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71 Applicant: **HOLLINGSWORTH (U.K.) LIMITED**
Scaitcliffe Street P.O. Box 55
Accrington Lancashire BB5 0RN(GB)

72 Inventor: **Wood, Alfred**
33, Clifton Crescent Heyside Royton
Oldham Greater Manchester OL2 6JF(GB)

72 Inventor: **Warrington, Thomas Joseph**
17, Crestfield Worsley View Rise Little Hulton
Greater Manchester M28 6BD(GB)

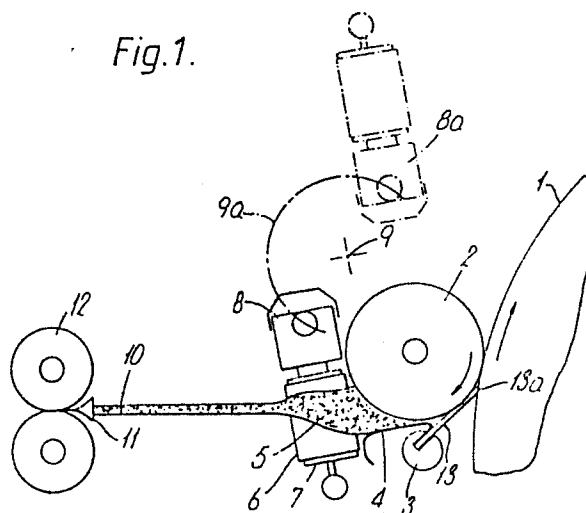
74 Representative: **Barlow, Roy James et al,**
J.A.KEMP & CO. 14, South Square Gray's Inn
London WC1R 5EU(GB)

54 **Carding apparatus.**

57 The doffer unit of a carding apparatus includes a doffer 1 forming an appropriate setting with a fluted stripper roll 2 from which the carded web 5 is stripped means of a blade 13 and laid on the upper surface of a stationary support plate 4 which guides the carded web to a condensing belt arrangement 6.

Traditionally a driven roller has been considered necessary to support the web 5 on its way to the condensing belt system 6, and surprisingly the present invention is able to operate satisfactorily and reliably with a stationary support plate.

Fig.1.



CARDING APPARATUS

The present invention relates to textile carding apparatus.

During the treatment of staple fibre material prior to the spinning step, the fibres are subjected to a carding operation to align the fibres for the purpose of increasing the longitudinal tensile strength of the fibrous material and in order to help in removing the residual impurities after the cleaning step. The carded fibrous material leaves the doffer, which has removed the fibres from the carding cylinder, in the form of a web which is then condensed to form a generally circular cross-section sliver.

The carded web is removed from the carding cylinder by a doffer from which the web then has to be stripped before it is condensed to form the sliver. One form of condensing means is disclosed in GB-B-1208264 as using a continuous conveyor belt to support the web and to feed it in a direction transversely to the direction of movement of the web leaving the doffer, thereby assisting in condensing the sliver which is coiled into a can at one end of the belt, i.e. at one side of the carding apparatus. A modification of the conveyor belt condensing means is disclosed in GB-B-1298855 where two separate conveyor belts feeding towards the centre of the web are employed.

Despite the fact that the rapid condensing of the web using such a conveyor belt system has the advantage of consolidating the delicate web by condensing it quickly into the form of a sliver, the delicate web of carded staple fibre material is still vulnerable before arriving at the conveyor belts and in both GB-B-1208264 and GB-B-1298855 the fibrous web is conveyed to the belts on a driven roller system which thrusts the carded web positively against the conveyor belt(s).

Traditionally the web is stripped from the doffer by means of a pair of co-operating stripper rollers as in

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GB-B-1208864. Although subsequently it has been desirable to use a single stripper roller in conjunction with a stripper blade, such an arrangement has not been compatible with a condensing conveyor belt web take-off system.

5 It is an object of the present invention to provide an improved form of carding apparatus using a belt condensing system to receive the web from a single stripper roller and to convert it into a sliver.

