Nov. 26, 1968 E. O. LIPPUNER 3,412,545

PNEUMATIC CLEANER FOR ROVING FRAMES AND THE LIKE

Filed May 22, 1967

FIG. 1.

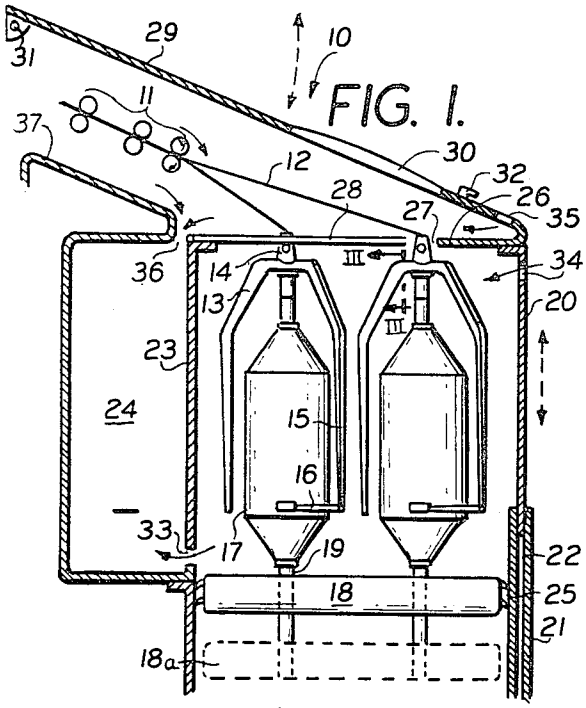

FIG. 2.

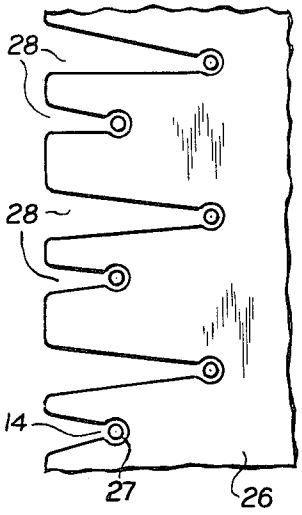

FIG. 3.

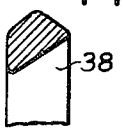

FIG. 4.

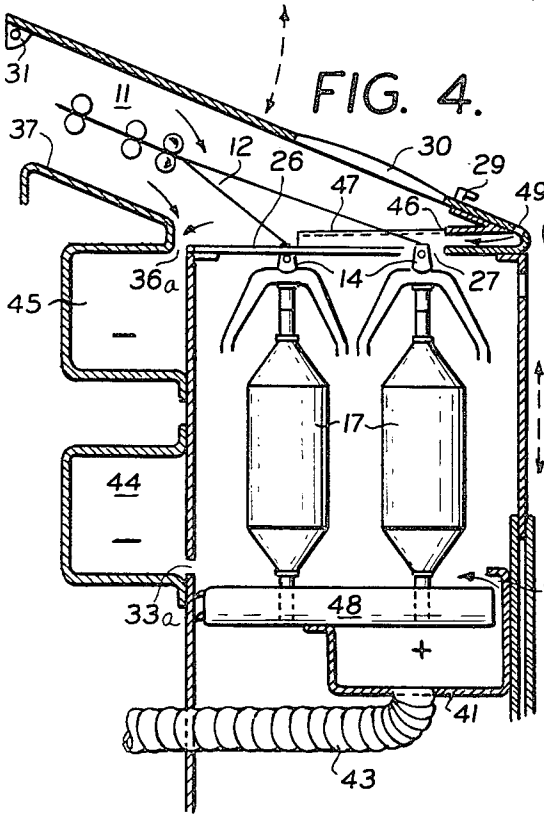

FIG. 5.

