

Suction duct for textile machines

(12)

The invention relates to a suction duct for textile machines, particularly for a bale opener, comprising a stationary connecting opening and a mobile connecting opening which is arranged in one longitudinal side of the suction duct and is part of an elongated slot which can be closed by a flexible cover band, one end of which is secured in a stationary manner.

It is known to use a suction duct having a stationary connecting opening for connection to an air conveying device and a mobile connecting opening at its upper side in order to suck up fibrous material, in which the mobile connecting opening, through which the fibrous material is fed into the suction duct, is part of a continuous elongated slot (DE-05 29 44 889).

The elongated slot, and thus the interior of this suction duct, which is provided in particular for a bale opener, is sealed against the outside air by a flexible cover band, the two ends of which are secured to the ends of the suction duct. The cover band is guided by means of guide rollers such that it leaves the mobile connecting opening free in the form of an interspace over a section of the elongated slot and is disposed in the form of two superposed layers on either side of this interspace, the upper layer being formed so as to be mobile. This

13

arrangement is intended to permit the interspace to move with a low expenditure of force.

However, as a result of the relative movement between the upper run of the cover band and the lower run, which closes the elongated slot, this arrangement leads to increased wear of the belt. A further disadvantage lies in the high expenditure on material, resulting in particular from the considerable length of the cover band, the numerous guide and bearing rollers for the band and the necessary numerous seals in the region of the band deflections, as well as the increased space requirement, which is necessary for stretching the long cover band. Furthermore, the band guide which is provided only permits a lateral connection of a feed tube, which leads to a suction device, at one end of the suction duct and impedes access to the suction duct for maintenance work.

These disadvantages are also found in another known suction duct, which is formed in the same manner as the above-mentioned one and is used to supply suction air to a cleaning or maintenance device, for example a knotter, which can move along a textile machine, at the individual working stations of the machine (British Patent 1 385 618).

The object of the present invention is to eliminate the above-mentioned disadvantages and to provide a suction duct which can be reliably sealed against the outside air in a simple and space-saving manner by means of a cover band, without the occurrence of relative movements, and which can receive at one end and in any direction a connection to an air conveying device.

This object is solved according to the invention in a suction duct of the above-mentioned type in that the other end of the cover band is secured to a winding-on roller, for winding the band thereon, which is mounted on a carriage which can be moved along the suction duct.

Owing to the fact that the cover band consists of spring band steel, it has such a great transverse rigidity that it resists bending due to the underpressure in the suction duct. Reinforcement ribs are therefore unnecessary. The drive for the winding-on roller is derived from the drive for the carriage in a manner which further simplifies the device. In order to adapt the drive speed of the winding-on roller to its peripheral speed, which alters with the winding diameter, the winding-on roller is driven by way of a slipping clutch. Owing to the fact that the slipping clutch is provided with a free-wheel, it can take up the braking action

(15)

of the winding-on roller when the cover band is drawn off the latter. In a preferred embodiment the suction duct is closed on the side opposite the stationary connecting opening by a cover which can move with the carriage. The part of the suction duct which is not required at a particular time thus remains open and is accessible at all times for inspection and cleaning.

The suction duct advantageously has a tubular shape. For improved sealing of the suction duct, the bearing surfaces for the cover band which are adjacent the elongated slot are provided with sealing strips. A reliable seal in the region between a connection piece leading into the mobile connecting opening and the winding-on roller is obtained in that the elongated slot is closed in this region by a cover which bears a seal resting against the cover band. In order to prevent air-borne fibres on the cover band from reaching the winding-on roller and accumulating between the wound layers, a brush is associated with the cover band as a cleaning device. When using the suction duct with a bale opener having a take-off device moving in the vertical direction, a pipe line, leading from the mobile connecting opening to the bale opener, is provided to convey the fibres. This pipe line is flexible, so that it can follow the vertical movement of the take-off device. In order that the interior of the suction duct may also be accessible in the region of the secured end of the cover band,

the suction duct is closed by a flap in the vicinity of the end of the cover band which is secured in a stationary manner. In a further embodiment a second winding-on roller for a second cover band is associated with the winding-on roller and arranged at a spacing therefrom, the stationary end of which second cover band is secured to the end of the suction duct which is remote from the stationary connecting opening.

