Method and Apparatus for Removing Dust From Fibre Material

The present invention relates to a method for removing dust from fibre material which is conveyed over a sieve-like surface, whereby it is exposed to a stream of suction air passing through the sieve-like surface, and relates to an apparatus for carrying out this method.

In a taker-in of a carder, it is known to guide the fibre material during its transport over a sieve-like surface surrounding the taker-in roller (German Published Application 1,510,337). Here, this fibre material is exposed to a stream of suction air directed radially outwards while it is kept in the operating area of the taker-in roller. In this way, dust which sits loosely on the outside of the fibre material located in the shaping of the taker-in roller can be removed by suction, but there is a danger that fibre residues, husk particles, etc. remain sitting on the sieve-like surface and block the latter.

In the known removal of dust in the blowing room, too, the fibre material is guided over sieve-like surfaces (German Patent Specification 3,304,571). Since the stream of suction air acts transversely to the direction of fibre transport here, too, there is also a danger here that fibre residues, husk particles, etc. result in blocking of the sieve-like surface.

A proposal has also been disclosed of holding back as a tuft the sliver supplied to an opening cylinder of an open-end spinner while the sliver is guided over a sieve-like surface surrounding the opening cylinder (German Laid-Open Specification 2,648,715). In comparison with cleaning in the area of the taker-in of a carder, this has the advantage that very intensive removal of the dust is achieved, since a supplied sliver is separated

into individual fibres at this location. Since, here, the tuft is still held back, however, the dust located between the fibres is stripped off by the shaping of the rotating opening cylinder. The dust loosened from the fibres in this manner is then removed by the suction air. In this known apparatus, too, there is a danger that fibre residues, dirt particles, etc. remain sitting on the sieve-like surface and thus result in impairment of the dust removal.

It is therefore the object of the present invention to provide a method and an apparatus for removing dust from fibre material, in particular in open-end spinning machines, in which this danger of blocking the sieve-like surface is eliminated or at least considerably reduced.

This object is achieved, in accordance with the invention, in that the stream of suction air to which the fibre material in the area of the sieve-like surface is exposed is guided away from the fibre material at an acute angle in opposition to the direction of fibre transport of the moving fibre material and is guided through the sieve-like surface in the same direction. Because of this orientation of the stream of suction air, of which part of the motion is opposed to the direction of fibre transport, fly, fibre residues, husk particles, burls, etc. are prevented from remaining sitting on the sieve-like surface. As a result of inertia, the fibres and dirt particles rather retain their previous direction of movement along the wall containing the sieve-like surface. Only the microdust particles, which, because of their small mass, have practically no inertia, and which can thus easily perform this change in direction, follow this stream of suction air through the sieve-like surface.

Particularly intensive cleaning is possible if the fibre material is kept in the area of influence of a shaped roller by the sieve-like surface, while the fibre material is exposed to the stream of suction air.

Further intensification of cleaning of the fibre material is achieved if the latter is made parallel before it is exposed to the stream of suction air. In this case, a greater relative movement between the shaping and the fibre material to be cleaned is possible, as a result of which not only the dust which is located on the surface of the fibres anyway or which is loosened from the fibres is removed by suction, but dust is scraped off the fibres carrying them, so that this dust can also be removed by the stream of suction air.

In the case of open-end spinning machines, the fibre material is supplied to the shaped roller constructed as an opening cylinder in the form of a sliver comprising fibres which have been made parallel.

In accordance with a further development of the method according to the invention, the fibre material is still held back in the clamping line of the supply apparatus in the form of a tuft while it is exposed to the stream of suction air. As a result, the stripping action is further intensified, which leads to a thorough cleaning of the fibre material. This is extremely important in the case of open-end spinning, since the fibre cohesion is interrupted during spinning, so that any dirt can result in considerable impairment of the spinning process.

In order to avoid the possibility of light material such as fly, etc. remaining sitting on the sieve-like surface permanently and thus resulting in impairment of the operability of the dust removal apparatus, in accordance with a further feature of the invention provision is made for a jet of air to be briefly directed at the side of the sieve-like surface remote from the path of fibre transport. As a result, these constituents are lifted from the sieve-like surface so that the dust removal apparatus can fulfil its function in a problem-free manner. In this connection, the cleaning

interval for the sieve-like surface can be phased with the work process of the textile machine or apparatus on which the subject of the invention is used such that this work process is not impaired.