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PNEUMATIC CLEANER FOR ROVING FRAMES AND THE LIKE

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6 Claims. (Cl. 57—56)

ABSTRACT OF THE DISCLOSURE

In combination with yarn processing textile machinery having flyers such as roving frames, or the like, an enclosure surrounding the flyer equipment, and an enclosure surrounding the path of travel of the yarn to the flyer equipment, with suction plenums arranged in communication with said enclosures with scavenging air intake openings into the enclosure to establish air flow paths in the flyer enclosure which pierce the curtain normally established by the rotation of the flyers, and in the second enclosure, which serves to clear the top wall of said flyer enclosure to prevent the admission of foreign matter to the flyer enclosure.

Background of the invention

This invention relates to an improvement in yarn processing equipment in which flyers are positioned to rotate with respect to a spindle on which a yarn take-up bobbin is positioned to wind the yarn onto the bobbin and simultaneously twist the yarn. Such flyer-type arrangements are commonly used in connection with roving frames, though it will be apparent to those skilled in the art that the inventive concept may be employed in connection with an flyer-type textile processing equipment.

As in connection with all textile processing equipment, so in connection with roving frames it is desirable to minimize the possbility of breaks in the yarn end, as well as minimizing the production of lint, fly, and the like foreign matter in the ambient atmosphere. With increased speeds of yarn movement, such as is now available on improved textile processing equipment, there is an increased production of fly and the like foreign matter. In addition to the required increase in cleaning with a concomitant increase in costs, other problems arise in that this increased production of fly and accumulations of foreign matter in the flyer vicinity serves to increase the rate of breakage of yarn at the pressure fingers on the flyers.

It has previously been proposed in the prior art to apply suction cleaning systems to roving frames. Thus, in British Patent 1,013,072, stationary suction openings are arranged directly below a point on the locus of rotation of the flyers to pick up any broken yarn ends. Aside from the fact that this serves to pick up yarn ends at only a single point on the circular path of the flyers, in view of the high speed of the flyer which tends to establish a curtain of air, such arrangements are generally found unsuccessful. Further, the creation of a single flow path for the pick-up stream tends to interfere with the smooth flow of yarn from the flyer to the bobbins.

It has additionally been proposed to provide individual suction orifices at the level of the flyers. Such arrangements have also proven unsatisfactory due to the air curtain established by the rapid rotation of flyers.

Summary

It is with the above considerations in mind that the present improved pneumatic cleaning system for roving frames has been evolved, a system providing for continuous cleaning throughout the flyer zone or other zone of a rapidly rotating member of a textile machine, with cleaning air paths established which pierce any curtains established by the rotation of the machine components.

It is, accordingly, among the primary objects of this invention to provide improved pneumatic cleaning means for removing lint, fly, and other foreign matter from rapidly rotating members such as flyers on textile machinery, such as roving frames.

Another object of the invention is to provide improved pneumatic cleaning means for use in conjunction with rapidly rotating members such as flyers on roving frames in which the curtain of air produced by the rotation of the member does not interfere with the cleaning operation.

These and other objects of the invention, which will become hereafter apparent, are achieved by providing a roving frame with a hood-like enclosure or casing extending along the machine and covering the spindles, flyers and spindle rail within a first chamber here referred to as a flyer chamber. A suction duct is arranged in communication with said flyer chamber, with appropriate discharge orifices between the chamber and the suction duct so as to permit the passage of air from the chamber to the duct. Scavenging air inlet openings are provided in the flyer chamber on the side thereof, remote from its connection to the suction duct, with said scavenging openings being arranged to provide the shortest direct line between a scavenging air inlet opening and a discharge orifice which passes through the flyer zone, with the discharge openings being lower than the scavenging air inlet openings.

An additional chamber enclosing the drafting zone of the yarn fed to the flyer zone is provided to clean the yarn and the top of the flyer chamber.

A feature of the invention resides in the fact that by arranging the scavenging air opening above the level of the discharge orifice from the chamber, it becomes possible to provide a cleaning air stream which passes through the flyer zone, in an effective cleaning fashion without substantial interference by the air curtain produced by the rotation of the flyer.

Another feature resides in the shaping of the flyers into a fan shape to minimize the air curtain normally provided.

Brief description of the drawing

The specific details of the invention, and their mode of functioning will be particularly pointed out in clear, concise and exact terms in conjunction with the accompanying drawings wherein:

FIG. 1 is a schematic cross sectional elevational view through the flyer zone and drafting zone of a roving frame made in accordance with the teachings of this invention;

FIG. 2 is an enlarged detail plan view of the upper surface of the flyer zone chamber enclosure shown in FIG. 1;

FIG. 3 is a cross sectional view taken on line III—III through a flyer, as shown in FIG. 1;

FIG. 4 illustrates another embodiment of the inventive concept similar to that of FIG. 1, but provided with an auxiliary blower at the bottom of the chambers surrounding the flyer zone;

FIG. 5 is a front elevational view of the apparatus shown in FIG. 4.

Description of the preferred embodiments

Referring now more particularly to the drawings, like numerals in the various figures will be employed to designate like parts.

In the embodiment of the invention illustrated in FIGS.

1–3, as seen in FIG. 1, the roving frame **10** is shown as provided with drafting rolls **11** between which the yarn end or roving **12** is drawn in its passage to the flyers **13** via flyer heads **14** in conventional fashion. As will be understood by those skilled in the art, the flyer arms **15** having pressure fingers **16**, act to wind the roving onto the bobbins **17**.

Casing **18** encloses the conventional spindle rail supporting spindles **19**, on which the bobibns are mounted for rotation. The casing **18** moves with the spindle rail from the solid line position shown at **18** to the dotted line position shown at **18***a* in conventional fashion.

In accordance with the teachings of this invention, the flyer zone is enclosed in a box-like chamber or enclosure having a vertically slidable front wall portion **20** which is preferably formed of a transparent material. Plexiglas is found particularly suitable for forming the movable front wall **20**. Slidable front wall **20** is mounted for sliding with respect to a stationary lower front wall portion **21** in slideway **22**.

The rear wall of the flyer zone enclosure or chamber is formed by a wall **23** which in the illustrated embodiment serves as the front wall of a suction duct **24**, seen to the left in FIG. 1.

The bottom wall of the flyer zone enclosure is formed by spindle rail casing **18** which is provided with sealing lips **25** to effect a relatively airtight seal at the bottom of the flyer zone enclosure.

The top wall **26** of the flyer zone enclosure, as shown in partial plan view in FIG. 2 rests on the upper edge of rear wall **23** and the upper edge of movable part **20** of the front wall. This top wall **26** is formed with rounded openings **27** dimensioned to accommodate the flyer heads **14**, and tapered slots **28** extend from these openings **27** to accommodate the passage of the roving **12** to the flyer head. This top wall **26** serves to separate the drafting zone from the flyer zone, and is formed integrally with a top cover plate **29** which serves to enclose the drafting zone. Top cover plate **29** is formed with an inspection window **30** and is pivotally secured at **31** to the frame of the roving frame. It is thus seen that the combination of wall **26** with plate **29** defines a second chamber enclosing the drafting zone of the machine. Handle **32** on the cover **30** provides a manual grip to implement movement of the walls **29** and **26** (which in the FIG. 1 embodiment are formed integrally) to a position exposing the drafting zone and flyer zone when necessary. It is preferred to provide a suitable mechanical or hydraulic linkage between the cover **29** and the support for the movable wall **20** such that upon raising the cover **29**, the movable wall **20** will be moved down.

Discharge orifice **33** in the flyer chamber is formed in rear wall **23** between the flyer chamber and suction duct **24**, and a scavenging air intake **34** is formed in front wall **20** of the flyer chamber to admit scavenging air to the flyer chamber. As best seen from FIG. 1, discharge orifice **33** is arranged at a point between the uppermost position of the spindle rail and the lower end of the flyer arms **15**. These discharge orifices **33** may be formed as a plurality of spaced openings, or as a continuous slot. As will be understood by those skilled in the art, though the suction manifold **24** is shown as immediately adjacent and defined by the rear wall **23** of the flyer chamber, the suction duct **24** may be formed as a separate duct with appropriate manifolds between the suction duct **24** and the flyer chamber discharge orifices **33**. The scavenging air intake openings **34** are arranged approximately on a level with the flyer heads **14**, with said openings formed either as a plurality of spaced openings, or as a continuous slot. This opening **34** may be provided by arranging the movable front wall portion **20** in a partially closed position so as to leave an opening between the top of wall **20** and upper flying chamber wall **26**.

In forming the openings in the flyer casing, the scavenging air intake oepnings **34** are preferably positioned at the upper end of the casing, while the discharge openings **33** are positioned at the lower end of the casing in a fashion such that the air flowing into the scavenging air intake opening **34** moves through the chamber in a downward diagonal direction, and by adjusting the speed of the flyers, and the air pressure at the chamber outlet **33**, it is found possible to pierce the air curtain set up by the rotation of the flyers. The air stream moves through the chamber in a downward direction as does the roving so as not to interfere with the spinning process.

A second pneumatic system is provided as a supplement to the aforedescribed flyer chamber system. The second pneumatic system lies above the top wall **26** of the flyer chamber and serves to avoid the deposit of foreign matter on the top wall **26**, and to control the passage of air through the openings **27** and **28** into the flyer chamber. In the illustrated embodiment, this second pneumatic system is provided in a chamber enclosing the drafting zone of the roving frame. Air flow into this drafting zone chamber is provided by intake orifices **35** formed in the cover wall **29** of the drafting zone chamber. Intake orifices **35** may be formed of a plurality of spaced openings, or as a continuous slot. This scavenging air taken in via openings **35**, is passed through the drafting chamber and discharged through discharge opening **36** into the suction duct **24** to entrain any foreign matter in the drafting zone. The scavenging air intake opening **35** into the drafting zone chamber sets up air flow over the guide plate **37** (beneath drafting rolls **11**) into the discharge orifice **36** which is below the drafting rolls **11** and acts to conduct any fly produced at the drafting rolls and possibly stripped therefrom into the suction duct **24**.

In order to prevent the accumulations of foreign matter at the flyer heads, particularly at the transition between the heads **14** and the flyer arms **15**, the flyer arms **15**, as best seen in FIG. 3, are formed as fan blades by bevelling flyer arm as at **38** in a direction facing the direction of rotation.

According to the embodiment of the invention illustrated in FIGS. 4 and 5, a construction is provided to implement the control of air flow into the flyer chamber.

This is accomplished by forming a spindle rail plenum **41** having a blower opening **42**, which opening may be formed of a variety of shapes, but is preferably developed as a longitudinal slot. The lower end of plenum **41** is connected to a flexible hose **43** connected to an appropriate blower (not shown).

Instead of the single suction duct **24** of the FIG. 1 embodiment, flyer chamber discharge orifice **33***a* and drafting chamber discharge orifice **36***a* are connected to independent suction ducts **44** and **45** respectively, which makes it possible to maintain different vacuums in the two chambers. It is preferred that the vacuum in duct **44** be at a lower pressure than that in duct **45**.

In order to keep the flyer heads free of dirt, tubular scavenging air ducts **46** and **47**, as best seen in FIG. 5, are arranged adjacent the upper wall **29***a* of the flyer chamber. These ducts **46** and **47** are connected to the openings **49** and in the cover **29**, as best seen in FIG. 4 and terminate in the vicinity of the corresponding flyer heads to bring clean air conditioned air from the ambient surroundings directly to each flyer head in response to the pressure differential between opening **36***a* and opening **49**.

As best seen in FIG. 4, plenum **41** is connected to rail casing **48** to slide therewith.

In FIG. 5, it is shown how the casing parts which are to be opened for inspection and maintenance, can be subdivided in sections along the machine. Section **50** shows the casing in closed position and section **51** in open position. In addition, scavenging air intake openings **52** are provided to make it possible to keep the parts of the flyer chamber top wall **26** clear of foreign matter.

The suction ducts **24**, **44**, and **45** extend along the textile machine and are preferably connected on the suction

side with one or more air handling and material separating devices. Where a separate filter box-blower is used for each machine, it is preferably arranged at the center of the machine so that the manifold length need be only half the length of the machine, thus implementing the handling of air. Instead of forming the upper flyer chamber wall **26** integrally with cover **29**, it is also possible to form these covers separately and to connect the cover **26** at its rear edge by a hinge to rear wall **23**.

Operation

In use, the aforedescribed equipment is employed by actuating the appropriate fans to establish air flow through the various ducts and plenums described.

In the flyers zone, scavening air is drawn into scavenging air intake opening **34** from which it moves in a downward diagonal direction through the flyer chamber out through discharge opening **33** into suction duct **24** in the FIG. 1 embodiment (or suction duct **44** in the FIG. 4 embodiment). Additional air is drawn in through openings **27** and **28** into the flyer chamber, as a result of which a stream of air extending generally downwardly and in a direction towards the discharge opening **33** is provided which air stream is positively superimposed on the air curtain produced by the rotating flyers. This super imposed stream of air extends substantially in the same direction as the roving so that the spinning process is not impaired. Any fly, or other foreign material, is entrained and carried to the discharge opening **33**, or it is passed into the suction duct **24** for removal.

The ambient air from the mill atmosphere is thus continuously fed to the flyer zone, this air being preferably precleaned by the conventionally employed air conditioning system and brought to desired temperature and humidity levels. It has been empirically determined that the passage of the scavenging air through the flyer zone in a direction substantially parallel to that of the movement of the roving results in substantial piercing of the air curtain set up by the rotating flyers, a result which was not heretofore obtainable since previous air cleaning systems directed the air stream perpendicular to the axis of the flyers, and the air curtain established by the flyers substantially minimized the cleaning effects.

The additional supplementary cleaning provided in the drafting zone by means of the drafting zone chamber above the flyer chamber, also as will be apparent to those skilled in the art, results in a substantial improvement in quality of the produced yarn.

The above disclosure has been given by way of illustration and elucidation, and not by way of limitation, and it is desired to protect all embodiments of the herein disclosed inventive concept within the scope of the appended claims.

What is claimed is:

1. In textile machinery having flyers, a pneumatic cleaner comprising an enclosure surrounding the flyers, said enclosure having scavenging air intake openings, and air discharge openings, said intake and discharge openings being provided on different walls of said enclosure along a line extending through the flyer zone, said discharge openings being in a plane beneath that of said intake openings.

2. A pneumatic cleaner, as in claim **1**, having a blower plenum arranged beneath the flyer enclosure with an opening between the blower plenum and the flyer enclosure through which air is directed in a direction parallel to the bottom wall of said flyer enclosure.

3. A pneumatic cleaner, as in claim **1**, in which the cleaner is applied to a roving frame having a drafting zone and flyer zone; an enclosure around said drafting zone separated from said flyer zone enclosure.

4. A pneumatic cleaner, as in claim **3**, having a top wall provided with V shaped openings above the flyers.

5. A pneumatic cleaner, as in claim **1**, having air ducts extending from a scavenging air inlet to a point adjacent the flyer heads.

6. A pneumatic cleaner, as in claim **1**, in which the flyer is formed with fan shaped blade arms.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,412,545

November 26, 19

Emil Oscar Lippuner

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 to the printed specification, after line 7, insert -- Claims priority application Switzerland, June 6, 1966 8136/66 --.

Signed and sealed this 17th day of March 1970.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents