Jan. 9, 1968 G. L. KISER 3,362,049

SLIVER CONDENSER AND GUIDE TUBE FOR DRAFTING UNITS

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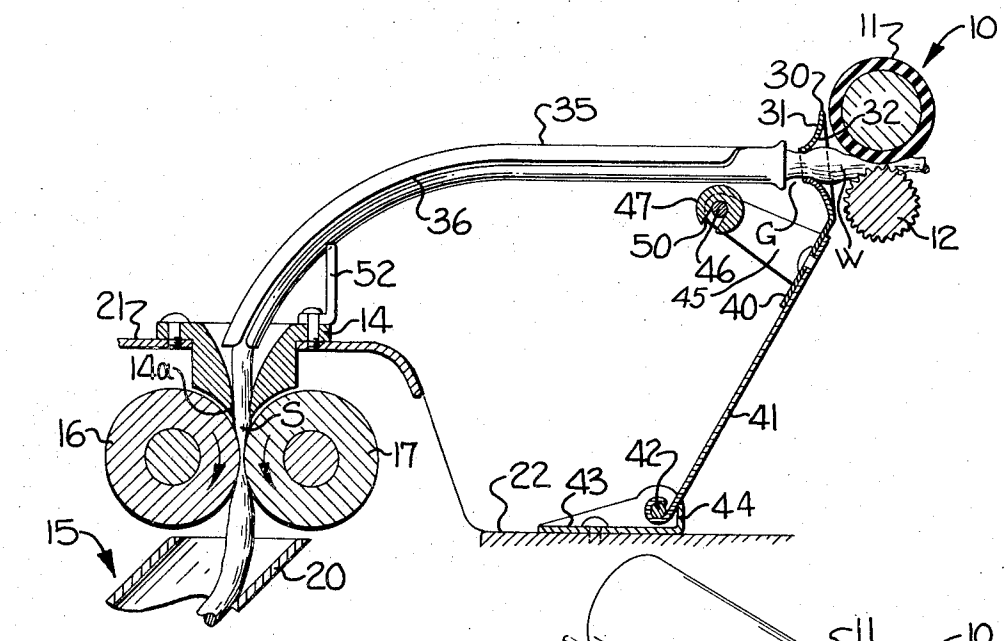

FIG-2

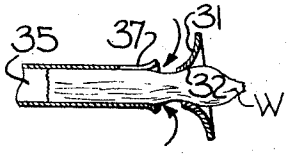

FIG-3

FIG-1

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SLIVER CONDENSER AND GUIDE TUBE FOR DRAFTING UNITS

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ABSTRACT OF THE DISCLOSURE

A condensing means closely adjacent the delivery rolls of a drafting unit and an elongate sliver guide tube extending forwardly of the condensing means for closely confining a sliver in its course from the drafting unit to a coiler. The entrance end of the tube is spaced from a trumpet-shaped passage in the condensing means to permit ambient air to enter the same, but is located in sufficiently close proximity to the passage to prevent excessive expansion of the fibers passing between the passage and the entrance end of the tube so as to minimize rupture of the sliver and choking of the tube.

This invention relates to an improved apparatus for condensing and guiding textile fibers in their travel from the delivery rolls of a drafting unit to a coiler trumpet so as to minimize escapement of fibers from the stock or sliver during its travel and to insure proper guiding of the sliver, especially at high speeds.

As is well known, textile fibers emerge from the delivery rolls of a drafting unit, such as is associated with drawing frames, combers and the like, in the form of a broad, flat and thin web, and generally converge and are condensed into a sliver as they enter and are drawn through a coiler trumpet spaced a substantial distance forwardly of the delivery rolls. Heretofore, straight or forwardly converging open-topped pans or troughs have been used for supporting and assisting in the condensing and conveying of the stock in its travel from the delivery rolls to the coiler trumpet, but substantial amounts of fibers would escape from the traveling stock, especially at the elevated production speeds at which most drawing frames are currently being operated. Such escaping fibers adversely affect the uniformity of the stock and also settle as lint on various parts of the machine and on the stock being processed, thus interfering with the efficiency of the machine and reducing the quality of the sliver being formed.