According to the invention, to carry out the method the sieve openings of the sieve-like surface are inclined at an acute angle in opposition to the direction of fibre transport. As a result of this, the stream of suction air which acts on the sieve-like surface on its side remote from the path of fibre transport can remove by suction the dust loosened from the fibres without relatively large particles such as dirt or fibres being able to remain sitting in the sieve openings as a result, however.

It has proved advantageous for the sieve openings to be constructed as elongate holes which extend substantially transversely to the direction of fibre transport.

In accordance with an advantageous embodiment of the subject of the invention, the sieve-like surface is arranged in the peripheral area of a shaped roller. In order that the stream of suction air exerts a centering effect on the stream of fibres/air, the sieve openings constructed as elongate holes are advantageously arranged at an angle to the direction of transport such that - seen in the direction of fibre transport - their ends are inclined in the direction of an imaginary centre-periphery line of the shaped roller. The effect of this is also that light fly which is collected by the air streaming through the sieve-like surface is oriented in the direction of these sieve openings constructed as elongate holes and thus passes through these sieve openings. As a result of this, too, the danger of blocking the sieve-like surface is reduced.

In sheet-metal sieves, sieve openings are usually produced by punching. In this manner, however, it is not possible to orient the sieve openings in the desired way

with respect to the direction of movement of the stream of fibres/air. In order that it is still possible to produce a stream of suction air oriented in the desired manner in a simple way, in an advantageous embodiment of the subject of the invention lamellae are formed in the metal by a combined deep draw/punching tool, and these lamellae separate the elongate holes from one another and are inclined in the direction of fibre transport towards the path of fibre transport. Here, to form the elongate holes material must not even be punched out of the metal; rather, the inclined lamella can be formed by making a cut parallel to the desired course of each elongate hole and by a subsequent plastic deformation of the metal in front of this cut - relative to the direction of fibre transport.

In order for it to be possible from time to time to remove fly constituents which might be deposited on the sieve-like surface, in spite of the inventive inclination of the sieve openings, it is advantageous for a blowing air nozzle to be provided which is directed towards the side of the sieve-like surface remote from the path of fibre transport and with which there is associated an apparatus generating a brief jet of compressed air.

The subject of the invention can also be used for measuring the dust content in a fibre material. To this end, in a further embodiment of the apparatus according to the invention, it is provided that a widening dust collection chamber having a plurality of filters of increasing fineness, arranged one after the other, is arranged between the sieve-like surface and the source of suction air. Since the filters or sieves through which the dust-containing air first passes are coarser than the following filters or sieves, the finer fly and dust constituents are allowed to pass through the first sieve or filter and are only captured in the next filter or one

of the next filters, as a result of which varying constituents of the scrap are separated. In order that it is possible for not only different types of dust to be separated but for the precise ratio of the individual dust, dirt and good fibre proportions to be determined, in accordance with the invention there are arranged, in the direction of fibre transport in the wall surrounding the shaped roller, one after the other, the dust removal opening, with which a widening dust collection chamber is associated, a dirt removal opening, with which a dirt collection chamber is associated, and a fibre take-off opening, with which a fibre collection chamber is associated.

The invention makes it possible to remove dust from fibre material in the most varied textile machines, and in this connection prevents the danger of blocking a sieve surface holding back the fibre material against the action of a stream of suction air. As a result, constant conditions with respect to the removal of dust are achieved with preparation machines and carders, etc. even over relatively long periods. In the case of open-end spinning machines, which are very sensitive to the occurrence of dust, by arranging a sieve surface constructed according to the invention in the peripheral wall surrounding the opening cylinder in the area of the fibre material held back by the supply apparatus still in the form of a tuft, not only are blockages of the sieve-like surface prevented but deposits of dust in the collecting groove or on the open edge of the spinning rotor are prevented over long operating periods, as a result of which thread breakages are prevented.

The above description shows that the shaped roller, in whose operating area the sieve-like surface is located, can be constructed in various ways. Depending on the type of machine in which the invention is used, there can be

used as a shaped roller a saw-tooth roller or a needle roller (e.g. in the opening apparatus of an open-end spinning device, or in the taker-in of a carder) or an impeller wheel (e.g. in the spinning preparation).

