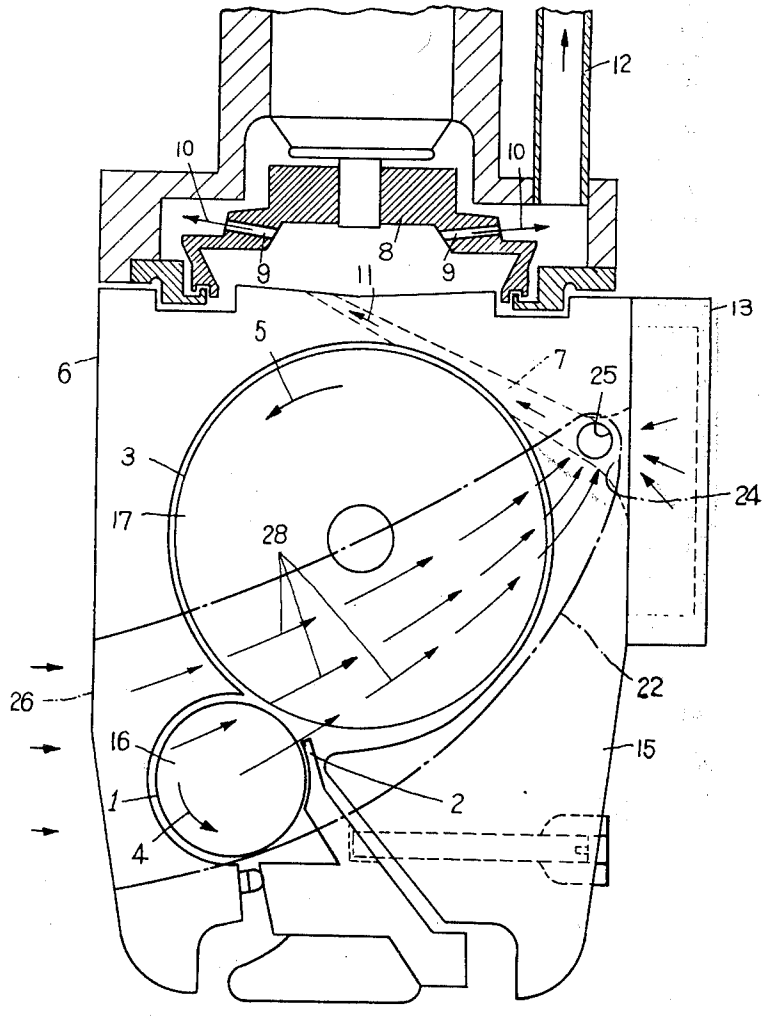
Primary Examiner—John Petrakes

Attorney, Agent, or Firm—Wenderoth, Lind & Ponack

[57] **ABSTRACT**

A device for preventing accumulation of fibers in the space between the free lateral surfaces of a feed roller and a combing roller and the inner surface of a closure plate covering the feed roller and combing roller in a spinning machine. A groove is formed on the inner surface of the closure plate extending in opposition to at least portions of the free lateral surfaces of the feed roller and combing roller and one end of the groove is connected to an air suction source, either to a channel for feeding combed fibers to a rotary spinning chamber, or to a duct which conducts the air exhausted from a rotary spinning chamber. The air current produced in the portion of the groove which covers the free lateral surface of the combing roller is substantially in the same direction as the direction of the air current produced by the rotation of the combing roller in the portion of the space which is opposed to the groove.

