United States Patent [19]

Benchemoul

[11] **3,834,600**

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[54] **APPARATUS FOR THE TRANSPORT OF YARNS**

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[73] Assignee: **Rhone-Poulenc-Textile,** Lyon Cedex, France

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[21] Appl. No.: **287,063**

[52] **U.S. Cl.** ..... **226/97,** 242/18 R, 242/18 A, 242/157 R

[51] **Int. Cl.** **B65h 17/32**

[58] **Field of Search** ..... 226/97; 242/157 R, 1, 47, 242/147 R, 35.5 R, 35.6 R, 35.6 E, 147 A

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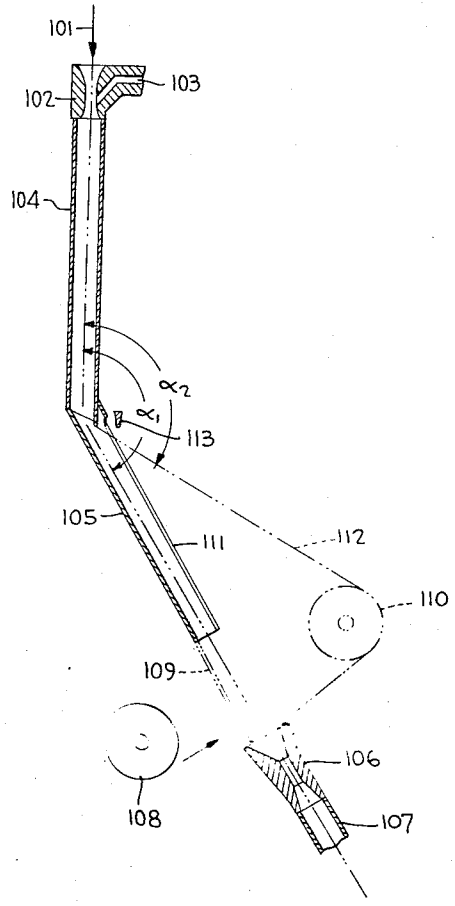
[57] **ABSTRACT**

Apparatus for the high speed transport of yarns using a fluid comprising a first guide passage, a second guide passage, the outlet of the first guide passage communicating with the inlet of the second guide passage, and a longitudinal slot in the second guide passage extending upstream from the outlet of the second guide passage along the length of the second guide passage.