Accordingly, the present invention provides a
10 carding apparatus wherein the doffer unit comprises a doffer; a stripper roll co-operating with the doffer for removing the carded fibrous web from the doffer; a stripper blade arranged to assist the fibrous web in detaching from the stripper roll to move along a first direction; a
15 condensing surface movable in a second direction transversely of the first direction of the carded fibrous material for the purposes of carrying the fibrous web, supported, in said second direction and condensing it to form a sliver; and a stationary support surface downstream
20 of the stripper blade to support the detached carded fibrous web on its travel as far as the point of its engagement with the moving condensing surface, in use of the apparatus.

In order that the present invention may more readily be understood the following description is given,
25 merely by way of example, with reference to the accompanying drawings in which:-

Figure 1 illustrates a schematic side elevation of the doffer section of a carding apparatus in accordance with the present invention; and

30 Figure 2 shows the apparatus of Figure 1 at the point when drive to the belt take-off unit is discontinued as it is moved between its operative and inoperative positions.

In Figure 1, the doffer cylinder 1, clad with wire
35 fillet or toothed carding wire in a manner known per se, rotates in the clockwise direction to carry the carded web

upwardly towards the transfer point with a single fluted stripper roll 2 which also rotates in the clockwise direction and therefore has its circumference moving in a direction opposed to that of the doffer 1 at the nip.

5 A support bar 3 below the stripper roll 2 carries both a web stripper blade 13 and a web support plate 4 which then supports the delicate carded staple fibre web 5, which has been stripped from the stripper roll 2 by the stripper blade 13, until the web is placed on the adjacent coplanar
10 runs of two conveyor belts 6 supported on rollers 7 on a frame 8 which is pivotable about a horizontal axis 9 extending transversely across the carding apparatus. By having the assembly comprising rollers 7 and frame 8 move along a circular locus 9a (of the point of securing of the
15 frame 8 to a carrier frame) to raise the frame 8 to its out-of-the-way position 8a shown in the drawing, it is possible to arrange that in the out-of-the-way position 8a the belts 6, the rollers 7 and the frame 8 are directly above the stripper roll 2 in order to expose completely the
20 underside of the fluted stripper roll 2 and the support plate 4, for process inspection and cleaning purposes or for any other maintenance work. The ease of access provided by the fact that the plane of the condensing surface defined by the endless belt(s) 6 is chordal to the circular locus 9a
25 contributes substantially to operator safety.

As in GB-B-1298655 there are two belts 6 each mounted on a respective pair of the rollers 7, with the four rollers 7 having their axes parallel and coplanar in the plane A extending transversely across the carding apparatus.
30 The direction of circulation of each of the belts 6 is such that the runs which are adjacent the fluted stripper roll 2 (the right-hand runs as viewed in the drawings) move towards the centre of the belt arrangement (i.e. towards the two innermost of the four support rollers 7) and thereby serve
35 to condense the delicate staple fibre web 5 on the plate 4 to form a generally vertically extending sliver 10 moving

towards the condensing trumpet 11 which feeds the calender rolls 12.

As mentioned above, the fibrous web 5 is stripped from the clockwise-rotating fluted stripper roll 2 by co-operation with the stripper blade 13 which has a strip of its surface close to one edge 13a spring biased into contact with the roll 2, or more properly into contact with the exposed surface of the carded staple fibre web on the roll 2 leaving the transfer point between the fluted stripper roll 2 and the toothed doffer 1. As a result of the frictional co-operation of the stripper blade 13 with the web supported on the fluted stripper roll 2, the web detaches from the fluted stripper roll 2. The web is supported by the stripper blade 13 until it passes to and rests on the stationary support plate 4. Bearing in mind the fact that it is friction between the stripper blade 13 and the moving carded web which strips the web from the stripper roll 2, it is surprising that the stationary support plate 4 is capable of supporting the web and preventing breakdown of the delicate web on its travel from (a) the stripping location between the fluted stripper roll 2 and the spring biased stripper blade 13 towards (b) the zone of contact with the conveyor belts 6.

Whereas in the prior art it was felt necessary to support the carded web on the upper segment of a driven rotating roll, it has now surprisingly been found possible to support the moving web adequately on a stationary surface which is therefore mechanically much simpler in construction and requires little or no maintenance and is consequently cheaper both to install and to maintain.

As illustrated, the preferred form of the support plate 4 has a generally flat upper run which carries the web from its point of stripping from the fluted stripper roll 2 towards the adjacent run of each endless belt 6, and at the edge of the plate adjacent to the belt 6 the support plate has a downwardly extending, preferably cylindrical, convex

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portion to guide the fibrous web 5 smoothly onto the condensing belt runs. It also has a convex upstream portion at the transition between the stationary support plate 4 and the stripper blade 13 which it contacts, thus presenting the web with a smooth leading edge on its path to the generally planar surface of the support plate 4.

In order to allow for the possibility of maximum use of the spring biased steel stripper blade 13, it is removably inserted in the support bar 3 so that when one edge surface wears it is possible for the blade to be reinserted with another of the four surfaces (i.e. two opposite edge surfaces at each of two edges) co-operating with the fluted stripper roll 2, and then subsequently when that fresh edge surface wears it is possible for each of the remaining edge surfaces to be used, in turn. For maximum simplicity, both the non-operative edge of the blade 13 and a parallel and continuous sheet metal portion of the support plate 4 are carried by the same support bar 3 and it is therefore readily possible to re-position the stripping blade 13 while still maintaining the correct positioning of the support plate 4 which it contacts.

The precise positioning of the belts 6 in the solid line position 8 of Figure 1 relative to the support plate 4 is adjustable by means of an Allen key locking screw which can be released to allow pivoting of the belt take-off mechanism about its axis which travels along the circular locus 9a.

Surprisingly, it has been found that with this much simplified form of web take off system the carding apparatus is nevertheless able to handle high volume throughputs with a relatively simple structure. Quite clearly, comparing the drawing described above with the drawings of GB-B-1208264 and GB-B-1298655, the apparatus is much simpler in construction because there is not the same number of rotating rolls to which drive needs to be applied.

Although the arrangement described above employs

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two conveyor belts moving towards one and other, it is equally possible to have two conveyor belts which move away from one another in order to provide side delivery of the web halves delivered from a split doffer working with the same carding cylinder in order to feed twin coilers at the sides of the carding apparatus. Alternatively, it is possible to use a single conveyor belt providing feed to a single coiler to one side of the carding apparatus, substantially as disclosed in GB-B-1208264.

10 It will of course be understood that the various rollers 7 are driven for rotation in the appropriate directions and that the drive gearing is constructed in such a way that when the belt support frame 8 is moved to the out-of-the-way position 8a drive to the belts is
15 automatically interrupted, for the purposes of safety of the operator.

The belt take-off unit will, for example, be required to be movable to its out-of-the-way position while the carding apparatus is delivering carded web, for example
20 for the purposes of inspection of the web to carry out a nep count.

The disengagement of drive does not take place immediately the belt take-off unit begins to leave the solid line operative position shown in Figure 1, but only when the
25 carrier for the belt take-off unit has rotated to the position shown at 8b in Figure 2. Between the solid line position 8 of Figure 1 and the solid line position 8b of Figure 2, the belt take-off unit remains driven by means of a gearing system which is shown in Figure 2 but has been
30 omitted from Figure 1 for reasons of simplicity.

Figure 2 shows the belt take-off unit as having a pinion 15 which is mechanically linked to the belts to drive them in the appropriate directions when the pinion 15 rotates in the clockwise sense as shown in Figure 2. In
35 turn, a further pinion 16 is carried by a rotary carrier 17 having its axis of rotation coincident with that of the

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stripper roll 2, and is spring-biased in the anti-clockwise direction by way of a spring 18.

A pinion (not shown in Figure 2) having substantially the same diameter as the stripper roll 2 and fixed for rotation therewith is constantly in mesh with the pinion 16 on the rotary carrier 17.

While the belt take-off carrier is in the solid line position 8 of Figure 1 or the solid line position 8_b of Figure 2, or any intermediate position between those two, the spring 18 will hold the carrier 17 biased towards the belt take-off carrier so that drive to the pinion 15 by way of the pinion 16 is maintained. However, once the belt take-off carrier enters the sector of its locus of movement between the solid line position 8_b of Figure 2 and the broken line position 8_a of Figure 2 the carrier 17 is limited from further clockwise motion and drive to the pinion 15 is interrupted.

The presence of a spring-biasing action on the pinion 16 allows for maintained rotation of the belts 6 for long enough to allow them to be well clear of the sliver 10 moving towards the condenser trumpet 11, and thus the quality of the sliver 10 is unchanged as the belts are withdrawn. However it is nevertheless the case that, when the belts are clear of the sliver, drive to them is stopped so that the operator can safely lift the belt take-off carrier to its broken line position 8_a of Figures 1 and 2 for the appropriate inspection of the sliver and of the carded web to be carried out.

Similarly, although the support bar 3 is normally biased about its longitudinal axis in a direction which urges the stripper blade 13 towards the stripper roll 2, it is possible for the bar to be rotated to an out-of-the-way position for maintenance.

Although in the above description the condensing is carried out by endless conveyor belts, it is of course possible for any other form of laterally moving surface to be used in place of the belt 6, as desired.

CLAIMS

1. Carding apparatus wherein the doffer unit comprises a doffer (1); a stripper roll (2) co-operating with the doffer for removing the carded fibrous web from the doffer; and a stripper blade (13) arranged to assist the
5 fibrous web in detaching from the stripper roll to move along a first direction; characterised by a condensing surface (6) movable in a second direction transversely of the first direction of the carded fibrous material for the purposes of carrying the fibrous web, supported, in said
10 second direction and condensing it to form a sliver; and a stationary support surface (4) arranged downstream of the stripper blade, to support the detached carded fibrous web on its travel as far as the point of its engagement with the moving condensing surface, in use of the apparatus.

15 2. Carding apparatus according to claim 1, characterised in that said support surface (4) has a convex terminal edge portion adjacent said moving condensing surface (6), for the purposes of smoothly feeding the fibrous material onto the condensing surface.

20 3. Carding apparatus according to claim 2, characterised in that said convex terminal edge portion is cylindrical.

4. Carding apparatus according to claim 2 or 3, characterised in that said convex terminal edge portion
25 adjoins a preceding flat portion.

5. Carding apparatus according to any one of the preceding claims, characterised in that said support surface is defined by a plate (4) which is carried by support means (3) which also supports the stripper blade.

30 6. Carding apparatus according to claim 5, characterised in that the support means for the support surface (4) and the stripper blade (13) is a support bar (3) which removably carries the blade (13) allowing it to be inverted and to be reversed end to end in order to allow the

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use of four separate edge surfaces of the stripper blade before the stripper blade is worn out, and wherein the inversion and reversing of the stripper blade can be carried out without risk of upsetting the setting of said plate
5 defining the support surface.

7. Carding apparatus according to claim 6, characterised in that the support plate has its edge which contacts the stripper blade of smoothly convex form.

8. Carding apparatus according to any one of the
10 preceding claims, characterised in that the laterally moving surface comprises a run of at least one endless belt (6) driven for movement laterally of the stripper roll.

9. Carding apparatus according to claim 8, characterised in that the said at least one endless belt is
15 carried by a movable frame which can be displaced from an operative position, in which drive is applied to said at least one belt, towards an inoperative position, in which said drive is automatically interrupted.

10. Carding apparatus according to claim 9,
20 characterised in that said at least one belt (6) is carried by a common frame (8) pivotable about an axis and in that movement of said at least one endless belt (6) extends chordally of a circle (9a) centred on the axis of rotation (9).