10 Claims, 5 Drawing Figures



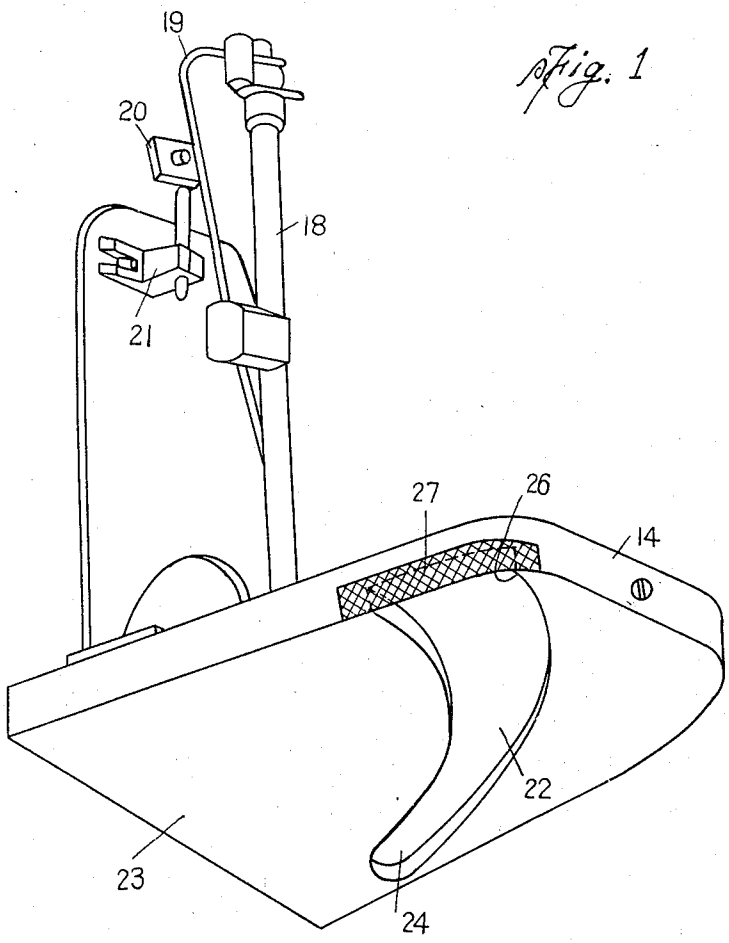


Fig. 1

