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Description

This invention relates to carding engines.

Carding engine drives are complex and usually involve one or more central drive motors which drive through appropriate gear boxes all the various rotatable elements of the carding engine. Often the main carding cylinder has its own drive motor, separate from the drive for other components, but usually the stripper, doffer, crush rolls (if these are provided), calender unit and autoleveller (if such is provided) are driven from a common power source positioned in the region of the stripper rolls. Drive from this source, which may be a motor or a drive transmission element powered from a drive to the takerin or from the main cylinder drive, is also transmitted to the coiler, and in some cases this source may also drive the feed roller. Typical of such drives is that shown in GB—A—1092364, wherein a drive motor drives a main carding cylinder and a transmission is taken from the cylinder to a variable speed unit located at the feed end of the machine. A long belt drive extends the length of the machine to a shaft at the delivery end thereof. That shaft drives a doffer and other elements of a web takeoff system, together with calender rollers and a coiler. A further fixed, non-slipping transmission connects the doffer back to the takerin of the machine so that these are driven together in constant speed ratio.

Detail of the belt drive in GB—A—1092364 is not described. It may comprise a timing belt arrangement in order to ensure efficient power transmission to the calender unit and the coiler, as both have relatively high power requirements, and thus demand high power transmissions. If so, such drive will be costly. If it is a flat belt or V-belt drive then it is questionable whether there is reliable transmission of sufficient power. In either case the arrangement has disadvantages. A further disadvantage is the constant speed ratio between the doffer and the takerin, this prevents the takerin being rapidly and independently stopped should the doffer slow down due to a fault condition.

The invention seeks to provide a simple system for overcoming these disadvantages.

According to the invention a carding engine comprises a feed arrangement; a main carding cylinder; a web take-off system including a doffer downstream of the main carding cylinder, all elements of the web take-off system being coupled to be driven together as a common unit; a pair of calender rolls downstream of the web takeoff system; a controlled power source; a first drive transmission between the power source and a drive shaft for the calender rolls; and a second drive transmission between the power source and the web take-off system, and is characterised in that the first drive transmission is a high power transmission, the second drive transmission includes a flat belt and pulley capable only of transmitting lower power than the first drive transmission, a rotation sensor is associated with the doffer for sensing the speed thereof, and means are provided responsive to the sensor for stopping drive to the feed arrangement if the doffer speed falls below an acceptable speed.

Thus, in a system according to the invention there is a high power transmission to the calender unit, which requires significantly more power than any other unit at the delivery end of the machine. If an autoleveller and/or a coiler is present it is generally coupled to the calender unit for direct drive therefrom and these other units having relatively high power requirements thus also benefit from the high power drive from the power source. The web take-off system of a carding engine has, in contrast, very lower power requirements and the drive transmission to that system can be designed accordingly, so considerably simplifying the overall drive system in comparison with those previously used. Thus, a simple flat belt and pulley drive is used for the web take-off system, such drive being inexpensive and virtually maintenance-free in contrast to gear trains and timing belts that have previously been used in arrangements where power has been transmitted in the reverse direction. In an overload situation at the doffer the lower power flat belt transmission will obviously start to slip, without affecting the transmission to the calender, and the doffer will decelerate. This will be sensed by the sensor and accordingly the feed roller will be stopped, so preventing further feed of material and damage to the machine.

The web take-off system may be a peeler or fly-comb, or the more modern system of rotary stripper, together with crush rolls if required. A further drive transmission may also be provided from the power source preferably via the doffer to the feed roll of the carding engine, and if the carding engine is a duo-card also to a centre section takerin and to other centre section rollers. Again, these units have low power requirements and simple and inexpensive flat belt drives can be used.

The power source is preferably a motor mounted with the calender and having a controlled power supply, for example a supply controlled through a frequency converter such as an invertor. Alternatively, the power source may be a drive transmission element from the drive to the takerin or to the main cylinder, the transmission element being capable of control to give a controlled speed output to the calender unit.

When the power source is an independent drive motor mounted with the calender unit then the invention allows the further simplification that the calender unit and its motor may be part of an assembly that is separate from, and desirably free-standing with respect to, the remainder of the carding engine. Calender units have in the past been mounted on the frame system of the carding engine, but by making the calender unit as part of a separate assembly, construction both of the calender unit and of the carding engine can considering be simplified. The calender unit assembly will desirably include an autoleveller if such is provided, and will also preferably incorporate a coiler. In this way the whole of the processing equipment following the web take-off system can be constructed as a self-contained unit, drive being taken from that unit to the web take-off system by a drive transmission including a flat belt and pulley. In this way a particularly advantageous arrangement results.

In order that the invention may be better understood a particular embodiment of carding engine 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 elevation of part of the delivery end of a carding engine; and

Figure 2 is a schematic plan of the carding engine of Figure 1.

Referring to Figure 1 this shows part of the frame 1 at one side of a carding engine. A similar frame is provided at the opposite side and rotatably mounted between the frames are a doffer 2 rotatable about an axis 2*a*, a stripper roll 3 rotatable about an axis 3*a* and crush rolls such as 4 rotatable about axes 4*a* and 5*a*, each axis extending transversely of the frame.

An assembly shown generally as 6 is formed as a module separate from the remainder of the carding engine and is free-standing adjacent to or abutting the end of the carding engine. This assembly includes a calender unit having calender rolls 7 driven from a drive shaft 8. The assembly also includes an autoleveller 30 and a coiler 31 each driven from the shaft 8 through a gearbox 9.

The assembly 6 includes a base 6*a* through which the assembly is secured to the floor and on which is mounted a drive motor 10. Means for controlling the power supply to the motor, for example an inverter, and a fan or other cooling means are also incorporated into the assembly 6. The drive pulley 11 of the motor 10 drives directly through a flat or toothed belt 12 a pulley 13 secured to and rotatable with the calender drive shaft 8. Thus, the drive to the calender drive shaft from the calender motor is direct. The shaft 8 also provides input drive to the gearbox 9, from which output drive is taken to the autoleveller 30 and coiler 31 to provide high power transmission to these elements.

The gearbox 9 drives an output shaft 14 on which a pulley 14*a* may be releasably mounted to be driven from the gearbox. The pulley 14*a* drives by way of a belt 15 a pulley 16 secured to and rotatable with the shaft of the lower one of the pair of crush rolls. This shaft also carries a gear 17 which meshes with a gear 18 on the shaft of the upper crush roll 4, that shaft carrying a further pulley 19. A belt 20 connects the pulley 19 to a pulley 21 secured to rotate with the shaft of the stripper roll, and a further pulley 22 on that shaft drives through a belt 23 a pulley 24 secured to the shaft of the doffer.

The belts 15, 20 and 23 may all be simple flat belts driven by and driving around flat belt pulleys. High friction, high efficiency nylon core type belts are preferred, such belts exhibiting negligible slip on their pulleys and also negligible creep. Indeed, some creep can be tolerated as, contrary to traditional thinking in the carding industry, it has been found not essential to maintain fixed drive ratios between the feed and the takeoff elements of the carding engine. Small variations can be compensated for in autolevelling systems that are now available. The doffer, stripper roll and crush rolls have low power requirements, generally less than 0.5 hp in total and accordingly this lower power transmission system is entirely adequate and is inexpensive and maintenance-free. Furthermore, if the pulley of the assembly 14 and the pulley 16 are stack pulleys as shown in Figure 2 then the drive ratio to the web take-off system may very simply be changed merely by selecting the pulley sections on which belt 15 runs. Further adjustability is given by the facility readilyto replace the pulley 14*a* on shaft 14.

An autoleveller is schematically shown as present in the drawings, although it could of course be omitted. If an autoleveller is incorporated then it may be of the long-term type which adjusts the feed rate to the carding engine or of the short-term type which operates by adjusting the degree of draft applied in the calender system. In the former system, drive to the feed roller of the card is generally independent of the drive to the web take-off system, whereas in the latter system the feed roller is usually driven from the doffer. In this case, as indicated by broken lines in the drawing a further belt 25 may drive to a countershaft 26, from which a belt 27 extends the length of the card. The other end of the belt 27 drives a further countershaft, from which a further belt drive is taken to the feed roller. Similarly, the transmission shaft may drive the centre section elements of a duo-card, although more usually such elements will be driven from the breaker doffer of the duo-card.

In a long-term autolevelling system where the feed arrangement is driven independently of the doffer, the problem arises that feed of material to the carding engine may continue if the doffer, for any reason, stops rotating. Accordingly, when a long-term autoleveller is incorporated in the calender unit, and indeed even if this is not the case, the doffer may have a rotation sensor such as a tachometer associated therewith, the sensor being operable to produce an output signal if doffer speed falls below an acceptable value. That output signal can then be used to stop the drive to the feed arrangement to prevent further feed of material to the carding engine in a fault situation.

Claims

1. A carding engine comprising a feed arrangement; a main carding cylinder; a web take-off system including a doffer (2) downstream of the main carding cylinder, all elements (2, 3, 4) of the

web take-off system being coupled to be driven together as a common unit; a pair of calender rolls (7) downstream of the web take-off system; a controlled power source (10); a first drive transmission between the power source (10) and a drive shaft (8) for the calender rolls; and a second drive transmission between the power source (10) and the web take-off system, characterised in that the first drive transmission is a high power transmission (11, 12, 13), the second drive transmission includes a flat belt and pulley (14a, 15, 16) capable only of transmitting lower power than the first drive transmission, a rotation sensor is associated with the doffer (2) for sensing the speed thereof, and means are provided responsive to the sensor for stopping drive to the feed arrangement if the doffer speed falls below an acceptable speed.

2. A carding engine according to claim 1 characterised by a further drive transmission (25, 26, 27) from the power source (10) to a feed roll of the carding engine.

3. A carding engine according to claim 2 characterised in that the further drive transmission comprises a flat belt drive (25, 26, 27) from the web take-off system (2, 3, 4) to the feed roll.

4. A carding engine according to any one of the preceding claims characterised in that the power source is a motor (10) mounted with the calender unit (7) and having a controlled power supply.

5. A carding engine according to claim 4 characterised in that the calender unit (7) and the motor (10) are part of an assembly (6) that is separate from the remainder of the carding engine.

6. A carding engine according to claim 5 characterised in that the assembly includes an autoleveller (30) and a coiler (31).

7. A carding engine according to claim 5 or claim 6 characterised in that the assembly (6) is free-standing with respect to the remainder of the carding engine.

Patentansprüche

1. Kardiermaschine mit einer Zuführanordnung, einem Haupt-Kardierzylinder, einer Florabzugsanordnung mit einer dem Hauptzylinder nachgeschalteten Abnehmerwalze (2), wobei alle Teile (2, 3, 4) der Florabzugsanordnung miteinander zum Zwecke des Antriebes als Einheit gekoppelt sind, mit einem der Florabzugsanordnung nachgeschalteten Paar Kalanderwalzen (7), mit einer steuerbaren Kraftquelle (10), mit einem ersten Übertragungsgetriebe zwischen der Kraftquelle (10) und einer Antriebswelle (8) für die Kalanderwalzen, sowie mit einem zweiten Übertragungsgetriebe zwischen der Kraftquelle (10) und der Florabzugsanordnung, dadurch gekennzeichnet, daß das erste Übertragungsgetriebe ein Hochleistungsgetriebe (11, 12, 13) ist, daß das zweite Übertragungsgetriebe einen flachen Riemen und eine Riemenscheibe (14a, 15, 16) aufweist, die eine geringere Leistung als das erste Übertragungsgetriebe übertragen können, daß mit der Abnehmerwalze (2) ein Rotationssensor zur Aufnahme der Walzengeschwindigkeit vorgesehen ist, und daß auf den Sensor ansprechende Mittel zur Unterbrechung des Antriebes für die Zuführanordnung vorgesehen sind, sobald die Drehgeschwindigkeit der Abnehmerwalze unter einen annehmbaren Wert absinkt.

2. Kardiermaschine nach Anspruch 1, dadurch gekennzeichnet, daß ein weiteres Übertragungsgetriebe (25, 26, 27) zwischen der Kraftquelle (10) und einer Speisewalze der Kardiermaschine vorgesehen ist.

3. Kardiermaschine nach Anspruch 2, dadurch gekennzeichnet, daß das weitere Übertragungsgetriebe aus einem Flachriementrieb (25, 26, 27) zwischen der Forabzugsanordnung (2, 34) und der Speisewalze besteht.

4. Kardiermaschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Kraftquelle aus einem an der Kalanderwalze (7) angeordneten Motor (10) mit steuerbarer Leistungs-Versorgung besteht.

5. Kardiermaschine nach Anspruch 4, dadurch gekennzeichnet, daß die Kalandereinheit (7) und der Motor (10) Teil einer von der übrigen Kardiermaschine getrennten Baugruppe (6) sind.

6. Kardiermaschine nach Anspruch 5, dadurch gekennzeichnet, daß die Baugruppe eine Regulierstrecke (30) und eine Drehtopfvorrichtung (31) aufweist.

7. Kardiermaschine nach Anspruch 5 oder 6, dadurch gekennzeichnet, daß die Baugruppe (6) freistehend gegenüber der übrigen Kardiermaschine angeordnet ist.

Revendications

1. Une machine de cardage comprenant un arrangement d'alimentation, un cylindre principal de cardage, un système d'enlevage du réticule qui inclu un peigneur (2) en aval du cylindre principal de cardage, tous les éléments (2, 3, 4) du système d'enlevage du réticule étant couplés afin d'être entraînés ensemble comme unité commune; un pair de rouleaux calendraux (7) en aval du système d'enlevage du réticule couplé afin d'être entraîner ensemble comme unité commune; une source d'énergie controllée (10); une première transmission d'entraînement entre la source d'énergie (10) et un arbre d'entraînement (8) pour les rouleaux calendraux; et une seconde transmission d'entraînement entre la source d'énergie (10) et le système d'enlevage du réticule, caractérisée en ce que la première transmission d'entraînement est une transmission de haute puissance (11, 12, 13), la seconde transmission d'entraînement comprend une courroie et une poulie aplatie (14a, 15, 16) qui sont seulement capables de transmettre de puissance plus basse que la première transmission d'entraînement; un organe sensible à la rotation est associé au peigneur (2) à senser sa vitesse et des moyens sont prévus correspendant à l'organe sensible visant à arrêter l'entraînement de l'arrangement

d'alimentation si la vitesse du peigneur tombe au-dessus de la vitesse acceptable.

2. Une machine de cardage suivant la revendication 1, caractérisée par une transmission d'entraînement supplémentaire (25, 26, 27) allant de la source d'énergie (10) au rouleau entraîneur de la machine de cardage.

3. Une machine de cardage suivant la revendication 2, caractérisée en ce que la transmission d'entraînement supplémentaire comprend un entraînement de courroie applatie (25, 26, 27) allant du système d'enlevage du réticule (2, 3, 4) au rouleau entraîneur.

4. Une machine de cardage suivant l'une quelconque des revendications précédentes, caractérisée en ce que la source d'énergie est un moteur (10) fixé à une unité calendrique (7) et disposant d'une alimentation en énergie controllée.

5. Une machine de cardage suivant la revendication 4, caractérisée en ce que l'unité calendrique (7) et le moteur (10) font partie d'un assemblage (6) qui est séparé du reste de la machine de cardage.

6. Une machine de cardage suivant la revendication 5, caractérisée en ce que l'assemblage comprend un auto-nivelateur (30) et une bobine (31).

7. Une machine de cardage suivant la revendication 5 ou 6, caractérisée en ce que l'assemblage (6) est séparé du reste de la machine de cardage.

FIG.1

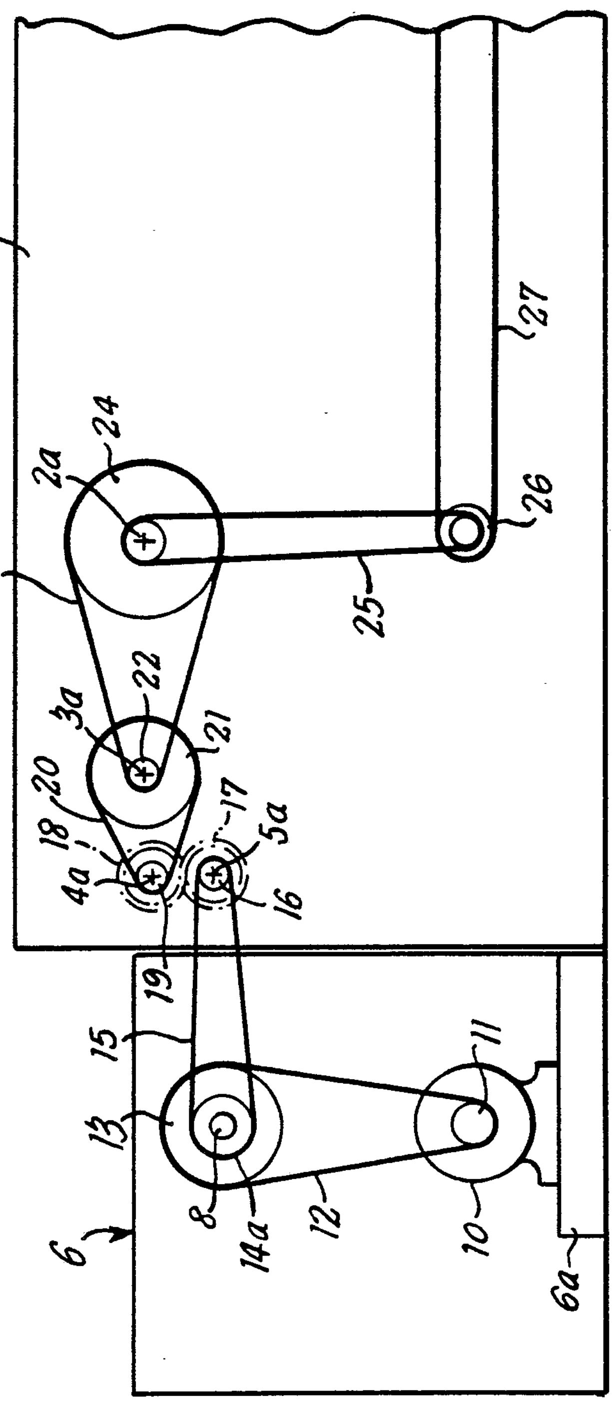
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FIG. 2