Further details of the invention are explained in more detail with reference to drawings, in which:

Figure 1 shows an open-end spinner, in section, having the fine-dust removal apparatus constructed in accordance with the invention and having a conventional dirt removal apparatus;

Figure 2 shows a modification, in accordance with the invention, to the sieve-like surface, in section;

Figure 3 shows a plan view of the sieve-like surface according to the invention, from the side facing the shaped roller;

Figure 4 shows a section of a cleaning apparatus constructed according to the invention, of a preparatory spinning machine;

Figure 5 shows, in diagrammatic side view, a carder constructed in accordance with the invention; and

Figure 6 shows a diagram of a dust-measuring apparatus constructed according to the invention.

Figure 1 illustrates the parts of an open-end spinner necessary for understanding the invention. In such a spinner, the sliver 1 to be spun is supplied to an opening cylinder 3 by means of a supply apparatus 2. The supply apparatus 2, which in principle can be constructed in various ways, has in the embodiment shown a supply roller 20 and a feed depression 21 cooperating with the latter. The front end, forming a tuft 10, of the sliver 1 is separated by the opening cylinder 3 into individual fibres 11 and is supplied in this form by means of a fibre feed channel 30 to a spinning element 31. In the exemplary embodiment shown, this is constructed as a spinning rotor, but there can also be used as a spinning element an

electrostatic or pneumatic spinning element, or a spinning element operating by friction or by another way. From the spinning element 31, the fibre material is drawn off in the form of a thread in a known manner (not shown).

The opening cylinder 3 is surrounded by a housing 32 which is provided with a wear-resistant lining 33 which has the openings 330 (for supplying the sliver 1 to the opening cylinder 3) and 331 (for taking off the fibres 11 into the fibre feed channel 30) which are technologically necessary.

Between the supply apparatus 2 and the spinning element 31 there is provided in the housing 32 a dust removal opening 4 which is covered by a sieve-like surface 5. The sieve-like cover 5 is an integral component part of the housing lining 33, against whose side remote from the opening cylinder 3 the feed depression 21 is supported. To this end, in known manner, two compression springs 210 and 211 are associated with the feed depression 21.

The sieve-like surface 5 has sieve openings 50 which are inclined at an acute angle α in opposition to the direction of fibre transport (see arrow 34). As shown by Figure 1, the direction of transport is in each case given by the tangent to the circle defined by the shaped points 35 of the opening cylinder 3 at the vertex of the angle α.

At the feed depression 21, there is provided a tube connection piece 40 connected to the dust removal opening 4, to which tube connection piece 40 there is connected a tubular channel 41. A source 43 of suction air is connected to the channel 41 via a filter 42.

The fibres 11 are separated from the front end of the sliver 1 by the rotating opening cylinder 3 and are guided to the fibre feed channel 30 between the opening cylinder 3 and the inner wall, formed by the lining 33, of the

housing 32, whereby these fibres 11 are held by the lining 33 in the operating area of the shaped points 35 of the opening cylinder 3. From the fibre feed channel 30, the fibres 11 reach the inside of the spinning element 31, for combination into the thread end.

On their way from the feed apparatus 2 to the fibre feed channel 30, the fibres 11 are guided over the sieve-like surface 5 which covers the dust removal opening 4. In the area of this sieve-like surface 5, the individual fibres 11 are exposed to the effect of the whirl of air rotating in the direction of the arrow 34 and to the effect of the stream of air sucked through the sieve openings 50 into the dust removal opening 4. This second stream of air, which, through separation by inertia, separates the dust from the fibre material, and to which the fibre material is exposed in the area of the sieve-like surface 5, is also oriented, because of the inclination of the sieve openings 50 at an acute angle α in opposition to the direction of fibre transport (arrow 34), at this acute angle α to this direction of fibre transport and is carried away from the fibre material in this direction. The individual fibres 11, because of inertia and/or because of the combing effect of the shaped rollers 35, are prevented from following this stream of air oriented at the acute angle α in opposition to the direction of transport. Rather, they continue their path to the fibre feed channel 30. In contrast, the practically inertia-free dust constituents have a high air resistance, because of their small size, and thus have a lower rate of fall. For this reason, they can also remain borne in the gas or air and be transported with the air movement for a relatively long time. Thus, the dust particles follow the change in direction forced by the stream of air and pass through the sieve openings 50 to the filter 42, where they are captured. In order to

guarantee the intensity of the suction over time, the filter 42 is replaced by a new one or cleaned from time to time.