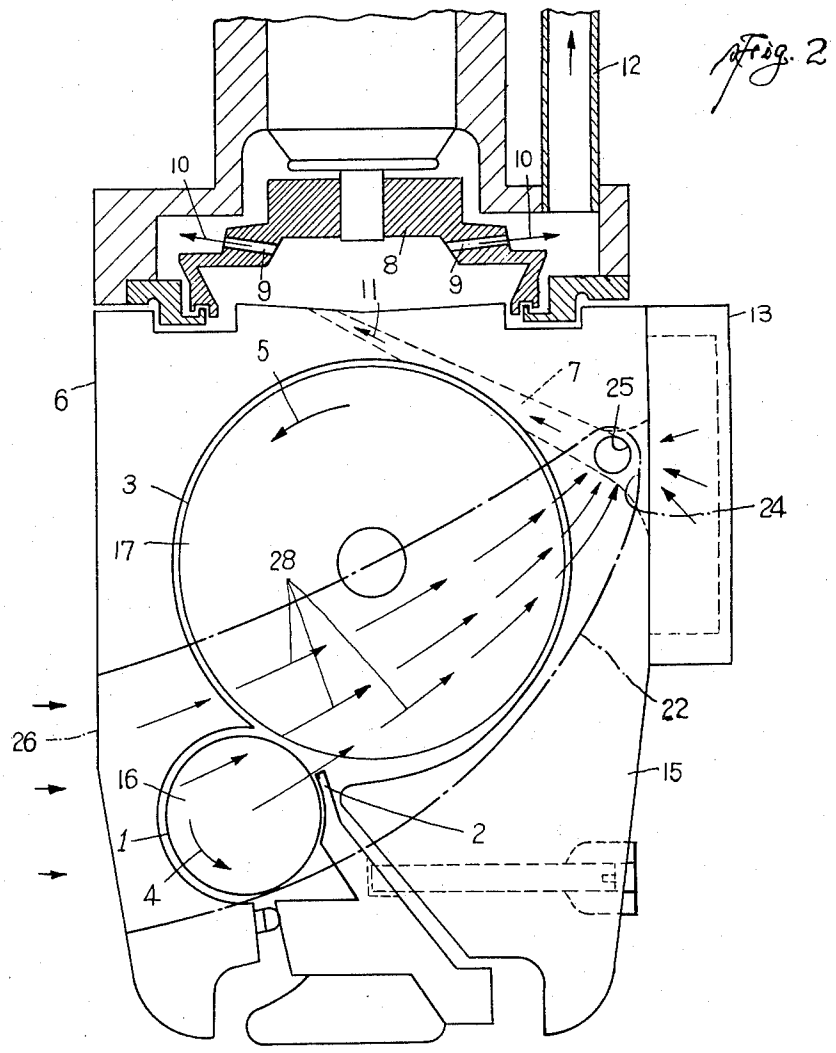


Fig. 2

Fig. 3

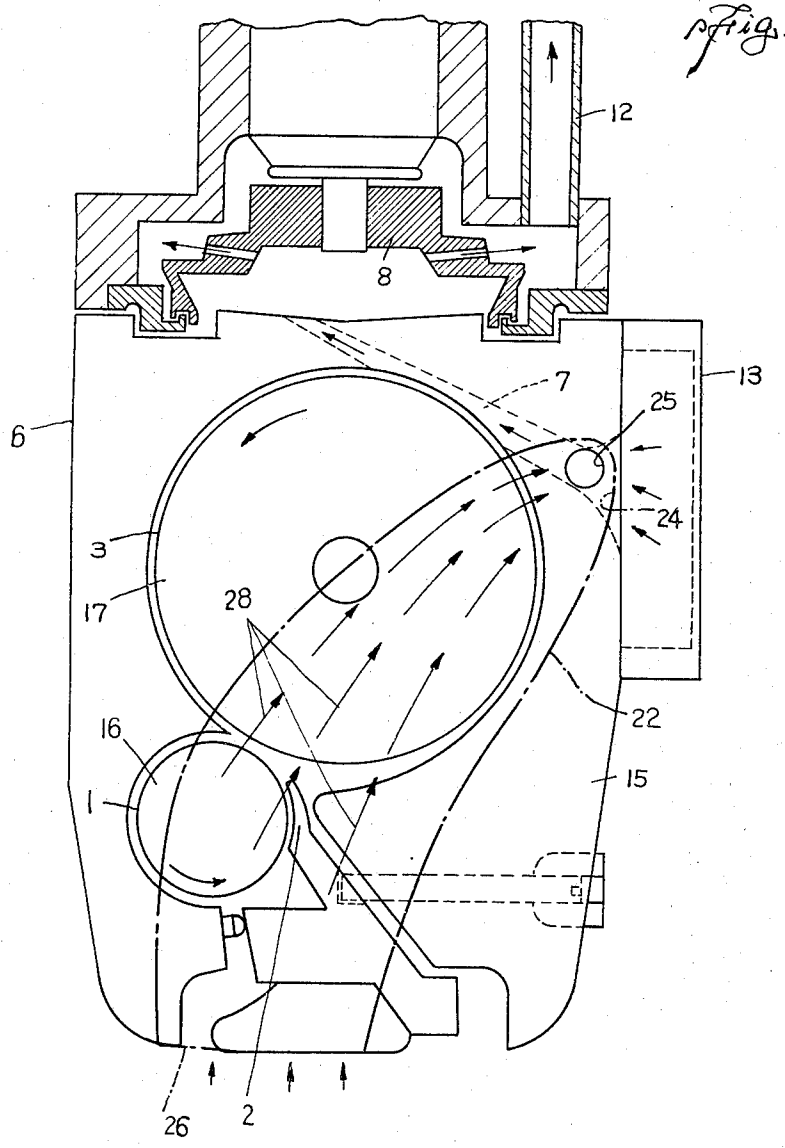