Further details and advantages of the invention are illustrated in the following with reference to the drawings, in which

Figure 1 is a cross-sectional view of a suction duct associated with a mobile bale opener;

Figure 2 is an enlarged view of the suction duct according to figure 1;

Figure 3 is a side view of the suction duct according to figure 1;

Figure 4 is a plan view of the suction duct according to figure 3;

Figure 5 is a side view of a suction duct with two winding-on rollers;

17
Figure 6 shows a suction duct with which a mobile maintenance device on a textile machine is associated.

The suction duct 1 shown in figure 1 is used to suck up fibrous material which a bale opener 2 draws by means of a needled taking-off roller from fibre bales

F, which are arranged in a row one behind the other. The suction duct is designed particularly for this purpose. The taking-off roller 20 of the bale opener is mounted so as to be movable in the vertical direction on a carriage 21, which can be moved along the row of bales.

The suction duct 1 has a tubular shape and comprises a stationary connecting opening 11 at one end (figures 3, 4). A mobile connecting opening 10', which is part of a continuous elongated slot 10, is provided at one longitudinal side of the suction duct 1, at the upper side in the embodiment (figures 2, 4). A connection piece 3 for a pipe line 30 leads into the mobile connecting opening 10', the other end of which pipe line 30 is arranged above the taking-off roller 20 and in the vicinity thereof (figure 1). The fibrous material taken from the bales F by the taking-off roller 20 is conveyed through the pipe line 30 into the suction duct 1. The connection piece 3 is secured to the carriage 21 and thus follows the movement of the latter. In order to permit the pipe line 30, which is secured to the connection piece 3, to follow the vertical

movement of the taking-off roller 20, it consists of a flexible material. At its stationary connecting opening 11 the suction duct 1 is connected by means of a pipe 12 to the suction side of an air conveying device (not shown) and is closed on the side opposite the stationary connecting opening 11 by a cover 13. The cover 13 is secured to the connection piece 3, so that it is displaceable with the latter in the direction of the elongated slot 10 in the suction duct 1 (figure 3). A sealing ring of a flexible material is advantageously provided at the circumference of the cover 13, which is adapted to the cross-section of the suction duct 1. This sealing ring rests tightly against the inner wall of the suction duct 1. The cover 13 can also be formed in the manner of a piston for this purpose.

The elongated slot 10 is closed by a cover band 4, which seals the interior of the suction duct against the outside air, along the path between the connection piece 3 and the stationary connecting opening 11. In order to improve the seal even further, the cover band 4 is disposed on sealing strips 40, which are arranged on bearing surfaces 14 of the suction duct 1 (figure 2). The bearing surfaces are defined by vertical rims 14', between which the cover band 4 is guided. A thin spring steel band, for example only 0.4 mm thick, is preferably used as the cover band 4, the smoothly polished surface of which offers little resistance to air and does not

tend to become dirty. In spite of the fact that it is not very thick, a cover band of this type is so rigid in the transverse direction that no bending occurs as a result of the underpressure in the suction duct.

