Dec. 25, 1956 O. E. SANDELIN 2,774,995

HIGH REDUCTION FIBER DRAFTING

Filed Oct. 26, 1951

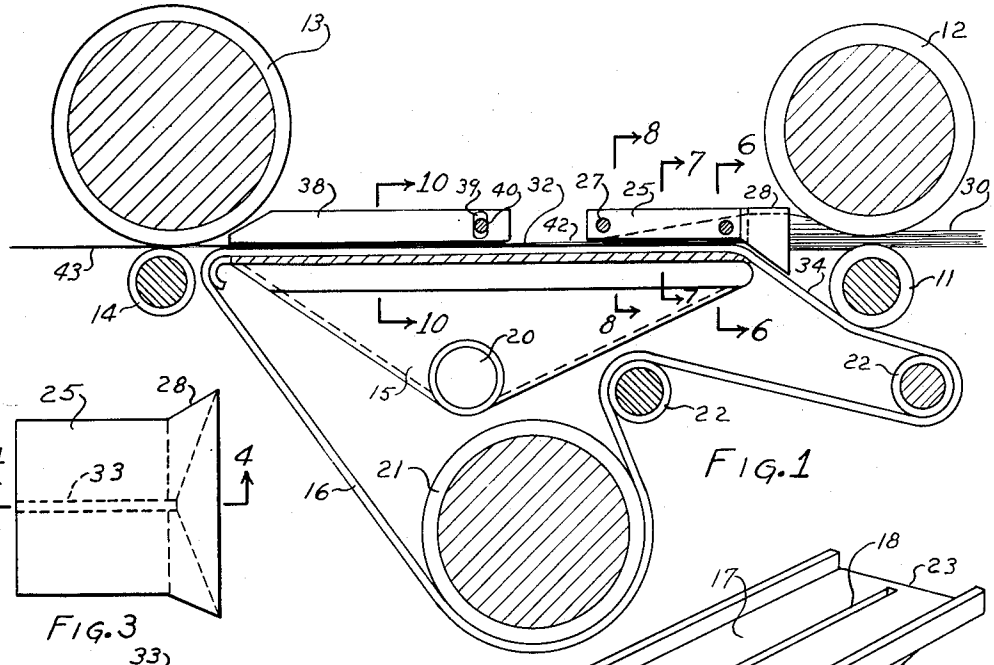


FIG. 1

FIG. 3

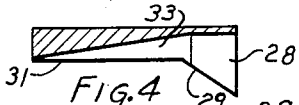


FIG. 4

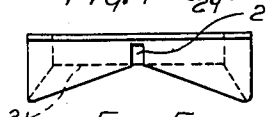


FIG. 5

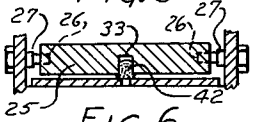


FIG. 6

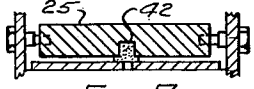


FIG. 7

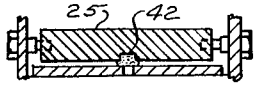


FIG. 8

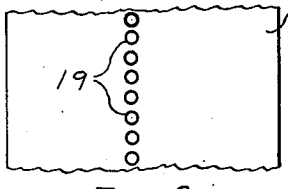


FIG. 9

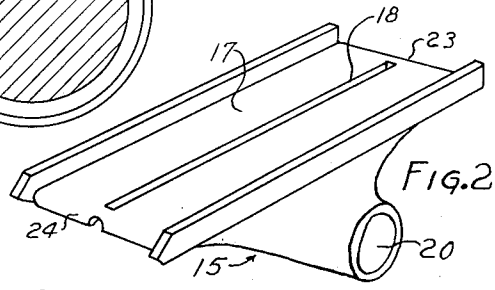


FIG. 2

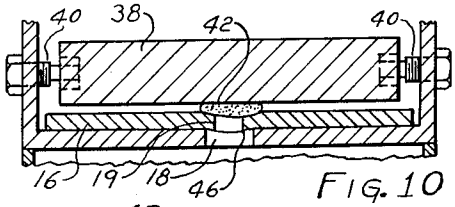


FIG. 10

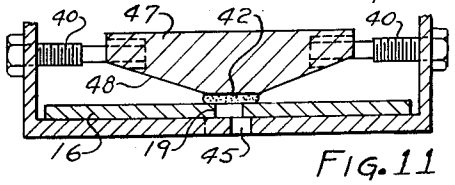


FIG. 11

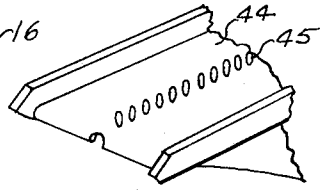


FIG. 12

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United States Patent Office 2,774,995 Patented Dec. 25, 1956

