Wearing Coating for Delivery Rollers of a Drawing Roller Frame

The invention is relative to a roller drawing apparatus for spinning machines in which the covering for the pressure roller at the output of a drafting field consists of an outer layer and of an inner layer fastened on the core of the pressure roller and the outer layer is thinner and harder than the inner layer, which outer layer loosely surrounds the inner layer so that the outer layer can move relative to the inner layer.

Such an apparatus is described in DE 102 60 025.2. Since the apron covering on the withdrawal cylinder has a running speed approximately 40 times greater than is the case in customary drafting aprons, it is very important that the apron covering is well guided and causes as little friction as possible on the deflection rail. The tensioning force required for the guidance of the apron covering is therefore very low and is advantageously only produced in that the apron covering tends to assume an approximately circular form in the circumferential direction in the unloaded state (DE 103 48 452 A1). Conditioned by this low tension with which the apron covering glides over the deflection roller, fibers collect on the deflection roller during a rather long operation of this apparatus. As a consequence laps form around the deflection rail that hinder the easy gliding over the deflection rail and generate a higher and higher tension that finally leads to the breaking of the deflection rail.

Furthermore, the running properties of the apron covering over the deflection rail are adversely affected in that the yarn insert applied to hinder longitudinal expansion is customarily produced by winding a yarn onto the first inner layer, that is then covered with another layer. As a result, it occurs again and again that at the high running speed the apron covering behaves asymmetri-

cally corresponding to the winding and has the tendency to run off to one side. This can be counteracted by positioning edges on the deflection rail. However, the borders of the apron covering are stressed and worn down by running against the edge.

The invention has the problem of avoiding the described disadvantages and of avoiding adverse effects during the gliding of the very rapidly running apron covering over the deflection rail.

This problem is solved by the features of Claims 1, 16 and 17 as well as by the features of the subclaims. It surprisingly turned out that given sufficiently large dimensioning of the circumference of the cross section of the deflection rail these lap problems can be avoided. The circumference of the cross section of the deflection rail is preferably greater than the length of the longest fiber of the fiber material processed on the drafting apparatus. A running of the rapidly running apron covering against limiting edges is avoided by the curvature of the apron gliding surface of the deflection rail transversely to the running direction of the apron. The limitation by edges can even be entirely eliminated, especially if the covering constructed as an endless apron is provided with a double yarn insert, which yarn inserts are wound in opposing directions. The opposing winding of the yarn inserts eliminates the asymmetric behavior of the apron covering at high running speeds. In addition, the advantage results that when using a rigid holder the apron covering can still be readily replaced. The rigid holder for the apron covering is preferably mounted on the pressure roller shaft in a freely rotatable manner and is supported via stops on the upper roller carrying arm of the drafting apparatus. In this manner an especially simple and operationally reliable guidance of the apron covering is achieved.

Further details of the invention are described using the drawings.

Figure 1 shows a cross section through the drafting apparatus.

Figures 2 to 4 show different cross-sectional profiles of the deflection rail.

Figure 5 shows a one-piece design of the deflection rail with the holder.

Figure 6 shows a replaceable deflection rail with holder.

Figure 7 shows the apron covering with opposingly wound yarn inserts.

Figure 8 shows another embodiment of the apron covering holder in a top view.

Figure 9 shows the apron covering holder of figure 8 in the insertion state and in section.

The drafting apparatus in figure 1 shows the customary construction of a double apron drafting system with lower cylinders 31, 61 and 71 by means of which apparatus fiber structure F is drawn to a yarn F'. The middle pressure roller 6 is looped around by a drafting apron 60 that is guided and tensioned by apron cage 63. Lower cylinder 61 is looped around by a drafting apron 62 that runs over the deflection rail 64 and is pressed against upper apron 60. Compressors 8 and 9 are provided in front of and in the drafting field for the compression of the fiber structure.

The delivery cylinder pair consists of the lower cylinder 31 and the pressure roller 3, that is looped around by an apron covering 1 that runs over deflection rail 2. Since pressure roller 3 has a speed approximately 40 or 60 times greater than pressure rollers 6 and 7, cover apron 1 must run very rapidly. The deflection rail 2 is therefore provided with a smooth, low-fiction apron

sliding surface 27 and covering 1, designed as an apron, of pressure roller 3 is tensioned only slightly. The intrinsic tension of apron covering 1, that would assume a circular form in the free non-tension state, is sufficient for this. Apron covering 1 is stretched by the arrangement of deflection rail 2. The tension produced as a result is already sufficient for the unobjectionable running of apron covering 1.