Fig. 4

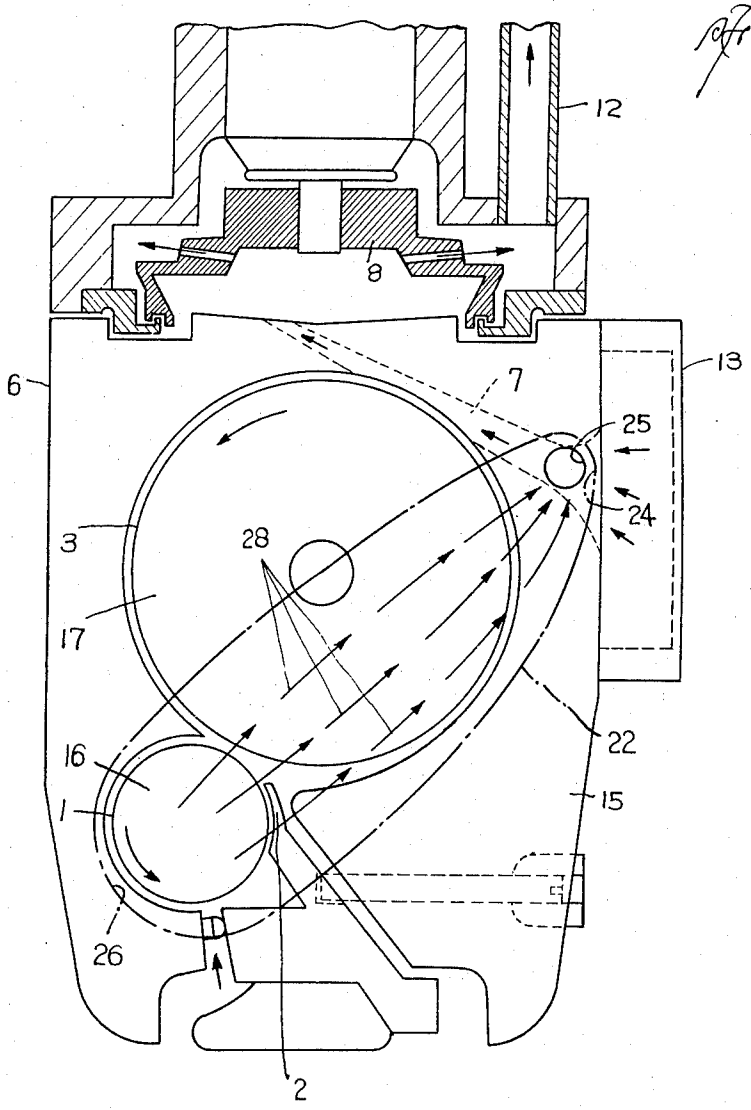
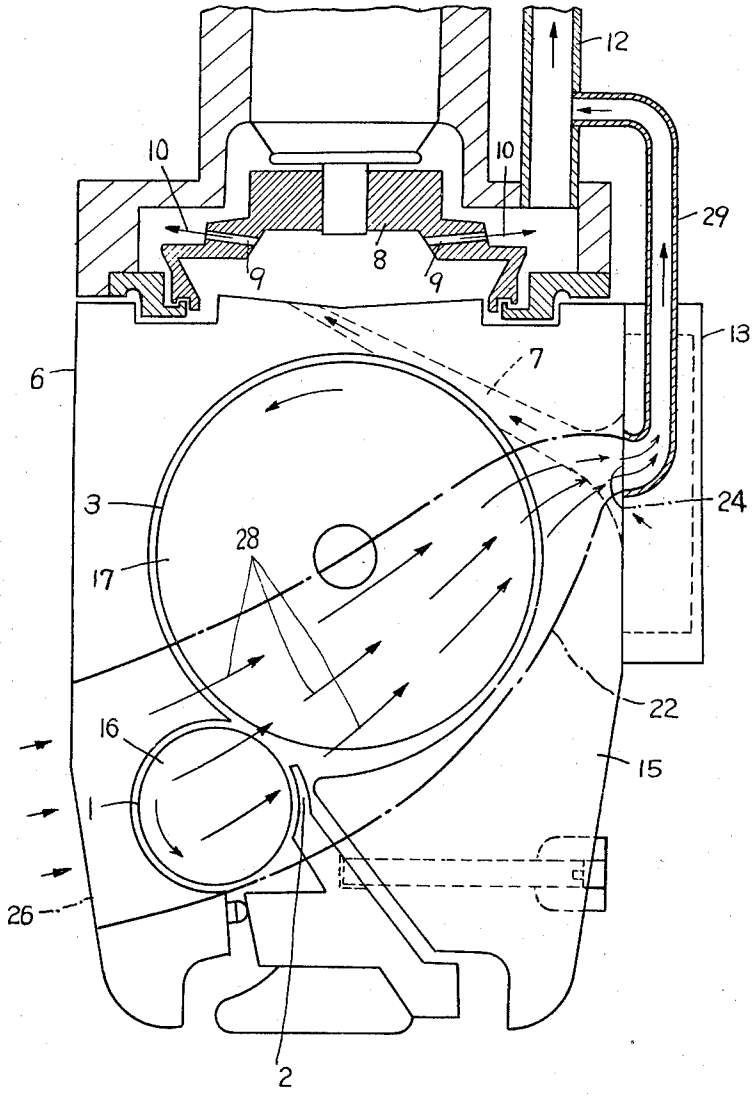


Fig. 5



DEVICE FOR PREVENTING ACCUMULATION OF FIBERS IN A SPINNING MACHINE

BACKGROUND OF THE INVENTION

The present invention generally relates to a ringless spinning machine having a combing roller for combing a sliver fed from a feed roller and a channel for feeding the combed fibers into a rotary spinning chamber from which a spun yarn is withdrawn, and more particularly relates to a device for preventing accumulation of fibers in the space between the free lateral surfaces of the feed and combing rollers and the inner surface of a closure plate covering the feed roller and combing roller.

In this type of ringless spinning machine, the subpressure produced in the rotary spinning chamber rotating at high speed is utilized to introduce the fibers combed by the combing roller provided with a number of saw teeth into the spinning chamber together with air through the channel.

However, since the combing roller is rotated at considerably high speed, there is necessarily produced a concomitant air current around the combing roller, interferring with the complete separation of the combed fibers from the combing roller, and some of the fibers remain adhered to the peripheral surface of the combing roller. While such adhered fibers are being carried back to the feed roller as the combing roller rotates, some of them are separated from the peripheral surface of the combing roller and enter into the spaces on the opposite sides of the feed roller and combing roller, where they accumulate. Furthermore, when a sliver nipped between the feed roller and a presser cooperating with the feed roller is subjected to a combing action of the combing roller, short fibers and cotton dust in the sliver are liberated and some of them enter into the spaces on the opposite sides of the combing roller since a subpressure is produced in such spaces adjacent to the central portion of the combing roller due to the rotation of the latter at high speed. As a result, the fibers and dust are accumulated in the spaces with the amount thereof increasing with the lapse of time and sometimes they become masses and are thrown toward the channel and thus into the rotary spinning chamber, or sometimes they stay in the spaces for a long time so that the spaces are choked with the fibers and dust.

In order to overcome these drawbacks, it has been proposed to provide air bleeding holes in the wall of the body in which the feed roller and the combing roller are located and in a closure plate covering the free lateral surfaces of the feed roller and combing roller in opposition to the opposite lateral surfaces of the rollers to introduce air into the spaces from outside, to at least partially cancel the subpressure therein to thereby prevent the entry of the fibers into the spaces as far as possible while entraining the fibers and dust which have entered into the spaces radially outwardly by air flowed into the spaces through the bleeding holes. However, this approach, though locally effective, cannot achieve satisfactory results because of the low flow power of the air flowed into the spaces through the bleeding holes.