6 Claims, 4 Drawing Figures



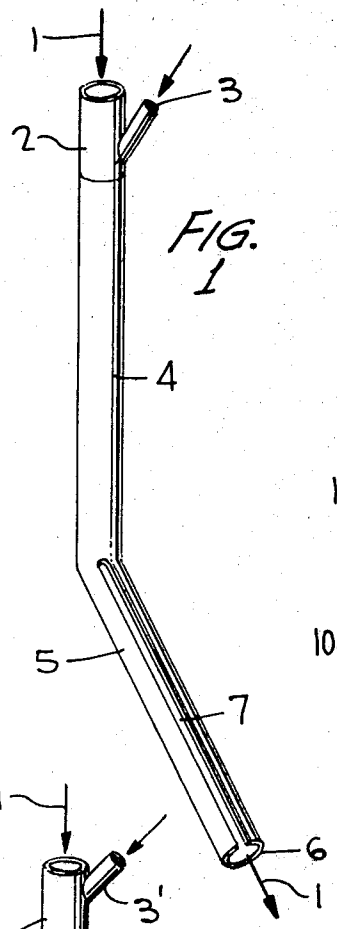


FIG. 1

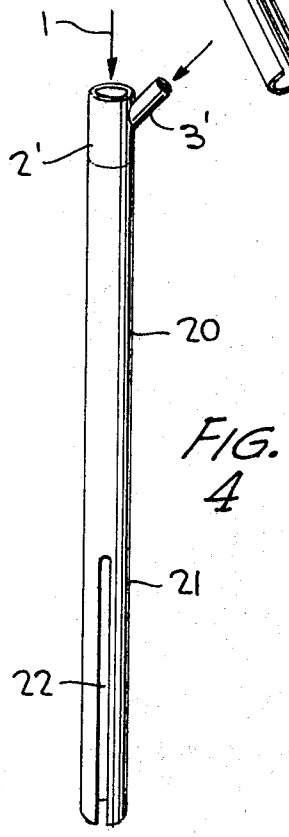


FIG. 4

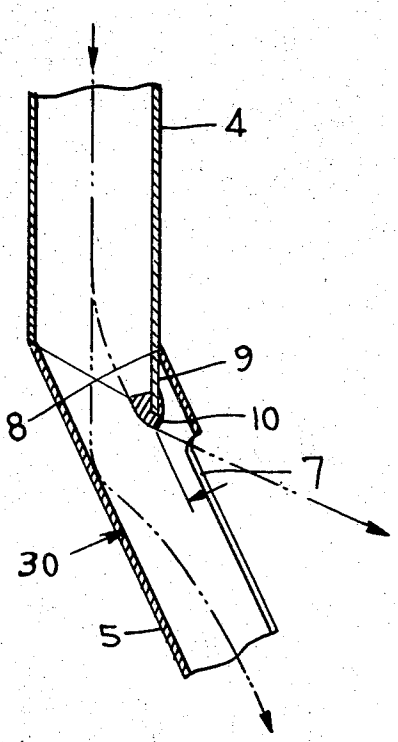


FIG. 2

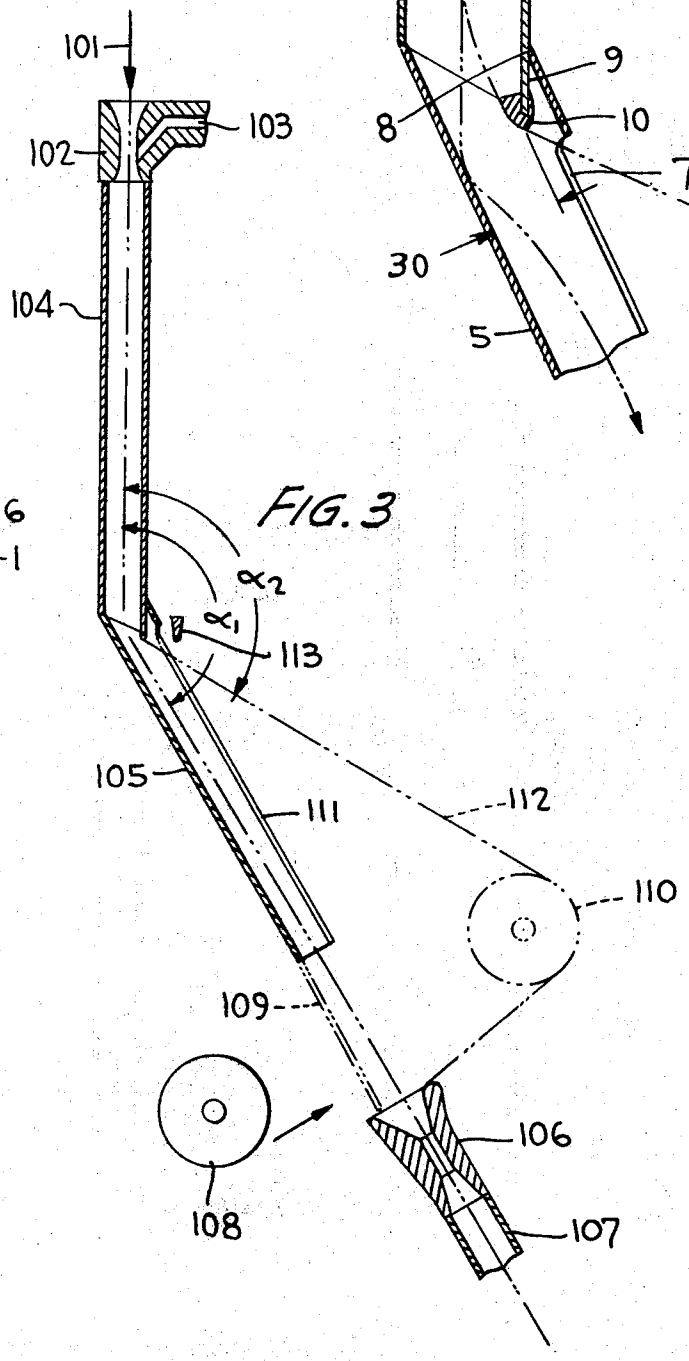


FIG. 3

APPARATUS FOR THE TRANSPORT OF YARNS

BACKGROUND OF THE INVENTION

This invention relates to a device for transporting yarns at high speed. More particularly, this invention relates to a device for continuously transporting yarns at high speed to a second yarn treating or collecting means which operates in a discontinuous manner.

During the production of textiles, it is often necessary to transport a yarn or thread from a first to a second treating device. Often, during this transporting of yarn, one of the treating devices continuously feeds the yarn to a second treating device which operates in a discontinuous manner. During the stopping of this second treating device, the yarn is often picked up by an auxiliary receptacle so that the yarn moves alternately along two different travel paths, such as where a yarn is fed from the delivery station or output of a yarn treating machine to a main collecting or winding means which winds the yarn upon individual bobbins or spindles.

The problem of transporting the yarn from the first device to the second device is complicated when the yarn must pass from the path of travel to a second path of travel. The transport apparatus must be one which can effect such change in path of travel without disturbing the continuous removal of the yarn and, at the same time, will require a minimum, if any, manual handling. Furthermore, modern processing increases the difficulty of these two paths of travel transport situations since the use of high speeds, etc. makes these devices more difficult to utilize since the continuous removal cannot be affected at such high speed, thereby necessitating that the entire apparatus be run at lower than economical speeds.

Generally, yarn transporting device utilize a high speed fluid, such as compressed air, which entrains the yarn and moves the yarn along at the speed of fluid flow. Although the prior art yarn transport devices utilizing high speed fluid flow effectively transport or move yarns from one apparatus to a second similarly operating treating apparatus without any difficulty, when the apparatus operate in a different manner, i.e. continuous as opposed to