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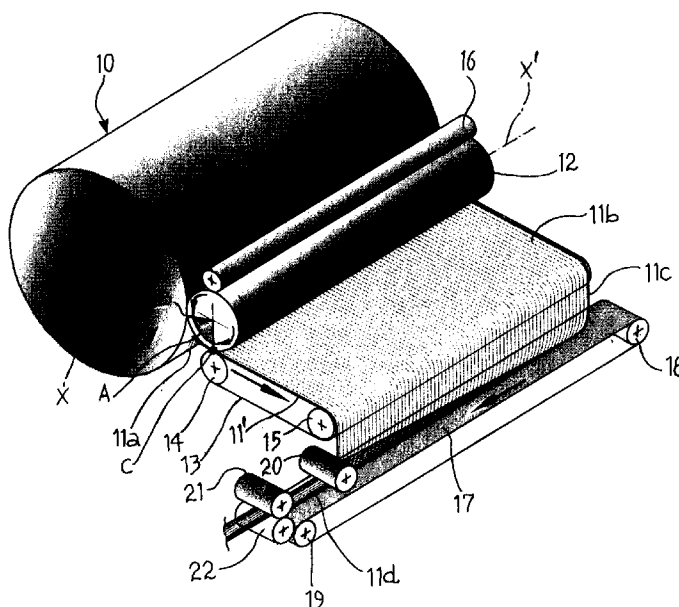
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(54) A carding machine with a doffer roller

(57) In a carding machine a conveyor belt means (13) is positioned to run in close proximity with a doffer roller (12). The conveyor belt means (13) is driven in such a way as to advance at a speed equal to the

peripheral speed of the doffer roller (12) so that the doffer roller and the conveyor belt means co-operate to exercise a grip action on the web (11).



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Description

[0001] The present invention relates to a carding machine of the type having the characteristics set out in the preamble of Claim 1.

[0002] As is known, carding machines include a final comb roller from which the combed fibres are removed in the form of a very thin web orientated parallel to the direction of advance of the web. To separate or doff the webs from the output comb roller of the carding machine an oscillating comb is used in certain cases, having a transverse blade parallel to and close to the comb roller; the blade is caused to oscillate rapidly in a direction substantially tangential of the comb roller in such a way as to separate the web from the comb during the descending part of the stroke of the blade.

[0003] This technique is used above all with fibres containing vegetable impurities (seeds, soil, etc.) which have not been removed by the washing; moreover, oscillating combs are also used when it is envisaged that the fibre, firmly held between the rigid saw tooth covers cladding the comb roller, requires a tearing action to be removed therefrom.

[0004] Oscillating comb systems have, however, some functional limits: above all the speed of advance of the web is limited to a maximum of 80-90 metres per minute since it is not possible to cause the combs to oscillate at a frequency greater than 3,000 oscillations per minute; when the doffer comb has a high vibrational frequency mechanical stresses are produced which reduce the reliability of the doffing system and, at the very least, require frequent maintenance operations. Additionally, the surface of the web, above all when this is very light, is detrimentally affected by the air suction generated by the oscillations of the comb, tending to become twisted. There is also the risk that the web will become wound around the oscillating comb blade and that this latter will become damaged when an accumulation of fibres occurs, above all in cases in which the web does not easily separate from the comb rollers, for example because of large knots or residual impurities. Finally, given that the doffing action of the combs takes place only during the descending stroke of the blade, its rising movement represents a passive phase which detracts from the efficiency of the machine.

[0005] Another technique used as an alternative to the oscillating comb provides for the use of a doffer roller mounted parallel to the comb roller and at a distance of 0.50÷0.80mm from it. The doffer roller, covered with a rigid covering having saw teeth of isosceles profile is made to rotate with a peripheral speed slightly greater than that of the comb roller so that it doffs the fibre from the comb by drawing. The doffer roller is associated with a pair of calendering rollers disposed immediately downstream of the doffer roller and rotating at a peripheral speed slightly greater again. The said calendering rollers, being provided with surface asperities such as striations, knurling or resilient covers, effect an addi-

tional draft action and discharge the web onto a cloth or strip conveyor which transfers the web to the subsequent working machines.

[0006] Doffer roller systems permit the web to advance at high speed and are widely adopted for synthetic fibres or cotton; these systems, however, are not usable for doffing webs of combed wool or recovered fibres having a high load of impurities and/or oiliness due to the fact that the fibres, especially if long, tend to wind around the calendering rollers.

[0007] Moreover, starting up the carding machine is problematical and risky for the operators due to the fact that it is necessary to introduce the web manually between the calenders, and extract it therefrom.

[0008] The conventional doffer roller system involves a further disadvantage due to the fact that when the web at the output is conveyed into the funnel to be converted into a sliver the fibres at the sides of the web are subjected to a significantly less draft than that to which the central fibres are subject. Consequently it is difficult to find an optimum draft ratio both for the lateral fibres and the central ones: in fact, an excessive draft tends to cause tearing of the central fibres whilst if the draft is too low it causes an accumulation of lateral fibres.

[0009] An object of the present invention is to provide a carding machine of improved type which can handle fibres, in particular combed wool, at higher speeds than those obtainable up until now, without encountering the limits and disadvantages of the prior art discussed above.

[0010] This and other objects and advantages which will become better understood hereinafter are achieved by a carding machine having the characteristics set out in Claim 1; other important characteristics are set out in the dependent claims.

[0011] The structural and functional characteristics of a preferred, but non-limitative embodiment of a carding machine according to the present invention will now be described; reference is made to the attached drawing which is a schematic perspective view of the end or doffing part of a carding machine according to the invention.

[0012] Making reference to the drawing, the reference numeral 10 indicates a comb roller of conventional type rotating about an axis which is transverse with respect to the direction of advance of a web 11 of fibre produced by the carding members situated upstream of the roller 10 and not illustrated for simplicity. As used here terms such as "longitudinal", "transverse", "central" and "lateral" will have to be interpreted with reference to the direction of advance of the web 11 unless differently indicated.

[0013] Immediately downstream of the comb roller 10 there is provided a doffer roller 12 rotating about a transverse axis X' parallel to the axis X of the comb roller 10. The doffer roller, covered in a known way with a covering of rigid saw teeth having an isosceles profile, is caused to rotate in the same sense but with a slightly greater peripheral speed than that of the comb roller so

as to cause a slight longitudinal draft in the treatment of the web 11a which passes from the comb roller to the doffer roller.

[0014] According to the present invention the doffer roller 12 removes the web 11 directly onto a horizontal cloth conveyor 13 the width of which corresponds to that of rollers 10 and 12, and which is driven by a pair of transverse rollers 13 and 14. The downstream roller 15 is driven at a speed such as to cause the cloth 13 to advance at a speed substantially equal to the peripheral speed of the doffer roller 12. The upstream roller 14 is positioned in such a way that the cloth runs very close to the doffer roller to cause, in collaboration therewith, a grip action on the web which facilitates its removal onto the fabric 13.

[0015] In the embodiment illustrated in the drawing, the passage of the cloth 13 in close proximity to the doffer roller 12 is achieved by positioning the roller 14 exactly beneath this cylinder, that is to say in such a way that its axis lies in a vertical plane passing through the axis of the doffer roll 12. It is intended, however, that the above-mentioned grip action could also be achieved by locating the roller 14 in a slightly forward or rearward position with respect to the doffer roller 12. In particular, the roller 14 could be positioned slightly in advance and raised, extending the contact arc indicated "A" and identified between the tangential point "B" between the doffer roller 12 and the comb roller 10 and the tangential point "C" between the doffer roller 12 and the conveyor cloth 13. In each case the minimum distance to observe between the periphery of the doffer roller 12 and the cloth 13 must not exceed 5mm by much. Ideally the minimum distance between these two members can vary between about 1 and about 5mm to obtain an improved result.

[0016] The doffer roller 12 of the carding machine according to the invention advantageously has a slightly greater diameter than the doffer rollers of conventional type; this arrangement, together with others which will be discussed hereinafter, helps to reduce the risk that the web may tear and/or become wound around this roller. In more detail, the doffer roller 12 is dimensioned and positioned in such a way that the arc "A" mentioned above is of a length greater than or equal to 150mm, that is to say greater than the length of the longest wool fibres, whereby to prevent the fibres from being retained at the end of the arc with the consequent risk of tearing.

[0017] The reference numeral 16 indicates a brush roller of conventional type which can optionally be provided for working on the upper part of the cylinder 12 for the purpose of keeping it clean.

