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Description

This invention relates to a carding machine.

The conventional cotton carding machine comprises a feed roller and feed plate for feeding material to be carded to a takerin. The takerin transfers the material onto a carding cylinder and flats cooperate with an arc of that cylinder so that a carding effect takes place between carding elements on the cylinder and on the flats. The carded material is removed from the cylinder by a doffer, and is stripped from the doffer and delivered from the machine. The flats may be either stationary or may travel in a closed path, part of which closely follows the working arc of the cylinder.

When higher carding performance is required it is also known to use a so-called duo-card, for example as shown in GB-A-1024541. A duo card has first and second carding cylinders, each with its own separate set of flats, and material doffed from the first cylinder is transferred by a centre section of the machine to a takerin for the second cylinder. It will be appreciated that the two sets of carding actions, coupled with the working that takes place in the centre of the carding machine can result in a cleaner web being delivered from the machine.

Duo-cards have in the past been significantly more expensive than single cylinder carding machines, and a need is perceived for a machine which is more efficient than the single cylinder carding engine and yet which is significantly cheaper than the known duo-cards. The invention seeks to provide such a machine.

According to the invention a carding machine comprises a first carding cylinder, means for feeding material to be carded on to the first carding cylinder, a second carding cylinder, a plurality of transfer rollers for stripping material from the first carding cylinder and transferring it to the second carding cylinder, the cylinders and rollers having parallel axes and being of substantially equal axial length, means for stripping carded material from the second carding cylinder and delivering the carded material from the machine, drive means for driving the first and second carding cylinders in the same sense of rotation and for driving the transfer rollers, a plurality of flats each comprising a flat bar of length at least equal to the axial length of each cylinder, each flat bar extending parallel to the cylinder axes and supporting carding elements, means linking each flat to the two immediately adjacent flats to form a closed chain of flats, and means for driving the chain of flats so that each flat travels in a closed path parts of which pass immediately adjacent to an arc of the circumference of each of the first and second carding cylinders, so that the carding elements cooperate in a carding action firstly with carding elements on one of the carding cylinders, and then with carding elements on the other of the car-

ding cylinders. The crux of the invention is that a single set of moveable flats cooperate with both carding cylinders. The drive system for the carding machine can thus be simplified over that of the conventional duo card, and costs can be cut significantly while still retaining high carding efficiency.

Preferably the transfer rollers comprise a doffer for removing material directly from the first carding cylinder and a takerin for removing material directly from the doffer and transferring it directly on to the second carding cylinder. This direct transfer using a minimum number of rollers in the centre section further reduces the cost, and indeed makes possible the manufacture of the new machine at a cost little higher than that of a single cylinder carding machine.

In order that the invention may be better understood embodiments of a carding machine in accordance therewith will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:-

Figure 1 is a schematic drawing of a first embodiment of carding machine;

Figure 2 is a schematic end elevation of a plurality of individual flats; and

Figure 3 is a schematic drawing of a second embodiment of carding machine.

Referring now to Figure 1 this shows a carding machine comprising a feed roller 1 and feed plate 2, a takerin 3 delivering material from the feed system to a first carding cylinder 4 and a centre section comprising a doffer 5 and second takerin 6. The doffer removes material directly from the first carding cylinder 4, and the takerin removes material directly from the doffer. The material from the second takerin is transferred directly onto a second carding cylinder 7 from which material is doffed by a doffer 8. A stripping roller 9 takes the carded web from the doffer 8 to any conventional delivery arrangement such as a condenser trumpet and sliver-forming rollers 10.

The takerin cylinders, doffers and stripping roller all have parallel axes and are all of substantially equal axial length. Suitable drive motor and transmission means are provided to drive the rotating elements in the senses shown by arrows, it being important that the cylinders 4 and 7 are driven in the same sense of rotation. The drive arrangement as such is not part of the invention and suitable arrangements will readily be apparent to those skilled in the art.

The carding machine is provided with a single set of flats 11. As shown schematically in Figure 2, each flat comprises a flat bar 12 supporting carding elements 13. Each flat bar is at least equal in length to the axial length of the cylinders and extends parallel to the cylinder axes. Each flat bar has support means 14 at each end, and is linked at each end to the two immediately adjacent flats by pivotal links 15 so as to form a closed chain of flats. Again, detailed flat construction and linkage will be apparent to those skilled

in the art. It is particularly preferred for the flats to be constructed as disclosed in US-A-4559674 the entire contents of which are hereby incorporated by reference. The closed chains of flats pass around block wheels 16, at least one of which is driven, and it will be seen that as the flats travel along their closed path they pass immediately adjacent to an arc of the circumference of each of the first and second carding cylinders. When travelling over those arcs the flats are supported so that the support means 14, at their ends run on bends provided in conventional manner to each side of the carding cylinder. The carding elements 13 on the flats thus cooperate in a carding action firstly with carding elements on cylinder 4 and then with carding elements on cylinder 7.

The number and spacing of the flat bars provided in the series of flats may be selected in accordance with the degree of carding required for the particular feed stock, and the choice of the particular card clothing selected for the flats may be similarly dictated.

The single set of flats, requiring only a single drive to all flats and only a single cleaning arrangement for the flats, together with the minimal roller arrangement in the centre transfer section of the carding machine, enables the machine to be manufactured at a cost that is little higher than the cost of a single cylinder machine.

Although the main benefit of the invention is achieved with the minimum transfer section as shown in Figure 1 between the two carding cylinders it will be appreciated that other transfer sections are possible. One such is illustrated in Figure 3, wherein parts similar to parts of Figure 1 are given the same reference numeral with the suffix a. In this embodiment, the centre section comprises a doffer 21 from the first carding cylinder, feeding the web between a pair of smooth surfaced crush rollers 22, 23. The web is taken from the crush rollers by transfer rollers 24, 25 to a takerin 26 for the second carding cylinder 7a. This extended centre section requires a longer path of travel for the flats 11a between the two cylinders, so that additional block wheels 16a as shown are necessary. It is also advisable to separate the flats from the rollers of the centre section by a guard 27 to prevent any waste falling from the flats on to those rollers.

Other centre section arrangements can be used if desired.

Claims

1. A carding machine comprising a first carding cylinder (4), means (1,2,3) for feeding material to be carded on to the first carding cylinder, a second carding cylinder (7), a plurality of transfer rollers for stripping material from the first carding cylinder and transferring it to the second carding cylinder, the cylinders and rollers having parallel

axes and being of substantially equal axial length, means (8,9,10) for stripping carded material from the second carding cylinder and delivering the carded material from the machine, drive means for driving the first and second carding cylinders in the same sense of rotation and for driving the transfer rollers, a plurality of flats (11) each comprising a flat bar (12) of length at least equal to the axial length of each cylinder, each flat bar extending parallel to the cylinder axes and supporting carding elements (13), means (15) linking each flat (11) to the two immediately adjacent flats to form a single closed chain of flats, and means for driving the chain of flats so that each flat travels in a closed path, parts of which pass immediately adjacent to an arc of the circumference of each of the first and second carding cylinders, so that the carding elements (13) cooperate in a carding action firstly with carding elements on the first carding cylinder, and then with carding elements on the second carding cylinder.

2. A carding machine according to claim 1 in which the transfer rollers comprise a doffer (5,21) for removing material directly from the first carding cylinder (4) and a takerin (6,26) for removing material directly from the doffer and transferring it directly on to the second carding cylinder (7).
3. A carding machine according to claim 1 or claim 2 in which the arcs are upper arcs of the cylinders (4,7), the closed path of the flats (11) extends above the transfer rollers (21,22,23,24,25,26) and a guard (27) extends in the space between the closed path and the transfer rollers.

Patentansprüche

1. Karde mit einem ersten Kardenzylinder (4), mit einer Einrichtung (1, 2, 3), welche zu kardierendes Material auf den ersten Kardenzylinder zuspeist, mit einem zweiten Kardenzylinder (7), mit einer Mehrzahl von Übertragungswalzen, welche das Material von dem ersten Kardenzylinder abstreifen und auf den zweiten Kardenzylinder übertragen, wobei die Zylinder und die Walzen parallele Achsen und im wesentlichen gleiche axiale Länge aufweisen, mit einer Einrichtung (8, 9, 10), welche das kardierte Material von dem zweiten Kardenzylinder abstreift und das kardierte Material aus der Maschine ausgibt, mit einer Antriebseinrichtung, welche den ersten und den zweiten Kardenzylinder im selben Drehsinn antreibt und die Übertragungswalzen antreibt, mit einer Mehrzahl von Deckeln (11), von denen jeder einen flachen Stab (12) umfaßt, dessen Län-

- ge mindestens gleich der axialen Länge von jedem Zylinder ist und der jeweils parallel zu den Zylinderachsen verläuft und Kardenelemente (13) trägt; mit einer Einrichtung (15), welche jeden Deckel (11) an den beiden unmittelbar benachbarten Deckeln derart anlenkt, daß eine einzige geschlossene Kette von Deckeln gebildet wird, und mit einer Einrichtung, welche die Kette von Deckeln derart antreibt, daß sich jeder Deckel auf einem geschlossenen Weg bewegt, der teilweise unmittelbar in der Nähe eines Bogens des Umfanges sowohl des ersten als auch des zweiten Kardenzylinders verläuft, derart, daß die Kardenelemente (13) kardierend zuerst mit Kardenelementen des ersten Kardenzylinders und dann mit Kardenelementen des zweiten Kardenzylinders zusammenwirken.
2. Karde nach Anspruch 1, bei welcher die Übertragungswalzen einen Abnehmer (5, 21), welcher Material direkt von dem ersten Kardenzylinder (4) entfernt, und eine Kratzenwalze (6, 26), welche Material direkt von dem Abnehmer entfernt und direkt auf den zweiten Kardenzylinder (7) überträgt, umfassen.
3. Karde nach Anspruch 1 oder 2, bei welcher die Bögen obere Bögen des Zylinders (4, 7) sind, der geschlossene Weg der Deckel (11) oberhalb der Übertragungswalzen (21, 22, 23, 24, 25, 26) verläuft und ein Schutz (27) in dem Raum zwischen dem geschlossenen Weg und den Übertragungswalzen verläuft.
2. Machine de cardage selon la revendication 1, dans laquelle les rouleaux de transfert comprennent un peigneur (5, 21) pour enlever le matériau directement du premier cylindre de cardage (4) et un cylindre briseur (6, 26) pour enlever le matériau directement du peigneur et le transférer directement sur le second cylindre de cardage (7).
3. Machine de cardage selon la revendication 1 ou la revendication 2 dans laquelle les arcs sont les arcs supérieurs des cylindres (4, 7), le passage délimité des plateaux (11) passant au-dessus des rouleaux de transfert (21, 22, 23, 24, 25, 26) et une protection (27) s'étendant dans l'espace entre le passage délimité et les rouleaux de transfert.

Revendications

1. Machine de cardage comprenant un premier cylindre de cardage (4), des moyens (1, 2, 3) d'alimentation d'un matériau à carder sur le premier cylindre de cardage, un second cylindre de cardage (7), une pluralité de rouleaux de transfert pour extraire le matériau du premier cylindre de cardage et le transférer sur le second cylindre de cardage, les cylindres et les rouleaux présentant des axes parallèles et des longueurs axiales essentiellement égales, des moyens (8, 9, 10) pour extraire le matériau cardé du second cylindre de cardage et pour distribuer le matériau cardé par la machine, des moyens d'entraînement pour entraîner le premier et le second cylindres de cardage dans le même sens de rotation et pour entraîner les rouleaux de transfert, une pluralité de plateaux (11) comprenant chacun un barreau plat (12) d'une longueur au moins égale à la longueur axiale de chaque cylindre, chaque barreau plat s'étendant parallèlement aux axes des cylindres et supportant des éléments de cardage (13), des