intermittent or discontinuous, these prior art devices have not only been completely satisfactory and have not been able to effect the discontinuous feed to a second treating device while receiving the high speed feed from the first device. Some prior art devices which have been utilized in this manner include reserve type devices, i.e. devices which accumulate the excess feed from the first device and later feed the same in a discontinuous manner to the second device and other similar devices which attempt to translate the initial continuous yarn flow into the subsequent discontinuous or intermittent yarn flow.

OBJECTS AND BRIEF DESCRIPTION OF INVENTION

It is, in view of the above noted problems and the above environment, that the apparatus of the present invention was developed. Briefly, the apparatus of the present invention for the transporting of yarns at high speeds using a flowing fluid comprises a first yarn passage, a second yarn passage, the inlet of the second yarn passage communicating with the outlet of the first yarn passage and a longitudinal slot in the second yarn passage extending upstream from the outlet of the second yarn passage along the length of the second guide passage.

It is, therefore, the primary object of the present invention to provide an apparatus which can be utilized to transfer yarns from a first path of travel to a second path of travel while maintaining a constant yarn feed rate.

It is a further object of the present invention to provide an apparatus which quickly and efficiently transports yarns at high speed between a first continuously operating textile treating apparatus and a second intermittently operating textile apparatus.

It is a still further object of the present invention to provide a device for transporting yarns at high speed over a series of different paths of travel.

BRIEF DESCRIPTION OF DRAWINGS

The above objects and advantages of the apparatus of the present invention will become more apparent from the attached drawings wherein:

FIG. 1 is a diagrammatic perspective view of the apparatus of the present invention;

FIG. z is a cut away view showing the details of the elbow arrangement as shown in FIG. 1;

FIG. 3 is a diagrammatic view of the present apparatus showing the use of the same in conjunction with a wind up device; and

FIG. 4 is a diagrammatic view of a second embodiment of the present invention.