[0018] Beneath the downstream roller 15 there is provided a conveyor belt 17 which runs in a transverse direction, being mounted on longitudinal rollers 18, 19 rotating at a peripheral speed slightly greater than that of the cloth 13 to prevent the web from accumulating. Thanks to this configuration the web leaving the doffer roller 12, with its fibres orientated parallel to the longitu-

dinal direction of advance, is conveyed for a certain distance 11b by the upper horizontal arm of the cloth 13 after which, passing beyond the roller 15, the web falls vertically by gravity (as indicated 11c) onto the transverse conveyor belt 17. On this second conveyor the web is transformed into the form of a strip as indicated 11d, being pressed by a series of longitudinal rolls 20, 21 and 22; of these, a first roll 20 is disposed above the transverse conveyor belt 17 at the edge 11' of the web facing towards the direction of advance of the transverse belt 17. The roll 20 constrains the section of the web 11c to fall vertically as illustrated. In the absence of this roll the web would tend to be drawn in the sense of transverse advance of the strip 17 and therefore to deviate from the predetermined path. The rolls 21 and 22, disposed downstream of the roll 20, are located opposite one another and act as calenders for further consolidating the web into the strip 11d, which is thus further advanced towards an accumulation receptacle (not illustrated).

[0019] As far as the material constituting the conveyor cloth 13 is concerned, this will preferably be chosen and conformed in such a way as to present an outer surface, that is the one facing the web 11, capable of exerting a frictional action against the web to improve its stability on the cloth itself.

[0020] It will be noted that the conventional calendering rolls disposed in association with the output of the doffer roller are eliminated, as is the conventional funnel for collecting the web in the form of a strip. Thanks to this configuration proposed by the present invention, the removal of the web from the doffer roller is now effected by the action of the same conveyor cloth, whilst the collection of the web in the form of a compressed strip is obtained by constraining the web to follow a final vertical path section, that is to say one substantially orthogonal to the horizontal path it follows as it is removed at the output from the doffer roller.

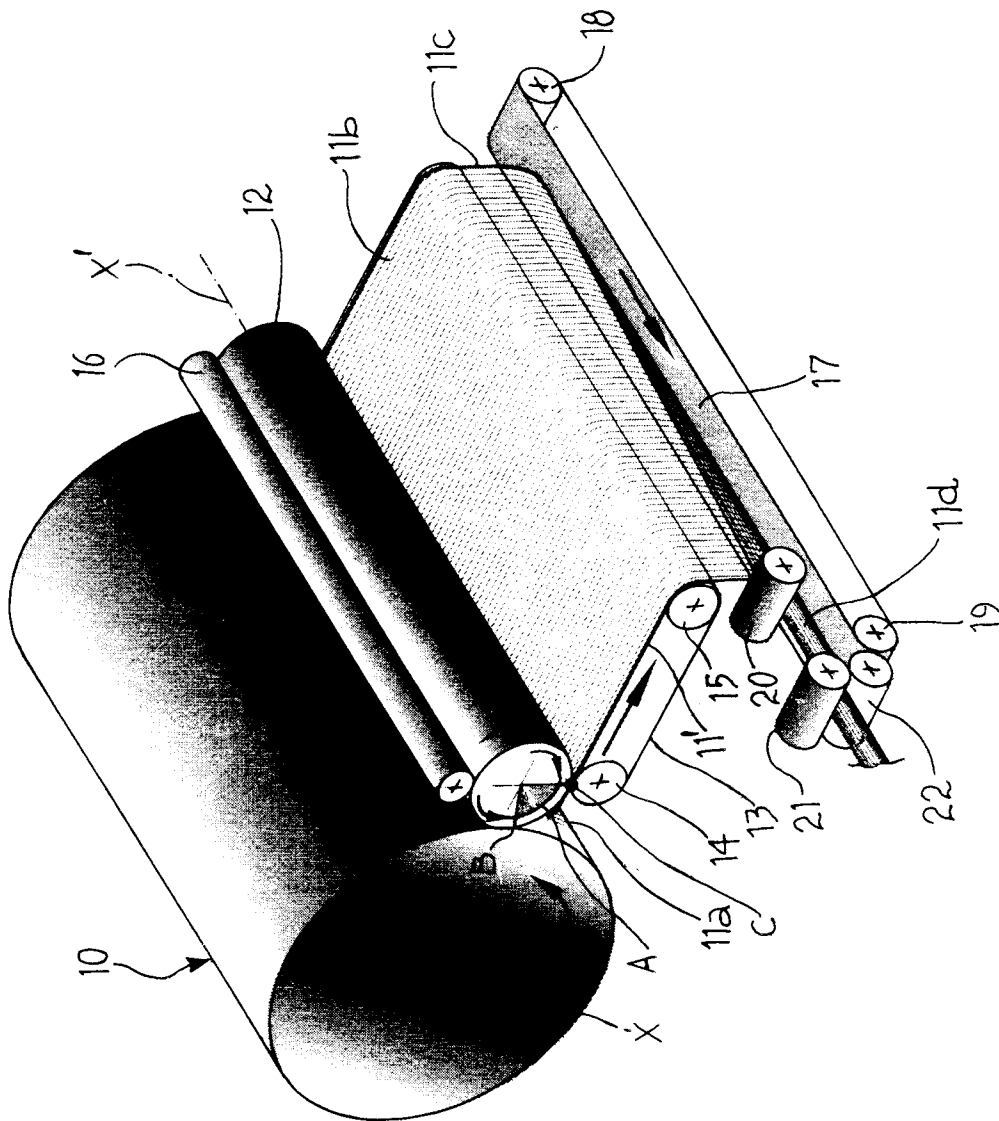
[0021] As will be appreciated the carding machine of the present invention makes it possible to utilise a doffer roller system for fibres of any type, and therefore, also of wool, achieving the typical benefits offered by roller systems but without incurring the disadvantages and limits of application discussed in the introductory part of this specification.

