Dec. 7, 1971 S. DIDEK ET AL 3,624,997

SELF-CLEANING COMBING ROLLER ARRANGEMENT FOR A SUCTION SPINNING CHAMBER

Filed Nov. 20, 1969 4 Sheets-Sheet 1

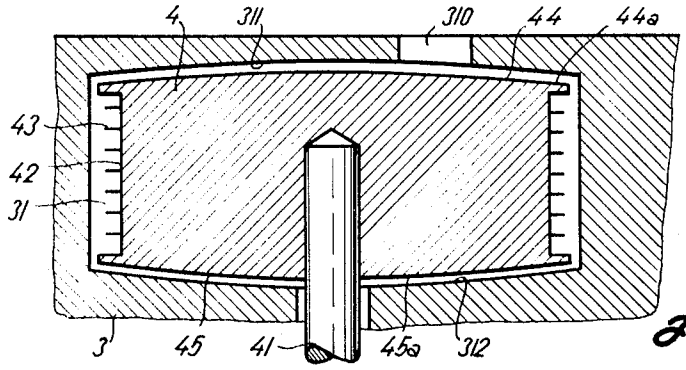

Fig. 2.

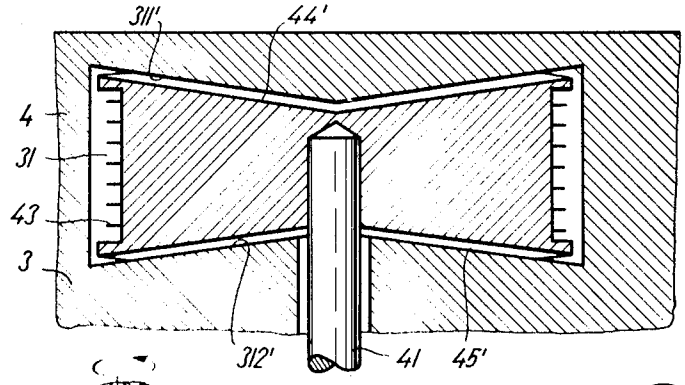

Fig. 3.

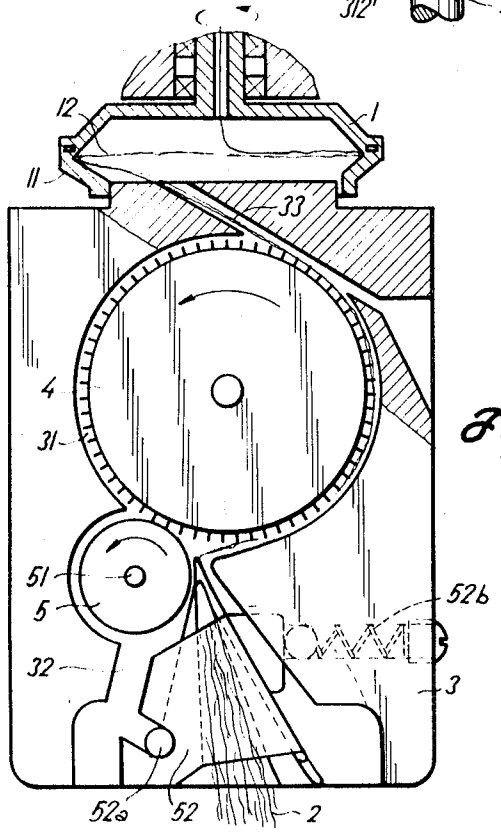

Fig. 1.