DETAILED DESCRIPTION OF INVENTION

FIG. 1 shows a diagrammatic perspective view of one form of the apparatus of the present invention. The yarn 1 which is continuously delivered from a textile treating apparatus (not shown) passes into air nozzle z. Compressed air or some other fluid enters nozzle 2 by port or conduit 3. The lower end of nozzle 2 is connected to the upper guide passage 4 of the apparatus of the present invention. Upper guide passages 4 is generally cylindrical in cross-section and extends from the outlet of nozzle 2 to second guide passage 5. As shown in FIG. 1, second guide passage 5 is in communication with first guide passage 4 and is connected thereto so that the axes of passages 4 and 5 form an angle. Extending from the outlet 6 of guide passages 5 is a longitudinal slot 7. Longitudinal slot 7 may extend the entire length of second guide passage 5 or may only extend upwards a convenient portion thereof. The particular length of slot 7 is not overly critical; although, in one form of the present apparatus, it is preferred that slot 7 extends substantially the length of second guide passage 5. Generally, the angle between the axes of first guide passage 4 and second guide passage 5 is between 120 and 180° with the referred angle being approximately 150°.

FIG. 2 shows a cut away view of the elbow portion or connection between guide passage 4 and guide passage 5. First guide passage 4 joins second guide passage 5 at elbow 8. Elbow 8 should be located above slot 7 as shown in FIG. 2. When the angle of the axes of first passage 4 and second passage 5 is substantially smaller than 180°, i.e. 175° or less, it is preferred to have a screen 9 which extends into the elbow and reduces the diameter of the passage to the diameter 30 as shown in FIG. 2. This reduction in diameter prevents the air or fluid coming from guide passage 4 from rebounding on the wall of guide passage 5. This rebounding tends to

create a rotating motion in the passage which, in turn, tends to drive the yarn out through the slot. Screen **9** may be integral with first guide passage **4** or may be a small plate or tab extending into the passage, the sole purpose of the same being to reduce the diameter to prevent the above noted rebounding effect. It is also preferred to cover the end of screen **9** with an abrasion resistant surface **10** having a low coefficient of friction. Surface **10** prevents the damaging of the yarn which would occur by the rubbing of yarns against the screen **9** and, further, protects screen **9** from wear.

FIG. **4** shows an alternative embodiment of the guide passage means of the present inventin. In FIG. **4**, yarn **1** enters a nozzle **2'** similar to the nozzle utilized in FIG. **1** which is fed compressed air through conduit **3'**. The lower edge of nozzle **2'** is attached to the upper edge of first guide passage **20.** Since guide passage **20** is completely straight, i.e. having no bend, second guide passage **21** which is attached to the lower edge of guide passage **20** is that portion of guide passage **20** having longitudinal slot **22** extending upward from the bottom or outlet end of second guide passage **21.** Since there is no angle between the first and second guide passages, there is no necessity for a deflection screen; however, it is often convenient to utilize an abrasion resistant and low friction surface **10** at the upper end of slot **22.**

FIG. **3** shows a cross-sectional diagrammatic view of the apparatus as shown in FIG. **1** in use in a wind up or take up apparatus. Yarn **101** is fed from a yarn treating device through nozzle **102** which is fed compressed air through conduit **103.** Yarn **101** then passes into upper guide passage **104** and through lower guide passage **105** into the inlet of a second high speed fluid nozzle **106** attached to conduit **107** which flows into a waste receptacle (not shown). From second guide passage **105** to the nozzle **106,** the yarn **101** passes through an open space sufficiently wide so that bobbin **108** may pass therethrough. Bobbin **108** then passes through open section **109** until it reaches the position **110** as indicated by the dotted bobbin. As bobbin **108** crosses open space **109** to position **110,** it contacts yarn **101** and moves the same through longitudinal slot **111** to the second path of travel of yarn **101, 112.** This second path of travel **112** makes an angle $\alpha 2$ with the path of travel of yarn **101** through first guide passage **104.** Angle $\alpha 2$ is smaller than angle $\alpha 1$ which is the angle of the first path of travel of yarn **101** through the apparatus of the present invention. When wind up bobbin **108** reaches the position **110,** yarn **101** is wrapped thereon and yarn **101** is broken at a point between bobbin position **110** and nozzle **106** when yarn **101** is firmly wound on bobbin **108.** Associated with bobbin are means to attach yarn **101** to bobbin **108.** Such means are conventional and well known in the art such as a protrusion (not shown) or similar means to cause yarn **101** to wind around bobbin **108.** As bobbin **108** becomes full, cutter **113** is actuated which causes yarn **101** to resume the first path of travel through second guide passage **105** and subsequently across open space **109** and into nozzle **106.** At this point, as bobbin **108** is removed the process is repeated and new bobbin **108** moves through open space **109** contacting yarn **101** and moves into the position left vacant by bobbin **108** thereby causing yarn **101** to again assume the second path of travel **112.**