Tubular chutes of relatively large cross-sectional area also have been employed for guiding textile fibers from delivery rolls to a coiler trumpet. Known tubular chutes have been provided with suction removal means for drawing escaping fibers away from the stock traveling through the chute in an attempt to prevent accumulation of lint at the trumpet and thereby to reduce the choking of the trumpet. However, the fiber loss resulting from such suction removal means is deleterious to the quality of the sliver being formed.

It has been proposed to improve the control of the fibers in their travel from the delivery rolls to a coiler trumpet by initially gathering and condensing the emerging fibrous web into a sliver through a trumpet-shaped passage located at a point closely adjacent and in front of the delivery rolls, and by relatively closely confining the sliver in a sliver guide tube in its further travel to the coiler trumpet. The condensing and confining of the sliver in the proposed manner has served to insure travel of the sliver in the desired path without being thrown over and beyond the coiler trumpet due to momentum

of the stock emerging from the delivery rolls at high speeds. Also, the confining of the sliver has greatly reduced or minimized fiber loss.

However, when the proposed sliver guide tube has been connected in closed communication with the trumpet-shaped passage closely adjacent the delivery rolls, difficulties have been experienced with frequent choking of the coiler trumpet occurring as a result of expansion of the sliver and opening of the fibers therein between the exit or discharge end of the sliver guide tube and the relatively small orifice or passage through the coiler trumpet. I have determined that such expansion of the sliver between the sliver guide tube and the coiler trumpet largely is caused by the flow of ambient air into the sliver because of the air previously having been squeezed out of the fibers during the initial gathering and condensing of the same.

It is therefore an object of this invention to provide an improved apparatus for condensing and guiding textile fibers in their travel from delivery rolls of a drafting unit to a coiler trumpet, in which a sliver condenser and sliver guide tube are so arranged between the delivery rolls and the coiler trumpet as to admit air to the sliver after it is initially condensed and passes through a trumpet-shaped passage in the condenser and substantially before the sliver reaches the discharge end of the tube, and wherein the discharge end of the tube is positioned in close proximity to the orifice of the coiler trumpet, as a result of which a substantial amount of air has already been received by the traveling sliver by the time the sliver emerges from the discharge end of the sliver guide tube. Thus, the sudden inrush of air into the sliver emerging from the tube is practically eliminated so that very little, if any, additional expansion of the sliver occurs in its passage between the discharge end of the sliver guide tube and the orifice of the coiler trumpet.

Although the further condensing of the sliver in its passage through the coiler trumpet orifice effects expulsion of air from the sliver, the inflow of air into the sliver following the initial condensing of the sliver and before the sliver emerges from the discharge end of the sliver tube, reduces turbulence in the area between the tube and the coiler trumpet orifice which would otherwise be caused by the inward flow of air into the stock at a point closely adjacent the point at which the air is expelled from the stock by the further condensing of the sliver in the coiler trumpet orifice. Thus, the sliver passes smoothly from the discharge end of the sliver guide tube into and through the orifice of the coiler trumpet without choking the trumpet.

It is a more specific object of this invention to provide a sliver condensing and guiding apparatus comprising a flat condenser plate positioned closely adjacent the delivery rolls, and a forwardly and downward curved sliver guide tube whose discharge end is positioned within the internally flared or conically-shaped upper portion of a coiler trumpet of a drawing frame and wherein the entrance end of the sliver guide tube is spaced a relatively short distance forwardly of the discharge end of a trumpet-shaped passage in a medial portion of the condenser plate so that, as the initially condensed sliver passes from the trumpet-shaped passage into the entrance of the sliver guide tube, ambient air is drawn into the tube under the influence of the fast moving sliver to permit a gradual expansion of the sliver to the extent permitted by the tube as the sliver subsequently travels along the tube to the coiler trumpet. The width of the gap provided between the entrance end of the tube and the discharge end of the passage in the condenser plate should preferably be about from ⅛ to ⅜ inch so as to insure that ambient air may enter the tube without causing excessive expansion of the fibers passing through the gap such as would

rupture the sliver or cause the sliver to choke the entrance end of the sliver guide tube.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective view of the invention showing the same in association with drafting rolls and a coiler mechanism of a textile drafting machine;

FIGURE 2 is a longitudinal vertical sectional view through the structure shown in FIGURE 1 and showing the sliver guide tube in elevation; and

FIGURE 3 is an enlarged fragmentary vertical sectional view similar to the upper right-hand portion of FIGURE 2 and also showing the entrance end portion of the sliver guide tube in cross-section.

Referring more specifically to the drawings, FIGURES 1 and 2 show the apparatus of the present invention, by way of example, in association with a standard drawing frame, only those portions of the drawing frame being shown which are necessary for a clear understanding of the present invention. As is well known, a drawing frame comprises a drafting unit **10** including a series of pairs of upper and lower drafting rolls, only the delivery rolls **11, 12** being shown in this instance.

Textile fibers are drafted through the drafting rolls and emerge from the delivery rolls **11** in the form of a web W which, according to conventional practice, is directed through a coiler trumpet **14** spaced a substantial distance forwardly of and below the level of delivery rolls **11, 12**. Coiler trumpet **14** is a portion of a coiler head or coiler mechanism, generally designated at **15**, which includes a pair of calender rolls **16, 17** which pull the sliver S, formed by the condensing action of the downwardly converging orifice or passage **14***a* through trumpet **14**, and direct the sliver S into an inclined coiler tube **20**, or a coiler plate, for coiling the sliver into a can, not shown. Coiler trumpet **14** is usually supported on a coiler head cover **21** mounted upon the usual spectacle plate or frame **22** of the drawing frame. Frame **22** is usually positioned on a substantially lower level than the upper surface of the coiler cover **21**, as shown in FIGURE 2.

In order to control the textile fibers in their course of travel from the delivery rolls **11, 12** of the drafting unit **10** to the coiler trumpet **14** and the calender rolls **16, 17** therebeneath, so as to insure that the textile fibers are adequately supported and travel in the desired path without excessive amounts of fibers escaping from the mass of material, I have provided a fiber condensing means in the form of a broad, flat condenser plate **30** whose length or horizontal dimension is at least equal to the width of the web W emerging from delivery rolls **11, 12**. Condenser plate **30** is positioned closely adjacent and in front of delivery rolls **11, 12** and is provided with a trumpet portion **31** on a medial portion thereof defining a frusto-conically-shaped or trumpet-shaped passage **32** through condenser plate **30**.

As the textile material is drawn forwardly from delivery rolls **11, 12** by calender rolls **16, 17**, the web W rapidly converges inwardly and is condensed to emerge as a sliver from the discharge end of trumpet-shaped passage **32**. The discharge end of trumpet-shaped passage **32** is preferably circular and of an internal diameter of about $^{13}/_{32}$ inch or, in other words, the discharge end of the passage **32** should have a cross-sectional area of about 130 square inch for accommodating cotton and/or synthetic fibers within the ranges of weights per yard usually processed through drawing frames. In practice, the upper portion of condenser plate **30** was positioned about $^{1}/_{16}$ inch forwardly of the upper delivery roll **11** which happened to be of larger diameter than the bottom delivery roll **12**, as shown.

In order to relatively closely confine the sliver emerging from condenser plate **30** so as to prevent the escapement of fibers from the sliver while guiding the same in the desired path to the coiler trumpet **14**, a sliver guide tube **35** extends from a position closely adjacent the discharge end of trumpet portion **31** to a point within the internally tapered upper portion of coiler trumpet **14**. Sliver guide tube **35** is preferably made from a smooth metal such as stainless steel and is preferably of a substantially uniform internal diameter throughout its length slightly greater than the internal diameter of the discharge end of passage **32** in condenser plate **30**. In practice, a tube **35** was employed having an internal cross-sectional area of about .150 square inch ($^{7}/_{16}$ inch diameter).