A particularly intensive dust removal is achieved if the dust is removed by suction from the fibre material in the area of the path of fibre transport, in which it is anyway loosened from the fibres 11. This is the case in the separating area, where the fibre material is still held back as a tuft 10 by the feed apparatus 2. When the sliver 1 is separated into individual fibres 11, the mechanical stress of the fibres 11 on the shaped points 35 of the opening cylinder 3, the friction of the fibres 11 against one another and at the guide surface, and the friction of the fibres 11 against the wall of the housing 32 rub and release dust on the surface of the fibres. In accordance with Figure 1, the dust removal opening 4 covered by the sieve-like surface 5 is thus arranged in the area of this tuft 10.

The stream of air which is sucked through the sieve openings 50 also removes by suction light fly which as a rule passes through the sieve openings 50 without difficulty. Nevertheless, it cannot be avoided that some short fibres and some fibre fly remain sitting on the sieve openings 50 over time. In order to prevent impairment of the dust removal, in accordance with Figure 2, a blowing air nozzle 44 is provided in the feed depression 21, and is directed, in the opposite direction to the air streaming through the sieve-like surface 5, towards the side of this surface 5 remote from the opening cylinder 3. In this connection, a control apparatus is associated with the blowing air nozzle 44 and generates a brief jet of compressed air. This control apparatus here has, for example, a valve which connects the blowing air nozzle 44 briefly to the compressed air side of the source 43 of suction air which generates the negative pressure

in the dust removal opening 4. The control apparatus can for this purpose be controlled in different ways. Thus, it is possible for the control apparatus to give periodic control pulses to control a valve placed in front of the blowing air nozzle 44. However, a negative-pressure measuring apparatus can also be associated with the dirt removal opening 4. If partial covering of the sieve openings 50 causes the negative pressure to depart from a predetermined tolerance range, this causes the compressed air to be released through the control apparatus. Of course, manual control of a control valve is also possible for the blowing air nozzle 44.

The blowing air nozzle 44 causes a jet of air to be briefly directed at the side of the sieve-like surface 5 remote from the opening cylinder 3. This stream of air, which is thus oriented opposite the air otherwise streaming through the sieve-like surface 5, thus removes from the sieve-like surface 5 all constituents which may be remaining suspended in the sieve openings. The time during which the jet of compressed air is effective is so short that it has practically no damaging effect on the fibres 11 supplied to the spinning element 31. If, with certain materials, there is still a danger of disruption of the spinning process, then this sieve-cleaning procedure can also take place when the spinning unit is not operating.

In order that heavy dirt constituents can also be removed from the stream of fibres/air, which dirt constituents as a rule have a larger mass and consequently also a greater inertia than the individual fibres 11, a dirt removal opening 37 is provided, in accordance with Figure 1, in the wall, surrounding the opening cylinder 3, of the housing in the direction of fibre transport (arrow 34) after the dust removal opening 4.

Figure 3 shows a feed depression 21 which not only

receives the dust removal opening 4 but which also carries the sieve-like surface 5 covering this dust removal opening. Connected to the feed depression 21 there is a tubular channel 81. In this exemplary embodiment, the sieve openings 50 are constructed as elongate holes which extend substantially transversely to the direction of fibre transport (arrow 34). The sieve openings 50 constructed as elongate holes are not arranged at a right-angle to the direction of fibre transport (arrow 34) in this exemplary embodiment - as is also possible - but are inclined thereto such that - seen in the direction of fibre transport - their ends approach an imaginary centre-periphery line 36. As a result of this, on the one hand, an effect of centering the stream of fibres/air rotating with the shaped points 35 of the opening cylinder 3 is achieved. On the other hand, the arrangement and construction of the elongate sieve openings 50 have the effect that fly constituents and short fibres which follow the stream of air sucked through the sieve-like surface 5 because of their low weight can also pass through the sieve openings 50 and reach the filter 42.

The sieve openings 50 can be produced in various ways, for example by boring or milling, etc. Figure 2 shows a sieve-like surface 5 in which the sieve openings 50 constructed as elongate holes have been produced by punching and plastic deformation. The edges limiting the sieve openings 50 against the direction of fibre transport (arrow 34) are here formed by lamellae 51 which are inclined in the direction of fibre transport towards the opening cylinder 3. As the arrow 52 shows, in such a construction of the sieve-like surface 5, a stream of air is also produced which is substantially oriented in opposition to the direction of fibre transport characterised by the arrow 34.