5 One end of the cover band is secured in the vicinity of the stationary connecting opening 11 of the suction duct 1 and the other end is secured to a winding-on roller 5, which is mounted in a rotatable manner in a holder 22, carried by the carriage 21, and in a pivotable
10 manner about a horizontal shaft 23 in the vicinity of the connection piece 3. A brush 41 is also secured to the shaft 23 (figure 3), the bristles of which brush contact the surface of the cover band 4. The region between the connection piece 3 and the winding-on roller 5 is closed
15 by a cover 15, for example a smooth sheet bearing sealing strips 16, which rest against the winding-on roller 5 or the cover band 4 disposed thereon, and lateral seals resting against the wall of the duct. The drive for the winding-on roller 5 required for winding up the cover band
20 4 is derived from the drive for the carriage 21. For this purpose a chain 6 is tensioned along the suction duct 1, the ends of which chain are secured to the ends of the suction duct 1 (figure 4). A chain wheel 60, which is mounted at the holder 22 and caused to rotate by the travelling
25 motion of the carriage 21, engages in the chain 6. The rotation of the chain wheel 6 is transmitted to the

20

winding-on roller 5 by way of two chain drives 61 and 62 and a slipping clutch 63.

5 The slipping clutch 63 enables the driving speed, which is adapted to the smallest winding diameter, of the winding-on roller 5 to be adapted to the peripheral speed, which alters as the winding diameter increases. In connection with a free-wheel, the slipping clutch can take up the braking action of the winding-on roller 5 when the cover band is drawn off the latter, so that the
10 amount of cover band which is unwound always corresponds to the path of travel of the carriage 21. In this embodiment only a cover band which is slightly longer than the elongated slot 12 is required to cover the latter.

15 During continuous operation the bale opener 2 travels along the bales F and the suction duct 1, the fibrous material removed from the bales by the taking-off roller 20 being passed through the pipe line 30 into the suction duct 1 and sucked up at its stationary connecting opening 11. When the carriage 21 travels towards the
20 stationary connecting opening 11, the cover band 4 closing the elongated slot 10 is wound onto the rotating winding-on roller 5 and, when the said carriage travels in the opposite direction, it is drawn off the winding-on roller 5, which is simultaneously braked. Consequently,

according to the position of the carriage 21, only a greater or smaller section of the suction duct 1 remains closed by the cover band 4 and the cover 13 moving along the elongated slot 10 with the connection piece 3, while the other section of the suction duct 1 which is not required remains freely accessible.

When the carriage is in motion the interior of the suction duct 1 is cleaned by the cover 13, which moves with the said carriage. The cover band 4 is similarly cleaned before the winding-on operation by the sealing strip in contact with its underside and by the brush 41 on its upper side, so that the device as a whole is automatically cleaned. A flap 7 is provided at the end 11 of the suction duct 1 in order to render the interior of the suction duct 1 accessible even when the cover band 4 covers the entire elongated slot 10. This flap 7, which is arranged between the secured end of the cover band 4 and the pipe 12, which establishes the connection to the air conveying device, can, if necessary, be manually opened.

The arrangement of the cover band 4 according to the invention is cost- and space-saving and enables the elongated slot 10 to be covered without any relative movement between the cover band and the suction duct or the sealing strips 40 and permits free access to the suction duct. Furthermore, the suction duct 1 can be connected to the air conveying device as desired, for



example at the side or directly below. However, for reasons relating to flow, the connection in the longitudinal direction of the suction duct according to figures 3 and 4 is preferred, if this is permitted by
5 the space conditions.

In the embodiment according to figure 5 two winding-on rollers 5 and 50 for a respective cover band 4 and 40 are provided, which rollers are arranged on either side of the connection piece 3 leading into the suction duct
10 and thus at a spacing from one another. One end of the second cover band 40 is secured to the end of the suction duct 1 opposite the stationary connecting opening 11 and the other end is secured to the winding-on roller 50. The mounting and the drive of the second winding-
15 on roller 50 correspond to those of the winding-on roller 5, as described with reference to figures 3 and 4. The cover 13, which closes the suction duct 1 at its end opposite the stationary connecting opening 11, is arranged in a stationary manner in this case. This
20 arrangement, in which a cleaning flap can be provided at one or both ends of the suction duct 1, also permits the elongated slot to be covered by unwinding the cover band 4 or 40 from the winding-on roller and allows a connection to the air conveying device which is adapted to
25 the space conditions. The embodiment according to figures 1 to 4 is, however, preferred, for reasons relating to

costs and on account of the free accessibility to the suction duct which this provides.