2,774,995

HIGH REDUCTION FIBER DRAFTING

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Application October 26, 1951, Serial No. 253,309

1 Claim. (Cl. 19—131)

The present invention relates to improvements in drafting fiber strands such as tops, slivers, rovings, slubbings and the like, consisting of natural or artificial staple fibers in bundles or aggregates, all of which are referred to for convenience in this specification and in the claims as fiber strands or slivers. The invention is particularly well adapted for use in a second drafting zone or intermediate drafting zone between a previous drafting zone and the spinning spindles. The invention is adapted to drafting by heads of the type having draft rolls following a draft control apron device or having a spaced series of rollers nipping the sliver at the exit and entrance ends of the drafting ratch, having a higher speed at the exit end than at the entrance end of the ratch.

An object of the invention is to provide improved means of combining a plurality of slivers and condensing slivers, especially those which have been subjected to large drafts and obtaining a further multifold reduction in weight in a single drafting stage preparatory to spinning.

A further object of the invention is to improve fiber control during drafting in drafting heads of the type mentioned with the aid of one or more air streams.

A more specific object of the invention is to improve the fiber control during drafting in drafting heads of the type mentioned by the conjoint effect of suction and condensation or compression, or both, along at least a part of the drafting ratch.

Still another object of the invention is to hold the fibers of the sliver approximately stationary in relation to a moving member, in at least a part of the drafting ratch until the fibers are gripped by the drafting rollers at the exit end of the drafting ratch.

Other and furher objects, features and advanages of the invention will become apparent as the description proceeds.

In carrying out the invention in accordance with a preferred form thereof, a drafting head is provided, which is adapted to combine a plurality of slivers which have been subjected to reduction by the drafting arrangement illustrated in my copending application Serial No. 51,951, filed September 30, 1948, now abandoned, and my copending application Serial No. 252,692, filed October 23, 1951, now Patent No. 2,659,936. Ratch rolls and draft rolls are provided and a moving belt or apron is provided having a portion thereof lying between the ratch and draft rolls to form a moving surface member to support the sliver. The peripheral speed of the draft rolls is greater than that of the ratch rolls and the apron or belt is driven substantially at the speed of the fibers approaching the draft rolls so that the fibers not gripped by the draft rolls are relatively stationary with respect to the apron surface. A condenser plate is mounted at the entrance end of the ratch with a lower surface in close proximity to the surface of the apron and having a trumpet formed therein; and a compressor plate is mounted in the ratch with sufficient freedom of vertical movement as to rest upon the fibers on the apron surface between the condenser plate and the draft rolls. Preferably, the portion of the apron surface in the ratch passes over the top wall of a suction box slotted or otherwise perforated at the zone along which the sliver passes and the apron or belt is provided with a corresponding air permeable zone whereby the condenser and compressor plates are aided by suction in causing the fibers of the sliver to adhere to each other and to the apron surface.

A better understanding of the invention will be afforded by the following detailed description considered in conjunction with the accompanying drawings, in which—

Fig. 1 is an elevation in diagrammatical form of a drafting head embodying the invention.

Fig. 2 is a view in perspective of a suction box showing the manner of slotting the top wall or surface of the suction box.

Fig. 3 is a top or plan view of the condenser plate forming a part of the apparatus of Fig. 1.

Fig. 4 is a view of longitudinal section of the condenser represented as cut by a plane 4—4 indicated in Fig. 3.

Fig. 5 is an elevation of the condenser as seen from the end at which the slivers enter.

Figs. 6, 7 and 8 are views of sections represented as cut by plane 6—6, 7—7, and 8—8 respectively, through portions of the apparatus of Fig. 1 including the condenser.

Fig. 9 is a fragmentary view of the moving-surface member, belt or apron of the apparatus of Fig. 1.

Fig. 10 is a view of a cross-section represented as cut by a plane 10—10 through a portion of the apparatus of Fig. 1, including the compressor plate.

Fig. 11 is a view, corresponding to Fig. 10, of a modified form of the invention, and

Fig. 12 is a fragmentary perspective view, corresponding to Fig. 2, of a form of the invention in which the suction box has obliquely to transverse slots in its air permeable zone.

Like reference characters are utilized throughout the drawing to designate like parts.

As illustrated in Fig. 1 of the drawing, a pair of ratch rolls 11 and 12 are provided, at least one of which is driven at a fixed speed and if desired, the rolls 11 and 12 may be the same rolls as the draft rolls of the preceding drafting zone. A pair of draft rolls 13 and 14, are provided, at least one of which is driven, having a peripheral speed considerably greater than that of the ratch rolls 11 and 12. Within the ratch between the nips of the two pairs of rolls is mounted an assembly including a suction box 15 and traveling surface member, belt or apron 16 with the upper surface of the apron 16 substantially aligned with the lines of tangency of the pair of ratch rolls 11 and 12 and the pair of draft rolls 13 and 14.

As illustrated more clearly in Fig. 2, the suction box 15 is provided with an upper wall or plate portion 17 along which the belt 16 is adapted to move and the center zone of the top wall 17 is perforated or slotted to cause suction to be applied along a relatively narrow air-permeable zone. The belt 16 has a corresponding relatively narrow center zone which is perforated or air permeable so as to cooperate with the perforated zone of the top wall 17 of the suction box 15.

For example, as illustrated in Figs. 2 and 9 the top wall 17 of the suction box 15 may be provided with a longitudinal slot 18 and the belt 16 may be provided with a series of holes 19. The invention is not limited to the specific arrangement of slots or apertures. However, if desired, a continuous slot, or openings in a continuous line, or staggered may be provided as illustrated in the said copending application, Serial No. 252,692, filed October 23, 1951. The suction box 15 is provided with

an exhaust port 20 adapted to be connected to a suitable suction line or exhaust pump, not shown.

For driving the belt 16, a drive roller 21 is provided. One or more guide rolls such as the guide rolls 22 are provided. Preferably, the upper portion of the belt 16 is guided by curved guide surfaces formed by edges 23 and 24 of the top wall 17 of the suction box 15.

For cooperating with the suction effect of the suction box 15, one or more plates are provided having lower surfaces lying close to the upper surface of the belt 16 or which rest upon the sliver 42 supported on the belt. For example, as shown, there may be a condenser plate 25 having suitable transverse mounting openings 26, so that it may be held in position just above the belt surface by a pair of cross-rods or, as shown, by inwardly projecting pins 27. As shown more clearly in Figs. 3, 4 and 5, the entrance portion of the condenser plate 25 is formed with a trumpet or condensing mouth 28 to facilitate bringing a plurality of strands of fibers or slivers 30 together at the throat 29 of the trumpet which are thereby combined into the single sliver 42. The condenser 25 is mounted at such a height that the under surface of the plate 25 is spaced from the top surface 32 of the belt 16 less than the original thickness of the sliver 30. The condenser plate 25 is provided with a tapering longitudinally extending vertical groove 33 in its lower surface 31 for receiving the slivers entering the trumpet 28 and registering with the throat 29 of the trumpet 28. The forward portion of the vertical tapered groove 33 gathers the horizontally spread sliver and transforms the same into a vertically extending rectangular shaped sliver as shown in Fig. 6. The trumpet portion 28 of the plate 25 extends downward below the lower surface 31 of the remainder of the plate 25 and along, but over, the surface of the diagonal portion 34 of the belt 16. The fibers are condensed by suction as well as by the action of the condenser plate 25, so that a combination mechanic-pneumatic condenser is formed.

As shown, the drive roller 11 has slight contact with the belt 16 and this contact serves only to keep the belt 16 clean. As the belt 16 moves past the drive roller 11, which is rotating in an opposite direction, any stray fibers on the belt 16 will be picked up by the roller 11.

A compressor plate 38 may be provided having a transverse slot or slots 39 vertically elongated, for cooperating with a cross-rod or, as shown, with a pair of inwardly projecting screw pins 40, which hold the plate 38 against longitudinal movement while leaving its weight free to rest on the top of the sliver in close proximity to the surface 32 of the apron 16 for supplementing the effect of suction. As illustrated in Fig. 10 the compressor plate 38 may be of simple rectangular cross-section, resting upon a sliver 42 so as to compress it in somewhat elliptical form as it rests upon the air permeable zone represented by the holes 19 in the belt 16. If the top wall 17 of the suction box 15 is provided with sufficiently narrow and short slots or openings, not substantially greater in transverse dimensions than the openings 19 in the belt 16, the surface 32 of the belt 16 will remain substantially in a plane as illustrated in Fig. 11.

A rectangular cross-section, flat-bottomed condenser plate 38 is shown in Fig. 10. If desired, however, a modified form of compressor plate 47 may be provided. For example, as illustrated in Fig. 11, a compressor plate 47 is provided with chamfered edges 48 along its lower surface.

In using a suction box having a top wall 17 with a long slot 18 of a width comparable to the width of the sliver 42, or slightly wider than the air permeable zone 19 in the belt 16, a slight sag may be formed in the portion 46 of the belt 16.

In the arrangement of Fig. 12 the suction box 15 is provided with a top wall 44 in which the air permeable zone consists of a row of slots 45 which extend obliquely transverse with the dimension of the slots measured in a direction perpendicular to the direction of the row approximately equal to the widths of the holes 19 in the belt 16. In this manner pulsation is overcome as explained in my copending application Serial No. 252,692, filed October 23, 1951.

In order to obtain the multifold reduction of which my arrangement is capable, the draft rolls 13 and 14 may be caused to rotate with a peripheral speed many times that of the rolls 11 and 12. Notwithstanding such great reduction the suction supplied by the suction box 15 serves to prevent the sliver from spreading and to cause the fibers of the sliver for a single sliver or a combination of a plurality of slivers to adhere to each other and to the top surface 32 of the apron 16. The condensing of the fibers is aided by the airflow towards the small condenser slot 33 and by the force caused by weight of the compressor plate 38 resting upon the sliver. Since the condenser plate 25 is mounted with its lower surface slightly above the surface of the belt 16, a slight space is formed between the condenser and the surface of the belt for a flow of air which enters said space from both sides of the condenser. The compressor plate 38 pressing upon the sliver by its own weight is also slightly spaced from the surface of the belt to permit a flow of air to enter said space from both sides thereof. Thus the flow of air from both sides of the condenser and the compressor along the surface of the belt toward the center thereof will cause the sliver arranged centrally of the belt to be compacted and the fibers of the sliver will adhere to one another during the drafting. In this manner, good fiber control is obtained notwithstanding the great reduction of the sliver in the draft zone illustrated in the drawing. Although I have illustrated an arrangement in which the weight of the compressor plate 38 serves to cause it to press upon the sliver it will be understood that my invention is not limited thereto and does not exclude the use of a compressor plate, which is mechanically loaded as by springs. After the plurality of slivers 30 from the previous zone are gathered into a single sliver in the trumpet 28 and such single sliver 42 has reached the end of the second zone, the sliver has been reduced to a very small diameter sliver 43 which is spun by the rotating spindle into a firm fine yarn.

While the invention has been described as embodied in concrete form and as operating in a specific manner in accordance with the provisions of the patent statutes, it should be understood that the invention is not limited thereto, since various modifications will suggest themselves to those skilled in the art without departing from the spirit of the invention.

What is claimed is:

A sliver control system for subjecting the fibers of a sliver being drafted to the conjoint effect of suction and condensation or compression, comprising in combination a suction box having a top wall with a substantially linear air pervious zone therein, adapted to be mounted in a drafting ratch in advance of draft rolls, a surface member having an air pervious zone therein corresponding to the air pervious zone in the suction box, means for moving such member in the direction of the sliver draft, a substantially rectangular condenser plate resting relatively close to the moving surface member for cooperation therewith in the control of slivers being drawn therebetween, and a substantially rectangular compressor plate resting relatively close to the moving surface member between said condenser plate and the portion of the drafting ratch adjacent to the draft rolls for cooperation with said surface member for the control of slivers being drawn therebetween, said condenser plate being mounted in a relatively fixed position with respect to said surface member and said compressor plate being yieldably mounted to produce a pressure on the sliver in the direction of the surface member normal thereto depending only on the force of gravity of said compressor plate, whereby the

compressor effect is substantially independent of the width or thickness of the sliver being drawn therebetween.

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