[0022] Finally, it will be appreciated that the carding machine according to the invention, not requiring conventional calendering rolls, allows a reduction of costs relating to the installation and maintenance of the parts of which it is comprised.

[0023] It is intended that the invention shall not be limited to the embodiment described and illustrated here which is described only as an example of the carding machine which, on the other hand, is capable of modifications relating to the form and arrangement of the parts and constructional and functional details.

Claims

1. A carding machine of the type comprising:
 - a comb roller (10) driven to rotate about an axis substantially transversely of a first direction of advance of a web (11) of fibres,
 - a doffer roller (12) disposed parallel to and immediately downstream of the comb roller (10) and driven to rotate in the same sense with this and at a peripheral speed greater than the peripheral speed of the comb roller (10),
 - a first conveyor belt means (13) disposed downstream of the doffer roller (12) and driven to move the web (11b) away from the output of the doffer roller (12) in the said first direction of advance;
 - characterised in that the said first conveyor belt means (13) is positioned to run in close proximity to the doffer roller (12) and is driven in such a way as to advance at a speed substantially equal to the peripheral speed of the doffer roller (12), in such a way that the said doffer roller and the said conveyor belt means co-operate to exert a grip action on the web (11) for separating the web from the doffer roller (12).
2. A carding machine according to Claim 1, characterised in that it includes a second conveyor belt means (17) travelling in a second direction of advance substantially transversely with respect to the said first direction, disposed downstream and below the said first conveyor belt means (13); the said second conveyor means being associated with at least one roller (20, 21, 22) rotating about a transverse axis with respect to the said second direction and acting on the said web to reduce it into strip-like form.
3. A carding machine according to Claim 1, characterised in that the said first conveyor belt means (13) is driven by a pair of rollers (14, 15), one of which (14) is positioned in close proximity to the doffer roller (12).
4. A carding machine according to Claim 1, characterised in that the said first conveyor belt means (13) has a transverse dimension corresponding to that of the doffer roller (12).
5. A carding machine according to Claim 1, characterised in that the minimum distance between the doffer roller (12) and the first conveyor belt means (13) is less than or equal to about 5mm.
6. A carding machine according to Claim 5, characterised in that the minimum distance between the doffer roller (12) and the first conveyor belt means (13) lies between about 1 and about 5mm.
7. A carding machine according to Claim 1, characterised in that an arc (A) identified between the point of tangency (B) between the doffer roller (12) and the comb roller (10) and the point (C) of tangency between the doffer roller (12) the first conveyor belt means (13) has a length greater than or equal to about 150mm.
8. A carding machine according to Claim 2, characterised in that it includes a roller (20) disposed close to the edge (11') of the web facing the said second direction of advance and acting to constrain the web to fall vertically (11c) from the first conveyor belt means (13) onto the second conveyor belt means (17).
9. A carding machine according to Claim 8, characterised in that it further includes a pair of calendering rollers (21, 22) disposed downstream of the said roller (20) and acting to consolidate the said web into a strip (11d).





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EUROPEAN SEARCH REPORT

Application Number
EP 99 11 0277

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