Of course, the apparatus of the present invention may be combined with other similar apparatus so that a series of yarns may be wound on a single winding tUbe or obbbin or, alternatively, first guide passage **104** may feed a series of second guide passages **105.** Also, a number of the apparatus of the present invention may be utilized and feed toward one single waste receptacle or, alternatively, a series of guide passages of the present invention may be utilized in a side-by-side relationship with the bobbins contactng each individual yarn and winding the same thereon with series of independent cutters **113** which immediately remove any yarns not desired to be wound on a particular bobbin.

As a test, the tube as illustrated in FIGS. **1** and **2,** and the assembly as shown in FIG. **3** is used for winding a polyester yarn having a count of 167 dtex. Space **109** was 200 mm., the feeding pressure of compressed air in tube **104** was six bars and the rate of flow of air in the tube was 30 Nm^3/H giving a rate of speed of the travel of yarn in tube **104** of 6,000 m/mn and a winding speed of 6,000 m/mn; when bobbin **108** passes through space **109,** the yarn passes over the bobbin into the waste receptacle until the same is effectively hooked onto the rotating winding tube or bobbin. When the winding tube or bobbin was completely filled, the actuation of cutter **113** effectively returned yarn **101** to second guide passage **105** through a cross space **109** and into waste receptacle tube **107.**

The apparatus of the present invention is applicable to the pneumatic transport of virtually all types of yarns, both continuous and fiber yarns, comprising any type of materials, such as natural and synthetic fibers, and also may be used for yarns of virtually any count, no matter how high or low.

While the apparatus of the present invention has been illustrated by way of the foregoing drawings and embodiments which are for the purpose of illustration only, the apparatus of the present invention is to be limited only by way of the following appended claims.

What is claimed:

1. Apparatus for the high speed pneumatic transport of yarns comprising, in the direction of yarn movement, a first guide passage of predetermined diameter and a second guide passage of predetermined diameter disposed at an angle relative to each other, the outlet of said first passage attached to the inlet of said second guide passage, means for directing a stream of fluid through said first and second passages, a longitudinal slot extending upstream from the outlet of said second guide passage along the length of said second guide passage, a screen extending from the outlet of said first guide passage into said second guide passage for reducing said predetermined diameter of said second guide passage in the vicinity of the inlet of said second guide passage.

2. The apparatus of claim **1,** wherein said screen is an extension of said first guide passage into said second guide passage and integral with said first guide passage.

3. The apparatus of claim **1** wherein said longitudinal slot extends substantially the entire length of said second guide passage.

4. The apparatus of claim **2** wherein said screen includes a surface having a low coefficient of friction and a high resistance to abrasion attached to the lower extremity of the screen.

5. The apparatus of claim **2** wherein said longitudinal slot extends substantially the entire length of said second guide passage.

6. The apparatus of claim **1** wherein said screen includes a surface having a low coefficient of friction and a high resistance to abrasion attached to the lower extremity of the screen.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,834,600 Dated September 10, 1974

Inventor(s) Claude BENCHEMOUL

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Heading, insert patentee's foreign application priority data as follows:

-- Claims priority, application France, No. 71/33479, September 15, 1971. --

Signed and sealed this 19th day of November 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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