The larger the degree of separation of the fibre

material, the better the dust removal. Before the fibre material is supplied to the open-end spinner described above, it is thus made parallel with the aid of draw frames, etc., and presented to the opening cylinder 3 as a sliver 1 with fibres which have been made parallel. The fibres 11 which are separated from this sliver 1 thus also have a parallel position before they are exposed to the stream of air sucked through the sieve-like surface 5.

Although the removal of dust from a fibre material separated into individual fibres 11 is particularly intensive, dust can also be removed, however, from fibre material which has not been made parallel and which is guided in the form of flock or in non-woven form over a sieve-like surface.

A first exemplary embodiment of this type is described with reference to Fig. 4, which shows an apparatus for homogenising, separating and cleaning mixtures of fibres (German Published Application 2,217,394). A container 6, to which the fibre material is supplied from the top, possesses two distributor shafts 60 and 600 next to one another, each having an impeller wheel 61 and 610 respectively which is provided with sealing impellers 62 and 620 respectively of a soft material and which turns in a housing 63 and 630 respectively. Each housing 63 and 630 has in its fibre guide area a wall comprising a sieve-like surface 64 and 640 respectively. The sieve-like surface 64 and 640 respectively has sieve openings 641 which are inclined in opposition to the direction of fibre transport characterised by the arrow 34 at an acute angle α.

Below the impeller wheels 61 and 610 there are located two shafts 65 and 650, at the bottom end of which cylinders 66 and 660 and 661 and 662 are arranged which supply the fibre material to a drum 67 and 670 respectively. These in turn guide the fibre material to a

channel 68 for the removal of heavy dirt constituents through gratings 671, and in the channel 68 the fibre material is pneumatically removed and supplied to other machines.

The impeller wheels 61 and 610 turning in the direction of the arrows 34 take the fibre material supplied to them pneumatically from the distributor shafts 60 and 61. The transport air is here removed by suction together with the dust through the sieve openings 641, in which a stream of air is produced with the aid of suction air lines 69 and 690. Since here, too, the sieve openings 641 are inclined at an acute angle α in opposition to the direction of fibre transport (arrow 34), there is no danger of blocking these sieve-like surfaces 64 and 640.

Figure 5 shows that such a construction of a dust removal apparatus is also possible for carders 7. In accordance with the exemplary embodiment shown, the wall surrounding the taker-in roller 70 is interrupted in the area of fibre transport. The dirt removal openings 71 and 72 hereby formed are in each case limited in the direction of transport (arrow 34) by a blade 73, with the help of which coarse dirt is scraped off the fibre material. To remove the fine dust, which cannot be eliminated with the aid of such blades 73, a sieve-like surface 74 is connected to the last dirt removal opening 72, and this surface 74 has sieve openings 740 which are inclined in the way described at an acute angle α in opposition to the direction of fibre transport (arrow 34). Here, too, a reliable removal of dust is thus achieved without there being a danger of blocking this sieve-like surface 74. To increase the reliability of operation even over relatively long operating times, a compressed air nozzle (not shown) can be provided here (as in the apparatus shown in Figure 4), which compressed air nozzle is directed from the side remote from the taker-in roller 75 (the impeller wheels 61

and 610) towards the sieve-like surface 74 (or 64 and 640), in order that the fly constituents attached to the sieve-like surface can be blown away from the latter by a brief burst of compressed air.

In order to treat the fibre material carefully, the fibres which are not yet made parallel are not subjected to such a forceful relative movement in preparatory machines, carders, etc. as in the separating apparatus of an open-end spinner. Nevertheless, the dust and dirt content of a fibre material can still be measured with the aid of a modification of the apparatus described with reference to Figures 1 to 3. Such a modified apparatus constructed as a dust and dirt measuring device is shown in Fig. 6. In this apparatus, a charging apparatus 8 is provided with a conveyor belt 80 which extends into a filling shaft 81 for the fibre material 12. For driving the conveyor belt 80, a drive roller 82 is provided at the bottom end of the filling shaft 81. The conveyor belt 80 is deflected by a deflection roller 83 and a tension roller 84 at the top end of the filling shaft 81 such that the conveyor belt extends from the deflection roller 82 to a further deflection roller 85 substantially in the horizontal direction. A compressor roller 86 cooperates with the deflection roller 83.