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Dec. 7, 1971 S. DIDEK ET AL 3,624,997
SELF-CLEANING COMBING ROLLER ARRANGEMENT FOR A SUCTION SPINNING CHAMBER
Filed Nov. 20, 1969 4 Sheets-Sheet 2

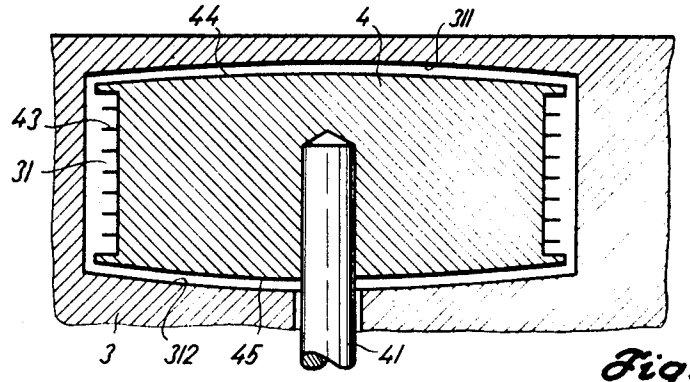

Fig. 4.

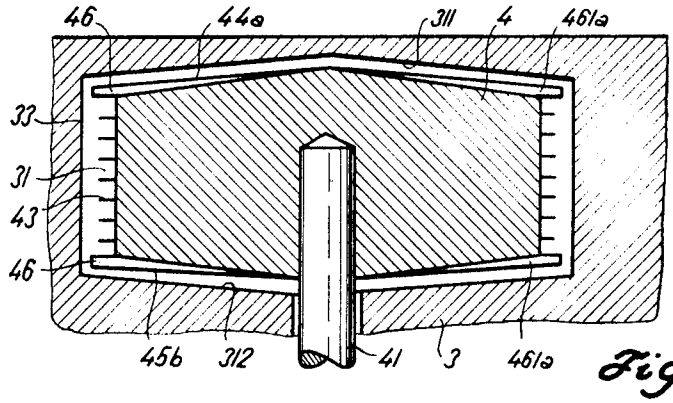

Fig. 5.

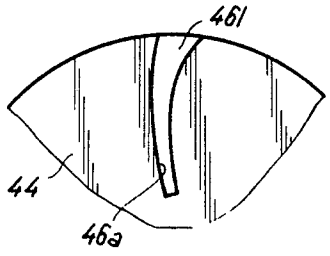

Fig. 7.

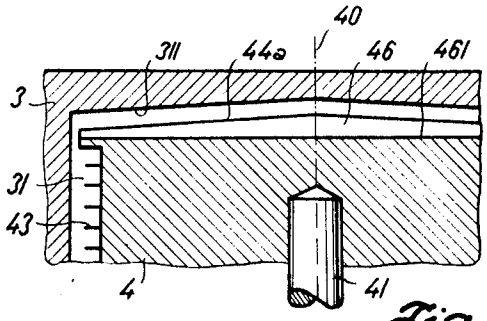

Fig. 6.

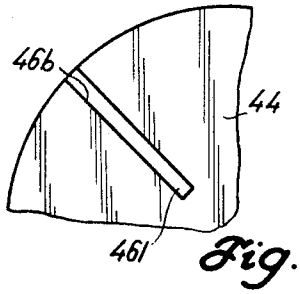

Fig. 8.

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Dec. 7, 1971 S. DIDEK ET AL 3,624,997
SELF-CLEANING COMBING ROLLER ARRANGEMENT FOR A SUCTION SPINNING CHAMBER
Filed Nov. 20, 1969 4 Sheets-Sheet 3

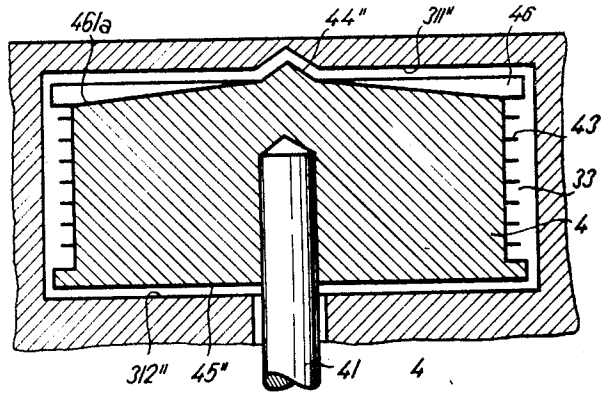

Fig. 9.