The use of the suction duct is not restricted to sucking up fibrous material. The suction duct may also be associated with a maintenance or cleaning device 8, which requires a suction air stream and can be moved by means of a carriage 80 along the suction duct 1, which is mounted between the end points 9, 90 of a textile machine and is formed from a U-shaped profile (figure 6).

The device may, for example, be connected to the interior of the suction duct 1 by means of a connecting pipe associated with the elongated slot 10.

The cover, which can not be seen and which closes the suction duct 1 on the side opposite the stationary connecting opening 11, is rigidly connected to the carriage 80, with which it can travel. The winding-on roller 5 is mounted in a rotatable manner on the carriage 80 and in a pivotable manner about a horizontal axis. The cover band 4 closes the elongated slot 10 disposed at the upper side of the suction duct 1 between the carriage 80 and the connection 12 to the air conveying device. One end of the cover band 4 is secured to the end of the suction duct 1 having the stationary connecting opening 11 and the other end is secured to the winding-on

24

roller 5. The drive means for the winding-on roller correspond to those shown in figure 4, so an illustration thereof is unnecessary.

The device according to the invention can be modified,
5 for example by disposing the elongated slot 10 to the side of the suction duct 1. The device may then also be used in a suction duct arranged in an arc. Similarly, the mouth of the connection piece 3 opening into the mobile connecting opening 10' can have an oblong cross-
10 section instead of a round one, as a result of which the width of the elongated slot 10 and thus that of the cover band 4 can be reduced.



1. A suction duct for textile machines, particularly for a bale opener, comprising a stationary connecting opening and a mobile connecting opening which is arranged in one longitudinal side of the suction duct
5 and is part of an elongated slot which can be closed by a flexible cover band, one end of which is secured in a stationary manner, characterised in that the other end of the cover band is secured to a winding-on roller, for winding the band thereon, mounted on a carriage
10 which can be moved along the suction duct.
2. A suction duct according to claim 1, characterised in that the cover band is made of spring steel.
3. A suction duct according to claim 1 or claim 2, characterised in that the drive for the winding-on
15 roller is derived from the drive for the carriage.
4. A suction duct according to any of claims 1 to 3, characterised in that the winding-on roller is driven through a slipping clutch.
5. A suction duct according to claim 4, characterised
20 in that the slipping clutch has a free-wheel.



(26)

- 15 -

6. A suction duct according to any of claims 1 to 5, characterised in that the suction duct is closed on the side opposite the stationary connecting opening by a cover which can move with the carriage.

5 7. A suction duct according to any of claims 1 to 6, which is of tubular shape.

8. A suction duct according to any of claims 1 to 7, characterised in that the bearing surfaces for the cover band which are adjacent the elongated slot
10 have sealing strips.

9. A suction duct according to any of claims 1 to 8, characterised in that the elongated slot is closed in the region between a connection piece leading into the mobile connecting opening and the winding-
15 on roller by a cover which bears a seal resting against the cover band.

10. A suction duct according to any of claims 1 to 9, characterised in that a brush is associated with the cover band as a cleaning device.

20 11. A suction duct according to any of claims 1 to 10, characterised in that the suction duct is closed



- 16 -

by a flap in the vicinity of the end of the cover band which is secured in a stationary manner.

12. A suction duct according to any of the preceding claims, characterised in that a second winding-on roller for a second cover band is associated with and spaced from the winding-on roller, the stationary end of this second cover band being secured to the end of the suction duct remote from the stationary connecting opening.
13. A suction duct according to any of claims 1 to 12, characterised in that a pipeline leading from the mobile connecting opening to a bale opener is formed of flexible material.
14. A suction duct for textile machines substantially as hereinbefore described with reference to Figs. 1 to 4, Fig. 5 or Fig. 6 of the accompanying drawings.
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