25 11. Carding apparatus according to claim 9 or claim 10, characterised in that drive to said at least one endless belt is by way of a gearing system involving an idler gear (16) carried (by 17) for rotation about its drive gear, and constantly in mesh with a pinion (15) of the belt drive
30 mechanism; and in that the idler gear (16) and the pinion (15) remain in engagement for a substantial part of the movement of the belt-carrying frame from its operative position towards its inoperative position, thereby ensuring maintenance of drive until the endless belt is well clear of
35 the sliver path (10).

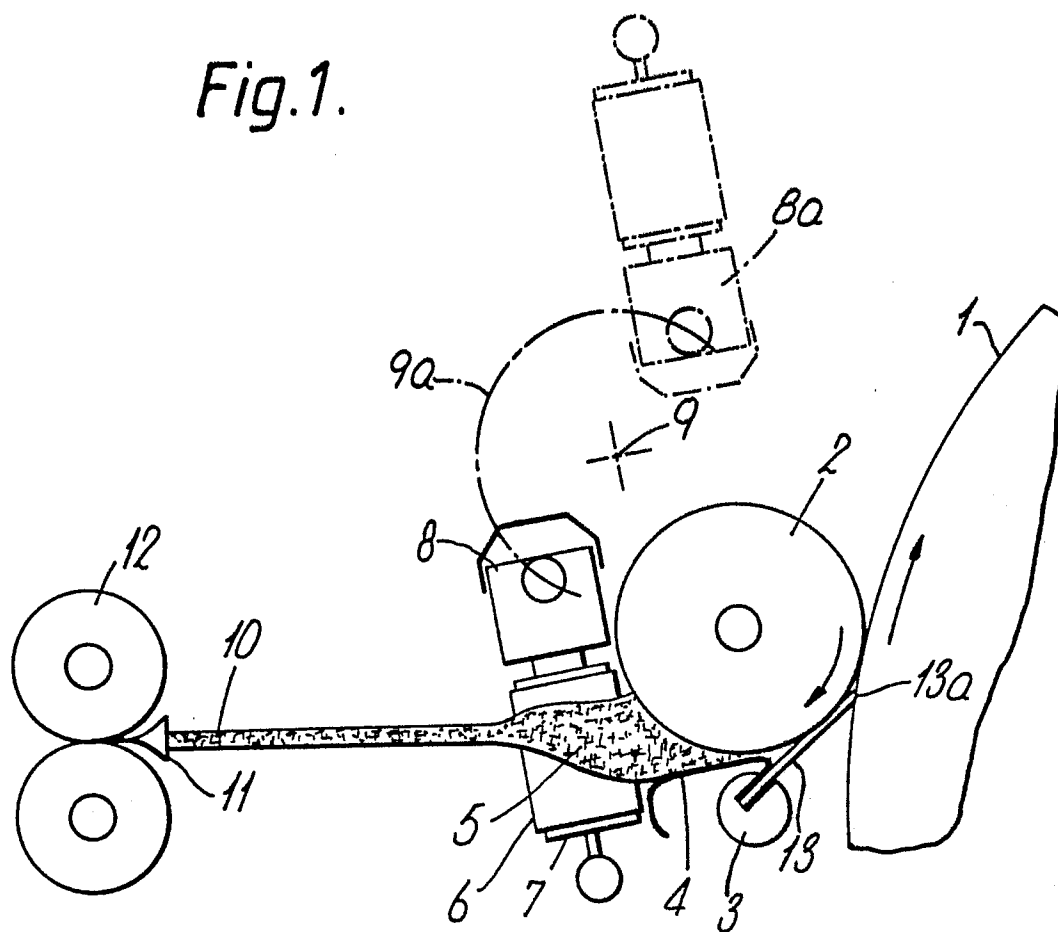
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12. Carding apparatus according to any one of claims 9 to 11, characterised in that the position of said at least one endless belt (6) relative to the movable frame is adjustable.

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Neu eingereicht / Newly filed
Nouvellement déposé

Fig.1.



Neu. eingereicht / Newly filed
Nouvellement déposé

Fig. 2.