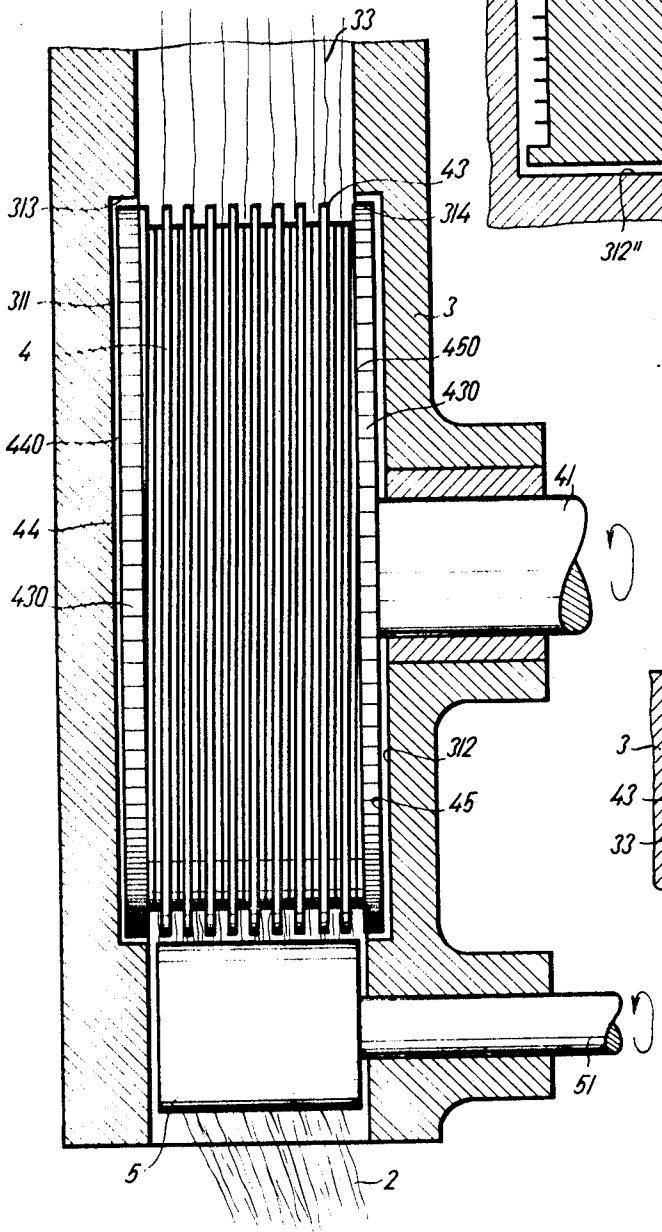

Fig. 11.

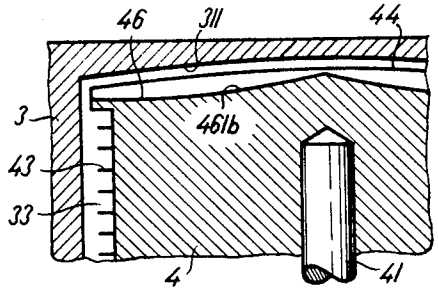

Fig. 10.

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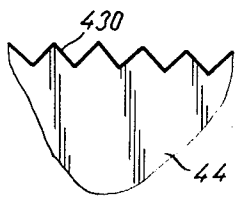

Fig. 12.

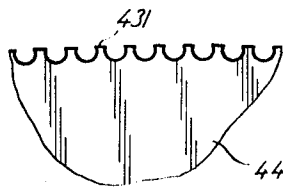

Fig. 13.

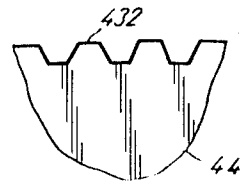

Fig. 14.

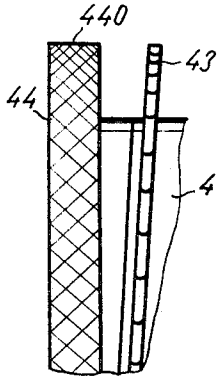

Fig. 15.