The entrance end of sliver guide tube **35** preferably is flared or slightly enlarged with respect to the major portion of the length of sliver guide tube **35** to assist in guiding the sliver from the discharge end of trumpet portion **31** of condenser plate **30** into the entrance end of sliver guide tube **35**. An important feature of this invention resides in providing a narrow gap G between the discharge end of trumpet portion **31** and the entrance or rear end of sliver guide tube **35** so as to provide means whereby ambient air may enter the previously condensed sliver and the tube at a point spaced a substantial distance rearwardly of the discharge end of the tube. The width of the gap G between the entrance end of tube **35** and the discharge end of trumpet portion **31** of condenser plate **30** should be such as to insure that ambient air can enter the tube without causing excessive expansion of the fibers passing through the gap such as would rupture the sliver or cause it to choke the entrance end of the sliver guide tube.

Accordingly, the entrance end of sliver guide tube **35** should preferably be spaced within the range of about $^{1}/_{8}$ to $^{3}/_{8}$ inch forwardly of the discharge end of trumpet portion **31**. It will be noted that sliver guide tube **35** curves downwardly in a gradual manner at its forward portion and, in order to further prevent excessive opening or expansion of the textile sliver before it is further condensed during its travel through the orifice **14***a* of coiler trumpet **14**, the forward, lower end portion of sliver guide tube **35** is preferably positioned inwardly of the internally tapered upper portion of coiler trumpet **14**; e.g., the discharge end of sliver guide tube **35** preferably terminates about $^{3}/_{8}$ to $^{1}/_{2}$ inch below the upper surface of coiler trumpet **14**.

Means are provided for supporting condenser plate **30** and sliver guide tube **35** on the drawing frame to permit forward movement of condenser plate **30** away from delivery rolls **11**. This facilitates threading the textile material into the trumpet-shaped passage **32**. The supporting means also is arranged to permit ready withdrawal of the discharge end portion of sliver guide tube **35** from within coiler trumpet **14** so a parted sliver S may be easily threaded into and through trumpet **14** and to the calender rolls **16, 17**.

Further, one side wall portion of sliver guide tube **35** is provided with a very narrow sliver-threading slot **36** about .035 to .060 inch wide and extending substantially throughout the length of tube **35**. At a point about $^{7}/_{8}$ inch from the entrance end of sliver guide tube **35**, slot **36** curves upwardly, as at **37**, along the upper wall portion of tube **35** and is open at the entrance end of tube **35**. The portion **37** of slot **36** at the entrance end of sliver guide tube **35** is preferably in the top wall portion of sliver guide tube **35** so that it is readily accessible for the insertion of the sliver therethrough closely adjacent the condenser plate **30**. On the other hand, the major portion of threading slot **36** preferably extends along one side wall portion of sliver guide tube **35**, instead of along the upper or front portion thereof, to insure that the fast moving sliver passing through sliver guide tube **35** is not thrown outwardly against that wall portion of the sliver guide tube having the slot therein with such force as to become lodged in the threading slot. Also, the arrangement of slot **36** is such that momentum of the traveling sliver as it rounds the curved portion of the sliver guide tube will not effect undesirable separation or escapement of fibers

from the sliver through the threading slot 36, as would be the case if the slot 36 were not quide narrow and were located in the upper front wall portion of sliver guide tube 35.

The means for supporting condenser plate 30 and sliver guide tube 35 may comprise a forwardly and downwardly inclined tab portion 40 integral with or suitably connected to the lower edge of condenser plate 30 adjacent the central portion thereof. Tab 40 is secured to a pivoted arm or bracket 41 which extends downwardly and forwardly at an angle and whose lower portion is hingedly mounted on a pivot pin 42 carried by a bifurcated base member 43. Base member 43 is suitably secured to the upper surface of the spectacle or frame 22 of the drawing frame. An upstanding rear abutment or stop 44 on base member 43 terminates above the level of pivot pin 42 so that bracket 41 normally may rest against abutment 43 to maintain condenser plate 30 in the desired spaced relation from delivery rolls 11, 12 while permitting condenser plate 30 to be swung forwardly about pivot pin 42.

Pivot arm 41 also pivotally supports the rear portion of sliver guide tube 35. To this end, the upper portion of bracket 41 has a pair of spaced ears 45 projecting forwardly and upwardly therefrom, between the forward portions of which a pivot pin 46 is secured. A relatively short transverse bar 47 is welded or otherwise connected to the lower wall portion of sliver guide tube 35, adjacent the entrance end thereof. Bar 47 is provided with a groove 50 in its lower portion which fits over pivot pin 46, thus pivotally supporting the rear upper portion of sliver guide tube 35. Also, the groove 50 in the lower portion of bar 47 permits the removal of sliver guide tube 35 from pivoted bracket 41 simply by lifting the same upwardly with respect to pivot pin 46.

In order to support the forward portion of sliver guide tube 35 so that its discharge end may be positioned the desired distance below the upper surface of coiler trumpet 14, a small L-shaped bracket 52, serving as an auxiliary support, is suitably secured to the rear upper portion of coiler trumpet 14 and has a shallow concave upper surface portion 53 therein upon which rests the downwardly curved forward portion of tube 35.

From the foregoing description it is apparent that the front portion of sliver guide tube 35 may be raised out of engagement with bracket 52 to withdraw the discharge end of sliver guide tube 35 from within the upper portion of coiler trumpet 14. Also, both sliver guide tube 35 and condenser plate 30 may then be swung forwardly away from delivery rolls 11, 12 to facilitate the threading of textile material through the condenser plate, the sliver guide tube 35 and the coiler trumpet 14, whereupon the sliver guide tube 35 may be released and it will return, along with condenser plate 30, to the original desired position. Also, tube 35 may be easily removed from its supporting means without disturbing condenser plate 30 simply by lifting bar 47 out of engagement with pin 46.

It is thus seen that I had provided an improved sliver condenser and guide tube arrangement for drawing frames or the like wherein, although air is squeezed out of the textile material as it is condensed by the passage thereof through trumpet-shaped passage 32 of condenser plate 30, the gap G provides for the introduction of ambient air into the entrance end of tube 35 and into the sliver thus formed at a point spaced substantially rearwardly of the discharge end of sliver guide tube 35. This arrangement, coupled with the fact that the discharge end of the sliver guide tube is positioned in close proximity to the smallest portion of orifice 14*a* in coiler trumpet 14, insures that the sliver S passes smoothly from the sliver guide tube 35 and through the coiler trumpet 14 without expanding unduly and choking the trumpet. Also, it can thus be appreciated that the textile material emerging from delivery rolls 11, 12 is relatively closely confined substantially throughout its travel from the delivery rolls to the coiler trumpet so as to substantially prevent escapement of fibers from the mass of the textile material during such travel thereof and also insuring that the textile material, when condensed into sliver form, cannot be thrown outwardly and forwardly over the coiler trumpet 14 due to the high speed of travel of the sliver.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. Apparatus for controlling textile fibers in their course from the delivery rolls of a drafting unit to a coiler and wherein fibers emerge from the delivery rolls as a broad, thin, flat web; said apparatus comprising:

condensing means positioned closely adjacent said delivery rolls and having a trumpet-shaped passage therein for condensing and forming the web into a sliver,

an elongate guide tube extending forwardly of said condensing means and being curved downwardly at its front end adjacent said coiler, the construction of said tube being such that said sliver is closely confined by said tube substantially throughout travel of the sliver from said passage to said coiler, and

the entrance end of said guide tube and the discharge end of said trumpet-shaped passage defining a narrow gap therebetween of such width as to ensure that ambient air can enter said tube, but the maximum width of the gap being limited to such extent as to prevent excessive expansion of the fibers passing through said gap and thereby to minimize rupture of the sliver and choking of the tube.

2. Apparatus according to claim 1, wherein the width of said gap is at least about ⅛ inch.

3. Apparatus according to claim 1, in which said tube is substantially circular in cross-section and the wall of said tube is provided with a narrow sliver-threading slot extending throughout its length, and at least the forward portion of said slot being formed in one sidewall portion of the curved front end of said tube such as to ensure that the forward momentum of the sliver through the curved front end of said tube will not cause the sliver to lodge in said sliver-threading slot and also to minimize the casting off of lint from the sliver as it is passing through the curved front end of said tube.

4. Apparatus for controlling textile fibers in their course from the delivery rolls of a drafting unit to a coiler having a coiler trumpet, and wherein fibers emerge from the delivery rolls as a broad, thin, flat web; said apparatus comprising:

condensing means positioned closely adjacent said delivery rolls and having a trumpet-shaped passage therein for condensing and forming the web into a sliver,

an elongate sliver guide tube associated with said condensing means for guiding and confining the sliver substantially throughout its travel from said passage to said coiler,

said tube being arranged to permit ambient air externally of said tube to enter said tube at a point closely adjacent and forwardly of said condensing means, and

said tube being curved downwardly at its end adjacent the coiler trumpet and terminating within the coiler trumpet.

5. Apparatus for controlling textile fibers in their course from the delivery rolls of a drafting unit to a coiler and wherein fibers emerge from the delivery rolls as a broad, thin, flat web; said apparatus comprising:

condensing means positioned closely adjacent said delivery rolls and having a trumpet-shaped passage therein for condensing and forming the web into a sliver,

an elongated sliver guide tube associated with said

condensing means for guiding and confining the sliver substantially throughout its travel from said passage to said coiler,

said tube being arranged to permit ambient air externally of said tube to enter said tube at a point closely adjacent and forwardly of said condensing means,

said tube being of substantially uniform internal cross-sectional area throughout at least the major portion of its length, and said cross-sectional area corresponding substantially to the cross-sectional area of the smaller end of said trumpet-shaped passage.

6. Apparatus according to claim 5, wherein the internal cross-sectional area of said major portion of the length of said tube is about .020 square inch greater than that of the smaller end of said trumpet-shaped passage.

7. Apparatus for controlling textile fibers in their course from the delivery rolls of a drafting unit to a coiler, wherein fibers emerge from the delivery rolls as a broad, thin, flat web, and a frame supporting said drafting unit; said apparatus comprising:

condensing means positioned closely adjacent said delivery rolls and comprising a substantially flat condensing plate having a dimension parallel to said delivery rolls which is at least equal to the width of the web emerging from the delivery rolls, and said condensing plate having a trumpet-shaped passage in a medial portion thereof for condensing and forming the web into a sliver,

an elongate sliver guide tube associated with said condensing means for guiding and confining the sliver substantially throughout its travel from said passage to said coiler,

said tube being arranged to permit ambient air externally of said tube to enter said tube at a point closely adjacent and forwardly of said condensing means,

supporting means comprising a bracket connected to and extending downwardly and forwardly from said condensing plate, means pivotally connecting a lower portion of said bracket to said frame, and abutment means against which said bracket normally rests and serving to maintain said condensing plate in predetermined closely spaced relation from said delivery rolls.

8. Apparatus according to claim 7, wherein said coiler includes a coiler trumpet having a downwardly converging orifice therethrough and in which a discharge end portion of said tube is positioned, said supporting means further comprising means pivotally connecting said sliver guide tube to said bracket adjacent the entrance end of said tube, and an auxiliary support positioned closely adjacent said coiler trumpet and upon which rests a forward portion of said sliver guide tube whereby said tube and condenser plate may be pivoted relative to each other and relative to said drafting rolls, and whereby said discharge end portion of said tube may be lifted out of said coiler trumpet without disturbing said condenser plate.

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MERVIN STEIN, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,362,049 January 9, 1968

George L. Kiser

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, lines 48 and 49, for "interfering" read -- interferring --; column 3, line 66, for "130 square inch" read -- .130 square inch --; column 5, line 2, for "quide" read -- quite --; column 6, line 75, for "elongated" read -- elongate --.

Signed and sealed this 11th day of February 1969.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents