A ringless fiber spinning machine with spinning units including spinning chambers and adjacent separating devices preceding them. The inlet of the air distribution chamber for the necessary air is arranged on the spinning units and is connected with at least two of the zones of the spinning chamber which take the technological air. The distributing chamber of the such air has a case and a cover of the body of the separating device which enclose the recess in which are located the zones that get technological air. The cover is provided with holes connecting the distributing chamber with at least two of the said zones. A filter is preferably inserted into the inlet of the distributing chamber.
RINGLESS SPINNING MACHINE

This application is related to the following applications of Doublesky et al. and assigned to the same assignee:

a. Ser. No. 236,758, filed Mar. 21, 1972, and entitled METHOD OF AND APPARATUS FOR REMOVING IMPURITIES RELEASED FROM STAPLE FIBERS

b. Ser. No. 237,003, filed Mar. 22, 1972, and entitled METHOD OF AND APPARATUS FOR SEPARATING IMPURITIES FROM FIBERS DURING CLEANING OF THE FIBERS

The invention relates to a ringless spinning machine with spinning units including spinning chambers and adjacent separating units preceding them.

The technological process of spinning on a ringless spinning machine is based upon a combined pneumatic and mechanical principle. The spinning unit of a ringless spinning machine comprises a separating device through which the necessary or required air, sometimes called "technological air" streams into the yarn-creating apparatus of the spinning chamber, the air stream being induced either by overpressure at the side of the separating device, or by underpressure within the spinning chamber, the source of these pressure parameters being either the spinning chamber or the combing-out roller; an external source can be applied for this purpose as well. It follows from the foregoing that the spinning chamber should also be designed in an appropriate way from the viewpoint of air conduits and pneumatic conditions. This applies to practically all systems of ringless spinning.

Suggestions have been made for dividing the supply of air into some function elements with the aim of improving the operation of the spinning unit, i.e. by providing separate air feeds to certain places. From the viewpoint of the design arrangement of the spinning unit of a ringless spinning machine, it is advisable to bring the necessary air, e.g., to the feeding roller, to the pressure table, into the spinning chamber, usually through the outlet channel to the combing-out roller, further to the cleaning zone and to the zone where the silver enters the separating device.

With respect to the fact that such air is usually brought to the above places from the spinning room wherein the ringless spinning machines are installed, it is necessary to provide all these air inlets with suitable effective filters preventing dirt and dirty fibers floating about in the spinning room from being sucked in.

With the purpose of obtaining maximum effectiveness, these filters are designed in different ways, especially taking into consideration the design aspects relating to the individual function elements. In consequence of that, the spinning unit tends to become exceedingly complicated from the viewpoint of design and liable to failures, while the control and maintenance requirements increase.

A further suggestion tries to do away with the above drawbacks in employing a so-called box filter inserted only into the air intake of the outlet channel leading from the combing-out roller into the spinning chamber and joined by means of the said air intake with the atmosphere of the spinning room. Basically, that suggestion does not offer anything besides an increased filtering surface, the effect of which can be observed only after obligatory cleaning of the apparatus including the filters; the problem of feeding air to more places, however, has not been attacked at all. Another disadvantage of the mentioned solution is caused by the lateral accommodation of the filter at the spinning units, as a result of which dust, impurities and dirty fibers come flying to the said filter when the spinning chamber of the adjacent spinning unit is being cleaned. Some of these dust and dirt particles get into the spinning chamber in spite of that filter and are spun into the yarn, thus contaminating it. Fly fibers stick to the filter due to the pressure of the sucked-in air and their amount is gradually increased by new fibers sucked during the operation from the surrounding atmosphere. This variable layer of fibers changes the volume of intake air while, at the same time, trapping the dust of the spinning room. Any handling at the neighboring spinning place or removing the layer of fibers from the filter during the spinning process results in the releasing of trapped dirt and impurities into the spinning chamber, thus contaminating the yarn.

A further cause of soiling the yarn or even of causing it to break results from the fact that the layer of fibers at the filter can be dragged to the feed sliver during some handling of the spinning unit and gets through the entire technological process down to the yarn.

It is an object of the present invention to do away with all the above-described undesirable features of a ringless spinning machine with spinning units including spinning chambers with adjacent separating devices preceding them.

In the apparatus of the present invention the inlet end of a distribution chamber is arranged on the spinning units for distributing the necessary air, said inlet end being connected with at least two of the zones of the spinning chamber which take such air.

From the standpoint of design, a preferable construction is one in which the chamber for distributing the necessary air is made up of a case and a cover of the body of the separating device for closing the recess in which there are located the zones that get such air, the cover being provided with holes connecting the distributing chamber with at least two of the said zones, there being a filter inserted into the inlet of the distributing chamber. Each of the zones taking the air from the distributing chamber may be connected with it through at least one hole.

Another feature is that the zones taking the required air are the following: inlet condenser, the pressure table, the feeding roller, the combing-out roller, the cleaning chamber and the outlet channel, the inlet of the distributing chamber may be joined to an air conditioning apparatus or the inlet of the distributing chamber may be connected to the atmosphere of the spinning room.

In a preferred embodiment according to the present invention with a cleaning device and with a sucking or a blowing nozzle moving along the apparatus the inlets of the distributing chambers of the spinning units are arranged at least in one row or in plurality of parallel rows in a machine and lie in each row at one level within the reach of the cleaning nozzle of the cleaning device.

From the viewpoint of maintenance and control, an embodiment is preferred in which the inlet is followed by a forechamber with an inlet filter, there are an outlet filter leading to the distributing chamber, and a removable bottom serving to catch and to remove the impuri-
ties, while the bottom is arranged under the inlet filter and the plane of the inlet filter is disposed at a right angle or an obtuse angle with the plane of the outlet filter.

Another feature of the invention is that the place taking the required air is directly connected with the distributing chamber at the one side through the hole in the cover, and at the other side by the hole in the cover and with the channel linked to it, while the channel is formed either directly in the body of the separating device or is formed by a narrow tube.

The foregoing and other features of the apparatus according to the invention will be more fully explained in the following detailed description read with the accompanying drawings in which:

FIG. 1 is a view in section through the separating unit and the spinning chamber;

FIG. 2 is a view in perspective of the spinning unit the air distributing chamber of which is connected with an air conditioning apparatus;

FIG. 3 is a view in perspective of a spinning unit the air distributing chambers of which are connected with the atmosphere of the spinning room and the filters of which are cleaned by a cleaning apparatus moving along the machine;

FIG. 4 is a view in section of the distributing chamber and a part of the body of the separating device;

FIG. 5 is a view in section of the distributing chamber and the forechamber;

FIG. 6 is a view in section of the distributing chamber and a part of the body of the separating device according to a further embodiment of the invention; and

FIG. 7 is a view in elevation of the cover with holes connecting the distributing chamber with zones or places to which technological air is fed.

The spinning unit substantially consists of a separating device working upon the principle of combing-out fibers from a fibrous configuration - a sliver - and of a yarn-creating apparatus wherein the parallel straightened fibers are twisted to yarn.

Turning now to the drawings, the separating device is formed by a body 1 with different working elements arranged in suitably shaped recesses of the said body 1. In an approximately circular recess 11 the combing-out roller 111 with combing-out tips or needles 112 at its circumference is rotatably accommodated in body 1 and driven by a conventional central drive (not shown).

The circular recess 11 overlaps the inlet recess 12 wherein the feeding elements serving to get the sliver 2 into the separating device are accommodated. The feeding elements usually consist of a feeding roller 121, pivotally mounted in the body 1 and driven by a not illustrated drive, a pressure table 122, resiliently pressing the sliver 2 against the feeding roller 121, and an inlet condenser 123.

Approximately at the side opposite the inlet recess 12 the circular recess 11 overlaps another recess, this one being the outlet channel 13.

In the section between the inlet recess 12 and the outlet channel 13, in the direction of rotation of the combing-out roller 111, there is disposed a cleaning recess 14 accommodating the cleaning chamber 141 for removing the impurities in the sliver 2.

The inlet end of the outlet channel 13 is widened, while the other end that narrows down and passes through the lateral cylindrical wall of the projection 15 the center of which is provided with the outlet hole 151 serving to exhaust the yarn 21.

A yarn-creating apparatus is swingably attached to the body 1 of the separating device (see FIG. 2). Apparatus 3 comprises a spinning chamber 33 attached to a shaft 31 driven by a pulley 32 and rotatably supported by means of bearings 311 in the housing 33 surrounding the spinning chamber 3.

This spinning chamber 3 is provided with ventilation openings 34 for creating the necessary underpressure during its rotation; these ventilation openings 34 open into the collecting area provided between the spinning chamber 3 and the housing 33. The opening 330 serves to exhaust air from the collecting area.

During the process of spinning, the spinning chamber 3 is oriented towards the body 1 of the spinning device so as to allow the projection 15 to project partially into its cavity and the outlet channel 13 to be directed to its inner, conically widening wall, the so-called slip wall 35. The pulley 32 in its working position (see FIG. 2) engages the driving belt 320.

The yarn-creating apparatus comprising the above-described elements is tiltable around the pin 36 with respect to the separating device, while the separating device supporting the yarn-creating apparatus is tiltable around the shaft 16 of the machine.

The recesses 11, 12, 13, and 14 in the body 1 are closed by cover 41 over which the case 42 is arranged, thus creating an air distributing chamber 4, the function of such air will be described later.

The case 42 is provided with an air inlet 421; a filter 423 is advantageously inserted into the said air inlet 421.

This inlet 421 is either connected with the atmosphere of the spinning room wherein the spinning machines are installed, or with an air conditioning system through a tube 314.

The intake condenser 123, the pressure table 122, the feeding roller 121, the combing-out roller 111, the cleaning chamber 141 and the outlet channel 13 - all these are places receiving air during the process of spinning.

Preferably at least two of these places are connected with the distributing chamber 4. In the described embodiments, all of such mentioned places are joined to said distributing chamber 4. By connecting or joining there is meant the creation of air ducts between the distributing chamber 4 and the said places or cavities wherein the said places are located. The outlet channel 13 is connected with the distributing chamber 4 through the hole 411 in the cover 41; the cleaning chamber 141 is connected to chamber 4 through holes 412, 413; the circular recess 11 is connected from the one side with the distributing chamber 4 directly by the hole 414 in the cover 41 and from the other side by the hole 415 in the cover 41 and the adjoining channel 17 in body 1. In the embodiment shown in FIG. 6 the channel 17 is formed by a small tube 170.

The inlet recess 12 is thus connected with the distributing chamber 4 for the feeding roller 121 through the hole 416; the pressure table 122 is connected through the hole 417; the intake condenser 123 is connected through the hole 418.

In the embodiment shown in FIG. 5 the inlet 421 is followed by the forechamber 43 with the inlet filter 430 and the outlet filter 431 which opens into the distributing chamber 4 and is provided with a removable bot-
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tom 432 for trapping and removing impurities. The bot-
tom 432 is arranged underneath the inlet filter 430, the
plane of this inlet filter 430 forming a right or an obtuse
angle with the plane of the outlet filter 431, which pre-
vents impurities from passing through both filters.

In order to allow easy cleaning of the filters 423 of
the inlets 421 of the distributing chambers 4 - and anal-
ogous the filters 430 in the embodiment according to
FIG. 5 - by means of a known cleaning equipment 5
with a sucking or possibly a blowing nozzle 51 moving
along the machine, the inlets 421 of the distributing
chambers 4 of spinning units are arranged on the ma-
chine in rows; the inlets in each row lie in one plane
within the reach of the nozzle 51 of the cleaning equip-
ment.

The described devices operate in the following way.

The sliver 2 passes through the intake condenser 123
under the effect of feeding roller 121 delivering it to
the rotating combing-out roller 111. The combing-out
tips 112 comb fibers out of the sliver 2, i.e. they sepa-
rate them and delivering them to the outlet channel 13.
During this transport, the impurities in the sliver are
shot into the cleaning chamber 141.

In the outlet channel 13 the said fibers are delivered
into the spinning chamber 3 onto its slip surface 35,
whereupon they slide to the place of the greatest diam-
erter of the spinning chamber 3 where they deposit to
form a ribbon shaped configuration. This ribbon is
them twisted in a known way to from the yarn 21 which
is continually exhausted from the spinning chamber
through the outlet hole 151 and taken up on a bobbin
(not shown).

The air streaming through the inlet channel 13 into
the spinning chamber 3, creating underpressure, is fed
from the distributing chamber 4 through the respective
holes that have already been described, or through
channels, to the individual places of the separating de-
vice, i.e. to the intake condenser 123, to the pressure
table 122, to the feeding roller 121, to the combing-out
roller 111, the cleaning chamber 141, and to the outlet
channel 13.

A considerable improvement can be obtained by dis-
tributing the air from the distributing chamber 4 to at
least two of the said places, e.g. into the outlet channel
13 and to the combing-out roller 111.

The arrangement of the distributing chamber 4 and of
the filter 423 offers substantial advantages for the oper-
ator - for maintenance and control, allowing cleaning
equipment 5 to be applied which moves along the
machines in a spinning mill and removes by blowing or
by sucking the impurities, fibers etc., deposited in the
course of time on the filters 423.

This problem is altogether eliminated in the embed-
dment according to FIG. 2, wherein the inlet 421 of the
distributing chamber 4 is joined to the tube 314 leading
directly to an air conditioning equipment.

In the embodiment according to FIG. 5, which is pro-
vided with a forechamber, the inlet filter 430 is some-
what more coarse and is arranged, as opposed to the
inlet filter 431, so as to allow the air streaming into the
distributing channel 4 to change its direction, so that
the impurities fall to the removable bottom 432 from
which the operator can remove them very easily from
time to time.

Although the invention is illustrated and described
with reference to a plurality of preferred embodiments
thereof, it is to be expressly understood that it is in no
way limited to the disclosure of such a plurality of pre-
ferred embodiments, but is capable of numerous modifi-
cations within the scope of the appended claims.

What is claimed is:

1. In a ringless spinning machine with spinning units,
including chambers and adjacent separating devices
preceding the spinning units the improvement which
comprises a distribution chamber on the spinning units,
the chamber arranged to distribute air under pressure
to at least two of the places of the spinning chamber
which take said air, the chamber for distributing the air
under pressure comprising a case and a cover for the
body of the separating device enclosing recesses in
which the places that receive said air are located, the
cover being provided with holes connecting the distrib-
uting chamber with at least two of said places, and a fil-
ter disposed in the inlet of the distributing chamber,
each of the places receiving said air from the distribut-
ing chamber being connected with it through at least
one hole, the apparatus having the following places
taking the said air under pressure:

- an inlet condenser, a pressure table, a feeding roller,
a combing-out roller, a cleaning chamber, and an
outlet channel.

2. Apparatus according to claim 1, wherein the inlet
of the distributing chamber is connected to an air con-
ditioning apparatus.

3. Apparatus according to claim 1, wherein the inlet
of the distributing chamber is connected to the atmo-
sphere of the spinning room.

4. Apparatus according to claim 1, comprising a
cleaning device with a nozzle creating an air pressure
difference moving along the apparatus, and wherein
the inlets of the distributing chambers of the spinning
units are arranged in at least one parallel row in a ma-
chine and lie in each row at one level within the reach
of the cleaning nozzle of the cleaning device.

5. Apparatus according to claim 1, wherein the inlet
is followed by a forechamber with an inlet filter and
comprising an outlet filter leading to the distributing
chamber and a removable bottom serving to catch and
to remove the impurities.

6. Apparatus according to claim 5, wherein the bot-
tom is arranged under the inlet filter, and the plane of
the inlet filter makes an angle up to 90° with the plane
of the outlet filter.

7. Apparatus according to claim 1, wherein the place
at the combing-out roller receiving the said air is di-
rectly connected with the distributing chamber at one
side through a hole in the cover, and at the other side
by another hole in the cover and a channel connected
said other hole.

8. Apparatus according to claim 7, wherein the said
channel is formed directly in the body of the separating
device.

9. Apparatus according to claim 7, wherein the chan-
nel is formed by a narrow tube.

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