A clearer roller 5 is arranged in a customary manner above pressure roller 3 and of apron covering 1 in order to keep apron covering 1 free of fibers. However, during rather long running times of the drafting device fibers accumulate on the inside of apron covering 1 between apron covering 1 and apron sliding surface 27 of deflection rail 2, which fibers are not eliminated by or cannot be prevented by the clearer roller. These fibers become firmly fixed so that a greater and greater accumulation of fibers develops on gliding surface 27 of deflection rail 2 and the tension of apron covering 1 increases in an inadmissible manner. The tension can even become so great that not only apron covering 1 is considerably braked and the course is thus adversely affected, but also deflection rail 2 breaks. The accumulation of fibers between apron covering 1 and apron sliding surface 27 of deflection rail 2 is counteracted by the shaping of deflection rail 2, especially of the cross-sectional circumference U. It turned out here that the size of the circumference U is important, that in any case should be greater than the average staple length of the fiber material drawn on the drafting apparatus. Good results were achieved, for example, with a cross-sectional circumference U of deflection rail 2 of at least 1.5 times the average fiber length. Since it is obviously important that the start and the end of a fiber can not close themselves to a ring around circumference U of deflection rail 2, the cross-sectional circumference U of deflection rail 2 should preferably be slightly longer than the longest fiber of the fiber material drawn on the roller drafting apparatus.

Even the cross-sectional form plays a certain part here. It can be circular in accordance with fig. 2. However, it turned out that cross-sectional forms like

the ones shown in figure 1 or in figures 3 and 4 avoid the accumulation of fibers under apron covering 1 the best. However, it is still important that the cross-sectional circumference U is sufficiently large that the fibers cannot form a ring around deflection rail 2. Figure 3 shows, for example, a cross section in which apron sliding surface 27 has the form of a circular arc whereas the flanks are flattened. In deflection rail 2 according to figure 1 the cross section of deflection rail 2 is rectangular; however, the small sides are rounded off in an arched form so that apron sliding surface 27 is rounded off. In the embodiment according to figure 4 apron sliding surface 27 of deflection rail 22 is also rounded off; however, the sides are maintained straight. This cross-sectional form is particularly resistant to pressure loads and offers a smaller apron sliding surface 27 so that less friction is exerted on apron covering 1. As can be gathered from figure 1, a clearer roller 5 is advantageously arranged above pressure cylinder 3 in order to keep apron covering 1 free of fibers on its outside.

Figure 5 shows the holder 4 with two deflection rails 23 arranged as a pair. Holder 4 has cheeks 41 with which it rests on shaft 65 of pressure roller 3. Cheeks 41 are designed in one piece with the two deflection rails 23. Deflection rails 23 comprise cylindrical apron sliding surfaces 27 with lateral edges 24 that prevent a running off of apron covering 1. As a result of the one-piece design of holder 4 with deflection rails 23, this part can be especially advantageously produced and mounted as only one part.

Figure 6 shows an embodiment similar to that of figure 5 but here the deflection rails 200 are screwed into the cheeks 41 of holder by a threading and can be replaced without replacing holder 4. In this manner an adaptation to different spindle pitches is readily possible. Furthermore, deflection rails 200 are provided with a slightly curved apron sliding surface 203. Apron covering 1 is held in the middle of sliding surface 203 by this curvature transversely to the direction of travel of the apron, which prevents it from running against

sleeve 204. An edge can be eliminated on the free side of deflection rail 200, which simplifies the removal of apron covering 1.

Figure 8 shows another embodiment of a holder 40 for apron covering 1. In accordance with the customary design of pressure roller 3, deflection rails 25 are formed in pairs on cheeks 42 of holder 40 so that they form one part with holder 40. Cheeks 42 comprise recesses 44 with which holder 40 rests and is supported on shaft 65 of pressure roller 3. A side edge 26 is formed on each free end of deflection rails 25 which edge extends only over apron sliding surface 203 of deflection rail 25.

Figure 9 shows holder 40 in insertion position with the view onto holder 40 corresponding to section AA of figure 8. The shaft 65 of pressure roller 3 is held in a customary manner in a spring clamp (not shown in more detail) in the upper roller carrying arm 51. Holder 40 grips with cheeks 42 by means of recesses 44 over pressure roller axis 65, around which it can freely pivot. Holder 40 is pivoted counterclockwise during operation in accordance with the torque exerted via pressure roller 3 and apron coating 1 so that it is supported via stops 43 onto upper roller carrier arm 51 and is fixed in this position. This should advantageously take place at an angle α of approximately 30°. This fastening is extremely simple and ensures an assembly and disassembly of the entire holder 40 together with coating apron 1 without special fastening means. Coating aprons 1 can be easily stripped off pressure roller 3 laterally off deflection rail 25 via the edge 26. Nevertheless, a reliable holding and guidance of apron coating 1 is ensured even at high turning speeds of pressure roller 3.

As is described in DE 102 60 025.2, apron coating 1 is stiffened by a yarn insert in the direction of travel of apron coating 1 and is therefore largely non-elastic in this direction. The yarn insert is wound in a spiral during the production of apron coating 1 onto the running layer of apron coating 1. During the cutting of apron coating 1 projecting fringes are produced by the yarn in-

sert on the edges. This is disadvantageous because these fringes result in accumulations of fibers. Apron borders 13 should be completely smooth so that no fibers are caught on them and could be entrained. Such a fringe-free cutting is achieved by cutting with laser.

As a result of the yarn insert applied in spiral form, apron covering 1 exhibits an asymmetric behavior and runs on the one side against edge 24. As a consequence, the smoothly cut borders 13 are roughened and a fringe formation and the above-described negative effects reoccur. The application of a yarn insert 11 in Z form and a yarn insert 12 in S form results in a crossing of the yarns in the spiral winding. Moreover, this counteracts the asymmetric behavior. Apron covering 10 runs uniformly, so that no damage occurs due to running on borders 13. Edges 24 can even be omitted if apron sliding surface 203 of deflection rail 200 has a slight curvature transversely to the direction of travel of the apron. Apron covering 10 is constantly held and guided as a result in the middle of sliding surface 203. The omission of outer edges 24 also has the advantage that apron covering 10 can be more readily replaced, even if deflection rail 200 is rigidly arranged. In the embodiment according to figure 6 apron covering 10 can simply be pushed off the deflection rail 200 laterally. A raising over an edge is not required.

All these described measures bring about an easy and trouble-free course of apron covering 1 or 10. Since this apron covering 1 or 10 runs at a very high speed, slight disturbances work themselves out to a large extent. The described measures can avoid disturbances in a simple manner and achieve an unobjectionable course of covering 1 even at high turning speeds of pressure roller 3.

Patent Claims

1. A roller drafting apparatus for spinning machines in which the covering for the pressure roller at the output of a drafting field consists of an outer layer and of an inner layer fastened on the core of the pressure roller and the outer layer is thinner and harder than the inner layer and is designed as an endless apron that loosely surrounds the inner layer so that the apron can move relative to the inner layer, characterized in that the apron covering (1, 10) slides over a deflection rail (2, 20, 21, 22, 25, 200) whose cross-sectional circumference (U) is greater than the average staple length of the fiber material drawn on the roller drafting apparatus.

2. The apparatus according to Claim 1, characterized in that the cross-sectional circumference (U) of the deflection rail (2, 20, 21, 22, 25, 200) is at least 1.5 times the average fiber length.

3. The apparatus according to one or more of Claims 1 or 2, characterized in that the cross-sectional circumference (U) of deflection rail (2, 20, 21, 22, 25, 200) is preferably slightly longer than the longest fiber of the fiber material drawn on the roller drafting apparatus.

4. The apparatus according to one or more of Claims 1 to 3, characterized in that the deflection rail (2, 20, 21, 22, 25, 200) has an apron sliding surface (27, 203) with a cross-section in form of a circular arc.

5. The apparatus according to one or more of Claims 1 to 4, characterized in that the cross-section of the deflection rail (2, 21, 22, 25) is partially circular, partially flattened.

6. The apparatus according to one or more of Claims 1 to 5, characterized in that the cross-section of the deflection rail (2) comprises a rectangle whose small sides are rounded off in an arc.

7. The apparatus according to one or more of Claims 1 to 6, characterized in that the apron sliding surface (203) of the deflection rail (200) has a curvature transversally to the direction of apron travel.

8. The apparatus according to Claim 7, characterized in that the apron sliding surface (203) of the deflection rail (200) has no limitation by edges on its free end.

9. The apparatus according to one or more of Claims 1 to 8, characterized in that the deflection rail (2, 20, 21, 22, 25, 200) is rigidly supported opposite the pressure roller (3) looped around by the apron covering (1).

10. The apparatus according to Claim 9, characterized in that the apron covering (1, 10) is run through a holder (4, 40) supported against the shaft (65) of the pressure roller (3).

11. The apparatus according to one of Claims 9 or 10, characterized in that the holder (4, 40) is supported in a freely rotatable manner on the pressure roller shaft (65).

12. The apparatus according to one or more of Claims 9 to 11, characterized in that the holder (4, 40) comprises cheeks (41; 42) that extend with recesses (44) over the pressure roller shaft (65).

13. The apparatus according to one or more of Claims 9 to 12, characterized in that the holder (40) comprises stops (43) that hold the holder (40) in the desired operating position.

14. The apparatus according to one or more of Claims 9 to 13, characterized in that the apron covering (1, 10) is tensioned when running over the deflection rail (2, 20, 21, 22, 25, 200) by its bending stiffness.

15. The apparatus according to one or more of Claims 1 to 14, characterized in that the surface (27, 203) of the deflection rail (2, 20, 21, 22, 25, 200) coming in contact with the apron covering (1) has a low-friction surface that favors the sliding.

16. An endless apron or sleeve for being used as covering for pressure rollers of a drafting apparatus for spinning machines, which covering consists of an outer layer and of an inner layer, and the outer layer is thinner than the inner layer and loosely surrounds the inner layer so that the outer layer can move relative to the inner layer, and which endless apron has a low expansion in the direction of travel through a yarn insert running in the direction of travel of the apron, characterized in that the apron covering (10) comprises a double yarn insert (11, 12) of which the one yarn insert (11) is wound opposingly to the second yarn insert (12) so that the yarns of the one yarn insert (11) cross the yarns of the second yarn insert (12).

17. A process for producing an apron according to Claim 16, characterized in that a first inner layer is put on a tubular body and a yarn is wound onto this layer, and another yarn is wound over this wound-on yarn in the opposite direction, so that the yarn layers cross each other, after which both yarn layers are covered over with another layer.