The filling shaft 81 is limited, on the side opposite the conveyor belt 80, by sieves 87, 88. Compressed air is supplied to the filling shaft 81 through the upper sieve 88 while the lower sieve 87 serves for the removal of exhaust air.

With the feed depression 21 of the feed apparatus 2 there is associated a limit switch 22 which stops the drive motor for the drive roller 82 when the feed depression 21 is deflected to too great an extent, and thus prevents further supply of fibre material 12 to the opening cylinder 3. This prevents the dust content of insufficiently separated fibre material 12, which is

supplied to the feed apparatus 2 in the form of excessively large flocks, from being measured.

The opening cylinder 3, the dirt removal opening 37 and the dust removal opening 4 having the sieve-like surface 5 are constructed in the manner described in the example of Figures 1 to 3. Instead of a simple filter 42, as shown in Figure 1, in this construction a filter unit 9 is provided which has in the direction of suction following one another a sieve 90 for short fibres and fly and a dust filter 91. A valve 93 is connected to the connecting line 92 between the filter unit 9 and the source 43 of suction air; the valve 93 produces the connection to the atmosphere when it is opened and thus reduces the negative pressure acting on the dust removal opening 4.

A collection container 38 is connected to the dirt removal opening 37.

The fibre feed channel 30 ends in a fibre collection container 94 which is connected, via a line 97, to the source 43 of suction air, a sieve 95 and a throttle 96 being placed in between. Between the fibre collection container 94 and the throttle 96 there is provided a valve 98 which can provide the connection to the atmosphere in order that the negative pressure acting in the fibre feed channel 30 can be controlled.

By appropriate matching of the negative pressures in the dust removal opening 4 and in the fibre feed channel 30, with the aid of the valves 93 and 98 and the throttle 96, it is established what proportion of short fibres may pass through the sieve-like surface 5 into the filter unit 9, whereby the arrangement of the sieve openings 50 at an acute angle α in opposition to the direction of fibre transport (arrow 34) ensures that larger individual fibres 11 are not deposited on the sieve-like surface 5, blocking the sieve openings 50.

The fibre material 12 to be checked is kneaded together into a uniform flock sliver, the dimensions of which correspond to a conventional sliver for open-end spinning machines. The fibre material 12 is supplied between the compressor roller 86 and the deflection roller 84, supported by the stream of air supplied through the sieve 87, and to the opening cylinder 3 with the aid of the feed apparatus 2. In this, the pneumatic compression of the column of flock in the filling shaft 81 ensures uniform supply of material to the opening cylinder 3. However, if, as an exceptional case, larger flocks are supplied to the feed apparatus 2, then the limit switch 22 operated by pivoting the feed depression 21 brings the drive roller 82 and thus the supply of fibre to the opening cylinder 3 to a standstill.

Light fly and dust are removed by suction at the sieve-like surface 5, while the heavier dirt constituents are separated off at the dirt removal opening 37 by centrifugal force.

Problem-free separation of the short fibres and fly on the one hand and dust on the other hand is achieved by the suitable choice and the arrangement behind one another of sieves and filters of increasing fineness (e.g. the sieve 90 and the dust filter 91). Widening the cross-section through which the air streams in the filter unit 9 with respect to the channel 41 and the connecting line 92 in order to form a widened dust collection chamber gives the result that, even after fly and dust have been deposited in this filter unit 9, the negative pressure in the dust removal opening is not substantially impaired.

According to the test carried out, the amounts of dust (at the dust filter 91), short fibres (at the sieve 90), dirt particles (in the collection container 38) and good fibres (in the fibre collection container 94) occurring can then be determined by measurement. This

measurement can take place in various ways, for example also electronically. For example, sensors are provided in the area of the fibre feed channel 30 and the dirt removal opening 37 to count the fibres 11 and the coarse dirt constituents respectively. Instead of a dust filter, a piezoelectric quartz disc is provided in the filter unit 9, on which disc the dust is deposited and the frequency of the dust-containing quartz is thus changed. Measurement of the mass of the dust coating can be determined by comparison with a reference quartz.

This apparatus can also be modified, for example by changing the sieve-like surface in accordance with Figure 2 or 3, by choosing another fibre supply means (another filling shaft or supply in the form of a sliver of fibres which have been made parallel). In order to optimise the measuring result, precisely when disordered fibres are present, it is also possible to allow fibres collected in the fibre collection container 94 to run through the dust measurement apparatus shown in Figure 6 twice or more often.