SUMMARY OF THE INVENTION

Therefore, it is an object of the present invention to provide a device which is very effective in preventing the accumulation or stagnation of the fibers and dust in a space between the free lateral surfaces of the feed and combing rollers and the inner surface of the closure plate.

It is to be noted that the term "free lateral surfaces" denotes the lateral surfaces of the feed roller and the combing roller which are free from shafts of the rollers and bearings for the shafts.

BRIEF DESCRIPTION OF THE INVENTION

The present invention will be better understood from the following description taken in connection with the accompanying drawings in which:

FIG. **1** is a perspective view of a closure plate provided with a groove on the inner surface thereof; and

FIGS. **2** to **5** are plan views of a ringless spinning machine partially in section with the closure plate being removed and showing various shapes and positions of the groove provided in the closure plate.

DETAILED DESCRIPTION OF THE INVENTION

Now referring to the drawings and more particularly to FIGS. **1** and **2** thereof, the reference numeral **1** designates a feed roller which cooperates with a presser **2** to feed a sliver to a combing roller **3.** The feed roller **1** and the combing roller **3** are rotated in the directions shown by the arrows **4** and **5,** respectively. The reference numeral **6** designates a body in which the feed roller **1** and the combing roller **3** are arranged in juxtaposed relation. In body **6** there is formed a channel **7** for feeding the combed fibers into a rotary spinning chamber **8.** The spinning chamber **8** is provided with a plurality of evacuating holes **9** so that when it is rotated at a high speed, the air inside the spinning chamber **8** is evacuated through evacuating holes **9** as shown by the arrows **10,** thus a subpressure is produced in the spinning chamber **8.** This subpressure produces an air current in the channel **7** as shown by the arrow **11,** which air current entrains the combed fibers and feeds them into the spinning chamber **8** as described above. The reference numeral **12** designates a duct which conducts the air as exhausted from the spinning chamber **8** to a main duct (not shown in the drawings) provided with a blower (also not shown in the drawings) which promotes the evacuation of the spinning chamber **8.** Covering the inlet end of the channel **7,** there is provided a filter **13** which prevents dust or floating short fibers from entering into the channel **7.** A closure plate **14** (FIG. **1**) is removably mounted on the surface **15** of body **6** to cover the free lateral surfaces **16** and **17** of the feed roller **1** and the combing roller **3,** respectively. In FIG. **1,** the reference numeral **18** designates a spun yarn withdrawing tube, **19** a feeler which normally contacts with the spun yarn after it has left the tube **19** to detect the presence of the yarn, **20** a magnet mounted on the feeler **19,** and **21** a switch which is operated by means of the magnet **20** when the feeler **19** is allowed to incline due to the absence of the spun yarn. The switch **21** turns on a yarn breakage indicating lamp (not shown in the drawings) when the yarn is absent or broken and/or effects other necessary functions.

In accordance with the present invention a groove **22** is formed on the inner surface **23** of closure plate **14** in opposition to at least portions of free lateral surface **16** and **17** of the feed roller **1** and combing roller **3,** respectively. The groove **22** of FIG. **1** is so shaped and positioned that it covers the entire free lateral surface

16 of the feed roller 1 and approximately half of the free lateral surface 17 of the combing roller 3 as shown by dot and dash line in FIG. 2 when the closure plate 14 is mounted in position.

Furthermore, in accordance with the present invention, one end 24 of the groove 22 is communicated to an air suction source. For this purpose, in the embodiment of FIG. 2, there is formed a communication opening 25 in the surface 15 of the body 6 at the inlet portion of the channel 7 and the one end 24 of the groove 22 is located in opposition to opening 25. The other end 26 of the groove 22 is opened in the peripheral outer surface of the closure plate 14. It is preferred to provide a filter 27 covering the other end 26 of the groove 22.

Thus, one end of the groove 22 is communicated to the inlet portion of channel 7, and when the rotary spinning chamber 8 is rotated at a high speed the air in the groove 22 is sucked into the channel 7 through communication opening 25, thus an air current is produced in groove 22 as shown by the arrows 28. This air current entrains the short fibers and dust which have entered into the space between the free lateral surfaces 16 and 17 of the feed roller 1 and the combing roller 3, respectively, into the channel 7 and, therefore, the accumulation of the fibers and dust on the free lateral surfaces 16 and 17 of the feed roller 1 and the combing roller 3 and in such space is effectively prevented.

As will be noted from FIG. 2, the direction of the air current produced in the groove 22 is substantially the same as the direction of an air current produced on the free lateral surface 17 of the combing roller 3 by the rotation of the same. This enhances the fiber entraining function of the air current produced in the groove 22.

The air current produced on the free lateral surface 17 of the combing roller 3 is powerful compared with the power of the air current produced in the groove 22, since the combing roller 3 is rotated at a considerably high speed. Therefore, it is not advantageous that the groove 22 covers substantially more than half of the free lateral surface 17 of the combing roller 3 whereat the two air currents would at least partially cancel each other. Furthermore, since the air current produced by the combing roller 3 is powerful as described above, the fibers and dust entered into that portion of the space which is not covered by the groove 22 are entrained by such air current into that portion of the space which is covered by the gorrove 22. Therefore, it is preferable and sufficient that the groove 22 covers approximately half of the free lateral surface 17 of the combing roller 3.

On the other hand, the rotational speed of the feed roller 1 is very low, and therefore, the air current produced by the rotation of the feed roller 1 is negligible. Therefore, it is preferable that the groove 22 covers substantially the entire free lateral surface 16 of the feed roller 1.

In the embodiment of FIG. 3, the groove 22 covers approximately half of the free lateral surface 17 of the combing roller 3 and substantially the entire free lateral surface 16 of the feed roller 1 as well as substantially the entire presser 2. Furthermore, in this embodiment, the other end 26 of the groove 22 is opened in the front portion of the peripheral surface of the closure plate 14. This makes it easier to intake air from the outside into the groove 22 than in the embodiment of FIG. 2, since in the embodiment of FIG. 3 the intake of air is not impeded by anything except filter 27, if provided, while in the embodiment of FIG. 2 the intake of the air is impeded by an adjacent spinning machine which is spaced closely to the spinning machine in question. Furthermore, in this embodiment the accumulation of the short fibers and dust on the presser 2 is prevented. If the short fibers accumulate on the presser 2, there is a possibility that they will be contaminated by the friction between them and the metal body of the presser 2 and that such contaminated fibers are entrained by the sliver and fed into the spinning chamber 8, thus lowering the quality of the spun yarn. Such drawback is overcome by the embodiment of FIG. 3.

A further embodiment of the present invention is shown in FIG. 4. In this embodiment, the other end 26 of the groove 22 is located in opposition to the feed roller 1 and the presser 2 without opening in the peripheral surface of the closure plate 14. In this case, the air flows from the space between the feed roller 1 and the presser 2 into groove 22. This embodiment is suitable for use in the case wherein a small air current is sufficient to prevent accumulation of the fibers in said space.

In the embodiments of FIGS. 1 – 4, one end 24 of the groove 22 is communicated to the inlet portion of the channel 7. However, it is possible to communicate one end 24 of the groove 22 to any other suitable air suction source. One such embodiment is shown in FIG. 5.

In the embodiment of FIG. 5, one end 24 of the groove 22 is opened in the peripheral surface of the closure plate 14 and communicated to the duct 12 through a pipe 29. Such arrangement brings about a special advantage that the short fibers and dust which have been entrained by the air current produced in the groove 22 are exhausted directly into the duct 12 without being fed into the rotary spinning chamber 8. Thus, even if the entrained fibers have been contaminated by friction with metal bodies of the various elements of the spinning machine, there is not the possibility that they will lower the quality of the spun yarn.