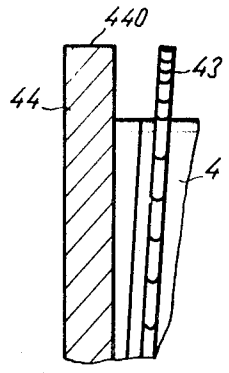

Fig. 16.

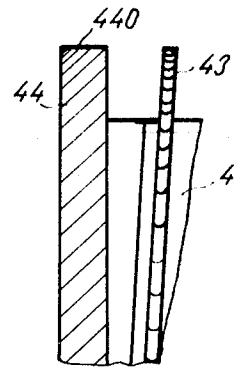

Fig. 17.

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3,624,997

SELF-CLEANING COMBING ROLLER ARRANGEMENT FOR A SUCTION SPINNING CHAMBER

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Int. Cl. D01h 1/12
U.S. Cl. 57—58.91 22 Claims

ABSTRACT OF THE DISCLOSURE

A combing roller which supplies fibers to a rotary suction spinning chamber, has lateral flanges with peripheral projections generating air currents inhibiting fiber accumulations in lateral gaps formed between lateral convex or concave faces of the combing roller, and matching surfaces of a supporting body.

BACKGROUND OF THE INVENTION

In accordance with prior art, a rotary suction spinning chamber receives fibers combed out of a silver by a combing roller located in a circular space in a supporting body, and feeding the combed-out fibers into a tangential outlet channel to which the vacuum of the spinning chamber is applied. A feed roller feeds the sliver to the rapidly rotating peripheral surface of the combing roller, which is provided with needle points, wire clothing, teeth and the like for combing fibers out of the sliver. In accordance with the prior art, the combing roller has circular planar faces respectively located opposite planar surfaces of the supporting body bounding the substantially circular space in which the combing roller is located.

During the combing of the sliver by the combing roller, it happens that not all fibers are transported into the outet channel by the combing roller, but some of the fibers are caught in lateral gaps between the smooth planar lateral faces of the combing roller and the respective opposite planar surfaces of the supporting body. Such undesired accumulation of fibers adjacent the lateral faces of the combing roller is mainly caused by turbulent air currents. The accumulated fibers form clusters and balls, which suddenly are sucked out of the lateral gaps adjacent the combing roller, and transported through the outlet channel into the suction chamber which is clogged due to the fact that the bunches of accumulated fibers are substantially larger than the single fibers which are normally spun by the spinning chamber into a yarn. As a result, the yarn is not continuously spun, which has the effect of yarn breakage, or the yarn is spun with undesirable knobs. In some extreme cases, the fiber accumulations in the lateral gaps adjacent the combing roller in the respective surfaces of the supporting body, cause a complete stoppage and clogging of the combing mechanism.

SUMMARY OF THE INVENTION

It is one object of the invention to overcome this disadvantage of known combing arrangements for suction spinning chambers, and to reduce or eliminate accumulations of fibers laterally of the combing roller.

Another object of the invention is to generate air current which prevent the entry of fibers into lateral gaps adjacent the combing roller.

Another object of the invention is to provide lateral gaps having such a shape that the flow resistance is increased, so that fibers entering peripheral portions of the lateral gaps cannot penetrate into the central areas of the lateral gaps, and are sucked out again by the suction spinning chamber.

With these objects in view, the present invention provides peripheral projections adjacent the lateral faces of the combing roller for generating air currents preventing accumulations in the region of the lateral faces of the combing roller.

In accordance with the invention, the lateral faces of the combing roller, are at least in the central region convex or concave, and the surfaces of the supporting body opposite the lateral faces match the respective lateral faces, and are preferably parallel to the same. Further improvement of the effect is obtained in accordance with the invention by providing grooves in the lateral faces. It is advantageous to provide an opening in the wall of the supporting body connecting the outside air with at least one of the lateral gaps so that the suction of the spinning chamber is effective in the respective gap to remove accumulations.