Furthermore, it is possible also to provide the sieve 87 in the filling shaft 81 with sieve openings, which are oriented at an acute angle in opposition to the direction of fibre transport. Here, the exhaust air is sucked through the filter unit 9 or a second such filter unit in order that the amount of scrap occurring there can also be measured. In this case, the sieve-like surface is not located in a wall surrounding a roller but, here too, dust removal is possible without the individual fibres which may be loosened from their fibre cohesion, as flock, lap web, non-woven or sliver, being removed by suction through this sieve-like surface, since here too the stream of suction air is guided away at an acute angle α in opposition to the direction of fibre transport towards the path of fibre transport of the fibre material. The

modifications described to the sieve-like surface and the stream of compressed air operating intermittently and directed to the side remote from the path of fibre transport are also possible here.

A sieve constructed in accordance with the sieve 87 can also be used in filling shafts of other textile machines, e.g. with carders.

Further modifications of the apparatus, by interchanging features and by replacing them by equivalents or combinations thereof, are within the scope of the present invention.

Patent Claims

1. Method for removing dust from fibre material which is conveyed over a sieve-like surface, whereby it is exposed to a stream of suction air passing through the sieve-like surface, characterised in that the stream of suction air is guided away from the fibre material at an acute angle in opposition to the direction of transport of the moving fibre material and is guided through the sieve-like surface in the same direction.

2. Method according to Claim 1, characterised in that the fibre material is kept in the area of influence of a shaped roller by the sieve-like surface, while the fibre material is exposed to the stream of suction air.

3. Method according to Claim 2, characterised in that the fibre material is made parallel before it is exposed to the stream of suction air.

4. Method according to Claim 3, characterised in that the fibre material is held back as a tuft while it is exposed to the stream of suction air.

5. Method according to one or more of Claims 1 to 4, characterised in that a jet of air is briefly directed at the side of the sieve-like surface remote from the path of fibre transport.

6. Apparatus for carrying out the method according to one or more of Claims 1 to 5, having a dust removal opening which limits the path of fibre transport and which is connected to a source of suction air and covered by a sieve-like surface, and having means (3; 8) which transport the fibre material over the sieve-like surface

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(15; 64, 640; 74; 87) while the stream of suction air is effective, characterised in that the sieve-like surface has sieve openings (50; 641; 740), the limiting surfaces of which are inclined at an acute angle (α) in opposition to the direction of fibre transport.

7. Apparatus according to Claim 6, characterised in that the sieve openings (50; 641; 740) are constructed as elongate holes which extend substantially transversely to the direction of fibre transport.

8. Apparatus according to Claim 6 or 7, characterised in that the sieve-like surface (5; 64, 640; 74) is arranged in the peripheral area of a shaped roller (3).

9. Apparatus according to Claims 6 and 7, characterised in that the sieve openings (50; 641; 740) constructed as elongate holes are arranged at an angle to the direction of transport such that - seen in the direction of fibre transport - their ends are inclined in the direction of an imaginary centre-periphery line (36) of the shaped roller (3; 61, 610; 70).

10. Apparatus according to one of Claims 7 to 9, characterised by lamellae (51) separating the elongate holes (50; 641; 740) from one another, which lamellae are inclined at an acute angle (α) in opposition to the direction of fibre transport.

11. Apparatus according to one or more of Claims 6 to 10, characterised by a blowing air nozzle (44) directed towards the side of the sieve-like surface (5; 64, 640; 74) remote from the path of fibre transport, with which blowing air nozzle (44) there is associated an apparatus generating a brief jet of compressed air.

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12. Apparatus according to one or more of Claims 6 to 11, characterised in that a widening dust collection chamber (9) having a plurality of filters (90, 91) of increasing fineness, arranged one after the other, is arranged between the sieve-like surface (5; 64, 640; 74) and the source (43) of suction air.

13. Apparatus according to one or more of Claims 7 to 12, characterised in that there are arranged, in the direction of fibre transport in the wall surrounding the shaped roller (3), one after the other, the dust removal opening (4), with which a widening dust collection chamber (9) is associated, a dirt removal opening (37), with which a dirt collection chamber (38) is associated, and a fibre take-off opening (30), with which a fibre collection chamber (94) is associated.

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