As apparent from the above, in accordance with the present invention, the short fibers and/or dust which have entered into the space between the free lateral surfaces of the feed and combing rollers and the inner surface of the closure plate are immediately and positively removed from such space by providing a groove on the inner surface of the closure plate extending in opposition to at least portions of the free lateral surfaces of the rollers and by communicating one end of the groove to an air suction source to produce an air current in the groove.

While the principles of the invention have been described above in connection with specific embodiments, and particular modifications thereof, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of the invention.

What is claimed is:

1. In a fiber spinning machine of the type including a body having rotatably mounted therein a fiber feed roller and a combing roller; said feed roller and combing roller having free lateral surfaces; a closure plate attached to said body and having an inner surface forming a space with said free lateral surfaces of said feed roller and combing roller; a rotary spinning chamber; a duct connected to said spinning chamber for exhausting air therefrom; and a channel extending through said

body to a doffing area adjacent the periphery of said combing roller and to said spinning chamber for feeding fibers doffed from said combing roller at said doffing area to said spinning chamber; the improvement comprising:

means for preventing accumulation of fibers in said space between said free lateral surfaces of said feed roller and combing roller and said inner surfaces of said closure plate; said means comprising a groove formed in said inner surface of said closure plate, said groove extending in opposition to at least portions of said free lateral surfaces of said feed roller and combing roller, said groove having a first end communicating with said channel at a position thereof upstream from said doffing area, and said groove having a second end communicating with ambient atmosphere, whereby upon operation of said machine an air current is formed in said groove from said second end thereof to said first end thereof.

2. The improvement claimed in claim **1,** wherein said air current in that portion of said groove opposed to said free lateral surface of said combing roller moves substantially in the same direction as the direction of an air current produced by the rotation of said combing roller in that portion of said space which is opposed to said groove.

3. The improvement claimed in claim **1,** wherein said second end of said groove is opened in a peripheral outer surface of said closure plate.

4. The improvement claimed in claim **1,** wherein said second end of said groove is located in opposition to said feed roller and a presser cooperating with said feed roller to feed a fiber sliver to said combing roller.

5. The improvement claimed in claim **1,** wherein said groove covers substantially the entire free lateral surface of said feed roller and approximately half of the free lateral surfaces of said combing roller.

6. In a fiber spinning machine of the type including a body having rotatably mounted therein a fiber feed roller and a combing roller; said feed roller and combing roller having free lateral surfaces; a closure plate attached to said body and having an inner surface forming a space with said free lateral surfaces of said feed roller an combing roller; a rotary spinning chamber; a duct connected to said spinning chamber for exhausting air therefrom; and a channel extending through said body to a doffing area adjacent the periphery of said combing roller and to said spinning chamber for feeding fibers doffed from said combing roller at said doffing area to said spinning chamber; the improvement comprising:

means for preventing accumulation of fibers in said space between said free lateral surfaces of said feed roller and combing roller and said inner surface of said closure plate; said means comprising a groove formed in said inner surface of said closure plate, said groove extending in opposition to at least portions of said free lateral surfaces of said feed roller and combing roller, said groove having a first end communicating with said duct, and said groove having a second end communicating with ambient atmosphere, whereby upon operation of said machine an air current is formed in said groove from said second end thereof to said first end thereof.

7. The improvement claimed in claim **6,** wherein said air current in that portion of said groove opposed to said free lateral surface of said combing roller moves substantially in the same direction as the direction of an air current produced by the rotation of said combing roller in that portion of said space which is opposed to said groove.

8. The improvement claimed in claim **6,** wherein said second end of said groove is opened in a peripheral outer surface of said closure plate.

9. The improvement claimed in claim **6,** wherein said second end of said groove is located in opposition to said feed roller and a presser cooperating with said feed roller to feed a fiber sliver to said combing roller.

10. The improvement claimed in claim **6,** wherein said groove covers substantially the entire free lateral surface of said feed roller and approximately half of the free lateral surface of said combing roller.

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