One embodiment of the invention comprises a supporting body having a cavity including a substantially circular space and an outlet channel connecting the periphery of the space with a suction spinning chamber; and a combing roller located in the space and forming in the same two lateral gaps, and an annular gap communicating with the outlet channel.

The combing roller combs fibers out of a sliver and transports the same through the annular gap into the outlet channel where the fibers are drawn into the spinning chamber.

In accordance with the invention, the combing roller has circular lateral flanges formed with peripheral projections for creating air currents inhibiting the entry of fibers into the lateral gaps.

In accordance with another aspect of the invention, the centers of the two lateral faces of the combing roller are located in the axis of the same spaced from each other a different distance than the peripheries of the two lateral faces are spaced from each other. Preferably, the surfaces opposite the lateral faces of the combing roller, are preferably parallel to the same. In accordance with operational conditions, the lateral faces of the combing roller are convex or concave, conical or curved. This construction is advantageously combined with the peripheral projections producing air currents for obtaining a particularly effective self-cleaning of the apparatus.

The novel features which are considered as characteristic of 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 drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a sectional view illustrating a combing and spinning apparatus to which the present invention is applied;

FIG. 2 is a fragmentary sectional view illustrating an embodiment of a combing roller provided with convex lateral faces forming lateral gaps to which outside air is admitted through an opening in the supporting body;

FIG. 3 is a fragmentary sectional view illustrating another embodiment of a combing roller provided with frustoconical concave lateral faces;

FIG. 4 is a fragmentary sectional view of the combing roller of the embodiment of FIG. 2 located in a closed space;

FIG. 5 is a fragmentary sectional view illustrating a combing roller provided with frustoconical convex lateral surfaces, and with grooves in the same;

FIG. 6 is a fragmentary sectional view illustrating a combing roller whose lateral face is provided with a groove having a bottom perpendicular to the axis of the combing roller;

FIG. 7 is a fragmentary end view of a combing roller provided with a groove curved in relation to a radial plane;

FIG. 8 is a fragmentary end view of a combing roller provided with a groove located in a radial plane;

FIG. 9 is a fragmentary sectional view illustrating a combing roller having a conical convex central face portion in one of its lateral faces, and grooves with bottoms slanted to a plane perpendicular to the axis of the combing roller;

FIG. 10 is a fragmentary sectional view illustrating a combing roller with a curved convex lateral surface formed with grooves having curved bottoms;

FIG. 11 is a fragmentary cross-sectional view illustrating a feeding roller with lateral peripheral projections generating air currents;

FIGS. 12, 13 and 14 are fragmentary schematic views illustrating three modifications of the projections for producing air currents;

FIG. 15 is a fragmentary side view of a combing roller having a lateral flange with projections inclined to the axis of rotation; and

FIGS. 16 and 17 are fragmentary side views illustrating projections slanted in different directions in relation to the axis of the combing roller.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, a rotary spinning chamber **1** of known construction has peripheral openings in the region of the widest chamber portion so that suction is generated in the spinning chamber during rotation of the same. The opening of the spinning chamber **1** surrounds a circular boss of a supporting body **3** so that an outlet channel **33** opens into the suction chamber. Supporting body **3** is formed with a cavity including a circular space **31**, outlet channel **33** which extends tangentially to the circular space **31**, and a cavity portion **32**. A feeding roller **5** is mounted on a shaft **51** and transports the end of a sliver **2** through a converging passage in a sliver condensor **52** so that the leading end of the sliver is engaged by the teeth or needles on the circular periphery of the combing roller **4** which combs fibers out of the sliver and transports the same in an annular gap surrounding combing roller **4** until the fibers enter the outlet channel **13** and are drawn by suction into the spinning chamber **1**. Condensor **52** is mounted on a pin **52***a* for angular movement, and is urged by a spring **52***b* into a position in which the sliver engages the feeding roller.

As shown in FIG. 2, for example, the combing roller **4** is mounted on a driven shaft **41**, and has circular lateral faces **44** and **45** on opposite sides forming narrow lateral gaps **44***a* and **45***a* with confronting circular surfaces **311** and **312** of the supporting body **3**. In the embodiment of combing roller **4** shown in FIG. 2, the lateral faces **44**, **45** are outward convex and are located opposite concave surfaces **311** and **312** which have the same curvature, and are parallel to, the surfaces **44**, **45** respectively, so that the gaps **44***a* and **45***a* are of uniform thickness. An opening **310** in the wall of the supporting body **3**, connects the outer atmosphere with the gap **44***a*. The peripheral cylindrical face **42** of combing roller **4** is provided with wire points or teeth **43** in the usual manner, and the points are constructed as required by the material of the sliver **2**.

In the embodiment of FIG. 4, the opening **310** in the wall of the supporting body is omitted. In the embodiment of FIG. 3, the lateral faces **44'** and **45'** of combing roller **4** are concave and conical, and the surfaces **311'** and **312'** have a corresponding conical shape forming gaps of uniform thickness with the lateral faces **44'** and **45'**.

In the embodiment of FIG. 9, the central portion of one lateral face **44''** projects outward in axial direction, while the remaining outer portions of the lateral surface are located in a plane perpendicular to the axis of rotation of the combing roller. It is also possible to form a concave conical surface in the center portion of the lateral face, but the surfaces **311''** and **312''** should be parallel with the lateral faces **44''** and **45''**. In the embodiment of FIG. 9, the lateral face **45''** and the surface **312''** are located in planes perpendicular to the axis of rotation of the combing roller.

In the embodiments shown in FIGS. 5, 6, 7, 8 and 10, grooves **46** are provided in the lateral faces. As shown in FIG. 7, a groove **46***b* is curved to the respective radial plane, while in the embodiment of FIG. 8, a groove **46***b* is located in a radial plane. As shown in FIG. 5, convex conical lateral faces **44***a* and **44***b* are provided with grooves **46** whose bottom faces are more steeply inclined so that grooves **46** are deeper near the periphery of the combing roller. The bottom face **461***a* of the grooves **46** of the embodiment of FIG. 9 are arranged in the same manner. In the embodiment of FIG. 6, in which the combing roller has convex conical lateral faces **44***a*, as in the embodiment of FIG. 5, the bottom face **461** of the groove **46** is perpendicular to the axis of rotation of the combing roller so that the greatest depth of groove **46** is in the region of the axis.

In the embodiment of FIG. 10, which has a curved convex lateral face **44**, the bottoms **461***b* are curved and concave.

During the operation of the apparatus shown in FIG. 1 provided with one of the combing rollers **4** described with reference to FIGS. 2 to 10, the feed roller **5** feeds the sliver **2** to the combing roller **4** whose points **43** separate individual fibers from the sliver and transport the same along a portion of the annular gap surrounding combing roller **4** until the fibers enter the tangential outlet channel **33** to which the negative pressure of the spinning chamber is applied so that the fibers move out of the outlet channel **33** and impinge the slip surface **11**, gathering on the circular collecting surface **12** where they are formed into a band which is twisted due to the rotation of the spinning chamber **1** to form a twisted yarn which is continuously delivered to the central outlet of the spinning chamber **1**.

In the embodiments of the combing roller **4** described with reference to FIGS. 2 to 10, a stream of air generated by the suction effect of the spinning chamber **1**, is oriented in such a manner that in the lateral gaps between lateral faces **44**, **45** and stationary surfaces **311**, **312**, an increased flow resistance prevails so that any fibers which may enter the lateral gaps **44***a*, **45***a* cannot penetrate into the central areas of the lateral gaps and are drawn by the suction of the spinning chamber into the annular gap surrounding the combing roller, or into the outlet channel **33**.

In the embodiments in which grooves **46** are provided, the pneumatic effect of the suction of the spinning chamber is complemented by a mechanical effect, since groove **46** directly acts on the fibers to carry the same out of the grooves into the peripheral gap and outlet channel. Furthermore, grooves **46** generate strong turbulent air currents in the annular peripheral gaps surrounding the combing roller **4** by which the fibers are prevented from flying into the lateral gaps **44***a* and **45***a* between the rotating lateral faces **45**, **46** and the stationary surfaces **311**, **312**.

The above-described ventilation effect by air flowing in a direction opposite to the direction in which the fibers tend to enter the lateral gaps, it is particulary increased when the opening **310** is provided in any of the embodiments of FIGS. 2 to 10.

Referring now to FIGS. 11 to 17, the combing roller **4** is provided with lateral flanges having the lateral faces

44, 45, which are shown to be planar and located opposite planar circular surfaces 311 and 312 in FIG. 10 for the sake of simplicity. However, it will be understood that the lateral surfaces 44, 45, and the surfaces 311, 312 are advantageously constructed as described with reference to FIGS. 2 to 10.

In accordance with the invention, the end flanges 440 and 450 are provided with peripheral projections and recesses 430 which may have sharp edges formed by slanted faces, as shown in FIG. 12, or may have differently shaped projections 431 or 432, as shown in FIGS. 13 and 14. The projections 431 have flat end faces and are separated by rounded recesses, and the projections 432 have flat faces and are separated by recesses which have flat bottom faces. The circular space in the supporting body in which the combing roller 4 is located, includes two circular recessed bounded by circular shoulders 313 and 314, and by the planar circular surfaces 311 and 312. The width of the gap between projections 430 and annular shoulders 313, 314 is exaggerated in FIG. 11, and the circumferential gap is actually very small.

During operation of the apparatus, and rotation of the combing roller 4 and feeding roller 3, the projections 430, 431, 432 of the rotating flanges 440, 450 act as fan wheels and produce air streams of high velocity and pressure which prevent and inhibit the entering of fibers into the lateral gaps between lateral faces 44, 45 and the circular gaps between projections 430 and annular shoulders 313 and 314. If any fibers happen to penetrate into the gaps, they are thrown back by the action of the projections 430.

The optimal self cleaning effect of the combing roller is obtained if the lateral faces of the same and the surfaces confronting the same are constructed as explained with reference to FIGS. 2 to 10, while projections 430, 431, 432 are provided on the end flanges 440 and 450.

In FIGS. 11, 12, 13 and 14, the teeth 430, 431 and the knurled projections 432 are shown to be parallel to the axis of rotation of the combing roller 4. However, it is also possible to provide on flanges 440, 450 projections which are slanted to the axis of the combing roller 4 in two directions, as shown in FIG. 15, or different directions, as shown in FIGS. 16 and 17.

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 combing roller arrangements for suction spinning chambers differing from the types described above.

While the invention has been illustrated and described as embodied in a self cleaning combing roller cooperating with a suction spinning chamber, 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.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

We claim:

1. Self-cleaning combing roller arrangement, comprising a rotary suction spinning chamber; a supporting body having a cavity including a substantially circular space and an outlet channel connecting the periphery of said space with said suction spinning chamber; and a combing roller located in said space mounted on said supporting body for rotation and having circular lateral faces forming in said space two narrow lateral gaps, and an annular gap communicating with said outlet channel so that fibers combed out of a sliver by said combing roller are transported through said annular gap and fed through said outlet channel into said spinning chamber, said combing roller having a central annular peripheral face of a predetermined axial width, combing needles projecting from said central peripheral face for engaging a sliver on the same, and lateral flanges on opposite sides of said central peripheral face, said lateral flanges having peripheral projections spaced from the sliver and functioning as fan blades for creating air currents inhibiting the entry of fibers into said lateral gaps.

2. Combing roller arrangement as claimed in claim 1 wherein said combing roller has two lateral faces; wherein said supporting body has two confronting surfaces on opposite sides of said space and forming with said lateral faces said lateral gaps, respectively; and wherein said lateral faces are formed with grooves located in substantially radial planes for producing air currents for preventing fibers to enter said lateral gaps, and for carrying fibers entering said lateral gaps in outward direction out of said lateral gaps.

3. Combing roller arrangement as claimed in claim 1 wherein said combing roller has an axis of rotation; and wherein said peripheral projections have free outer end portions extending over the entire axial thickness of said flanges.

4. Combing roller arrangement as claimed in claim 3 wherein said free outer end portions are parallel to said axis.

5. Combing roller arrangement as claimed in claim 1 wherein said projections have slanted faces forming recesses between adjacent projections and edges on the same.

6. Combing roller arrangement as claimed in claim 1 wherein said projections have flat end faces and have concave curved lateral faces forming rounded recesses between adjacent projections.

7. Combing roller arrangement as claimed in claim 1 wherein said projections have flat end faces and slanted faces forming recesses having flat bottom faces between adjacent projections.

8. Combing roller arrangement as claimed in claim 1 wherein said combing roller has an axis of rotation; and wherein said peripheral projections are slanted to said axis of rotation.

9. Combing roller arrangement as claimed in claim 1 wherein said combing roller has two circular lateral faces; wherein said space has two confronting surfaces forming with said lateral faces said lateral gaps, respectively; wherein said combing roller has an axis of rotation; wherein the centers of said two circular lateral faces are located in said axis spaced from each other a different axial distance than the peripheries of said two circular lateral faces.

10. Combing roller arrangement as claimed in claim 9 wherein said two surfaces of said space are at least partly parallel with said two faces, respectively.

11. Combing roller arrangement as claimed in claim 9 wherein said faces are at least partly convex in opposite axial directions.

12. Combing roller arrangement as claimed in claim 9 wherein said faces are at least partly concave in axial direction.

13. Combing roller arrangement as claimed in claim 9 wherein said faces are at least partly conical.

14. Combing roller arrangement as claimed in claim 9 wherein the central portions of said faces are outward convex in axial direction, and the remaining portions of said faces are perpendicular to said axis.

15. Combing roller arrangement as claimed in claim 9 wherein at least one of said two lateral faces is formed with at least one groove.

16. Combing roller arrangement as claimed in claim 15 wherein said groove is curved relative to a radial plane.

17. Combing roller arrangement as claimed in claim 15 wherein said groove is located in a radial plane.

18. Combing roller arrangement as claimed in claim

15 wherein said groove has a bottom face perpendicular to said axis of rotation.

19. Combing roller arrangement as claimed in claim 15 wherein said groove has a bottom face slanted to said axis of rotation.

20. Combing roller arrangement as claimed in claim 9 wherein said supporting body is formed with at least one opening connecting the outside of said supporting body with at least one of said lateral gaps so that said spinning chamber sucks air through said opening and said gaps into said outlet channel for drawing fibers from said lateral gaps into said spinning chamber.

21. Self-cleaning combing roller arrangement comprising a rotary suction spinning chamber; a supporting body having a cavity including a substantially circular space having a pair of confronting surfaces, and an outlet channel connecting the periphery of said space with said suction spinning chamber; and a combing roller located in said space and being mounted on said supporting body for rotation about an axis, said combing roller having a peripheral surface forming in said space an annular gap communicating with said outlet channel so that fibers combed out of a sliver by said combing roller are transported through said annular gap and fed through said outlet channel into said spinning chamber, said combing roller having two circular lateral faces having radial

grooves and located opposite said surfaces, respectively, and forming narrow lateral gaps with the same, respectively, the centers of said two circular lateral faces being spaced from each other along said axis of rotation of said combing roller a different distance than the peripheries of said two circular lateral faces so that entry of fibers into said lateral gaps is inhibited.

22. Combing roller arrangement as claimed in claim 21 wherein said surfaces of said space are at least partly parallel with said faces of said combing roller, respectively, and wherein said supporting body is formed with at least one opening connecting the outside of said supporting body near said axis with at least one of said lateral gaps so that said spinning chamber sucks air through said opening and said gaps into said outlet chamber for drawing fibers from said lateral gaps into said spinning chamber.

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JOHN PETRAKES, Primary Examiner

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57—50, 58.95