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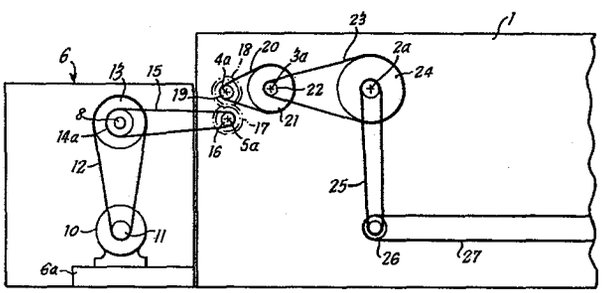
(54) Improvements relating to carding engines.

(57) A carding engine in which the calender unit (7) is driven directly from a motor (10), a coiler (31) and autoleveller (30) (if parallel) are driven by gearing from the calender unit. A belt drive (15) transmits power from the calender unit (7) to the web take-off system comprising a doffer (2), stripper roller (3) and crush rolls (4).



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IMPROVEMENTS RELATING TO CARDING ENGINES

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. In a duo-card the source may also drive rollers in the centre section of the card. Costly gear trains or timing belt arrangements have previously been necessary in order to ensure efficient power transmission to all these elements, particularly to the calender unit, autoleveller and coiler, as all have relatively high power requirements, and thus demand high power transmissions. The object of the present invention is to simplify the drive system of a carding engine.

According to the invention a carding engine having

a web take-off system and a calender unit is provided with a drive system that comprises a controlled power source, a direct drive transmission from the power source to the calender unit and a subsidiary drive transmission from the calender unit to the web take-off system.

Thus, in a system according to the invention the power source drives the calender unit directly, this being the unit at the front of the machine which requires significantly more power than any other unit in this area. 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 direct drive from the power source. The web take-off system of a carding engine has, in contrast, very low power requirements and the drive transmission from the calender unit to that system can be designed accordingly, so considerably simplifying the overall drive system in comparison with those previously used. For example, simple flat belt drives may be taken from the calender unit to the web take-off system, such drives being inexpensive and virtually maintenance-free in contrast to gear trains and timing belts that have previously been used for transmission of power in the reverse direction.

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 drive transmission may also be provided from the calender unit, 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 drives can be used. When drive is taken to the feed roll or to centre section rollers this is, again preferably by way of single belt drives.

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 of the carding engine by a suitable low-power drive transmission. 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 2a, a stripper roll 3 rotatable about an axis 3a and crush rolls such as 4 rotatable about axes 4a and 5a, 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 6a through which the assembly is secured to the floor and on which is mounted a drive motor 19. 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 14a may be releasably mounted to be driven from the gearbox. The pulley 14a 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 15runs. Further adjustability is given by the facility readily to replace the pulley 14a 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.

The invention has been particularly described in the context of a new card where full advantage can be taken of the drive simplification by the provision of simple belt drives. However, the invention is not so limited and it also finds application in conversions of existing cards. Thus, in such a conversion the drive motor is adapted to drive directly onto the calender shaft, and any existing transmission system between the calender shaft and the shafts of the doffer, stripper and crush rollers or of the elements of any other type of take-off system may be left in place to transmit power back from the calender shaft to those elements. The fact that the transmission is then being used only for lower power rather than high power transmission significantly prolongs its life and reduces the maintenance required. It would of course be possible as part of the conversion to remove the existing transmission, be it gearing or timing belt systems, and to replace it by a simple flat belt transmission system, although this extra expense may not be warranted. It is also possible as part of the conversion to cut back the frame of the card and remove therefrom any calender and autoleveller that may be present, replacing these by a free-standing calender unit.

CLAIMS:

1. A carding engine having a web take-off system, a calender unit and a drive system comprising a controlled power source, a direct drive transmission from the power source to the calender unit and a subsidiary drive transmission from the calender unit to the web take-off system.

2. A carding engine according to claim 1 and including an autoleveller and a further direct drive transmission from the calender unit to the autoleveller.

3. A carding engine according to claim 1 and including a coiler and a further direct drive transmission from the calender unit to the coiler.

4. A carding engine according to any one of the preceding claims in which the subsidiary drive transmission comprises a flat belt drive from the calender unit to the web take-off system.

5. A carding engine according to any one of the preceding claims and including a further subsidiary drive transmission from the calender unit to a feed roll of the carding engine.

6. A carding engine according to claim 5 in which the further subsidiary drive transmission comprises a belt drive from the web take-off system to the feed roll.

7. A carding engine according to any one of the preceding claims in which the power source is a motor mounted with the calender unit and having a controlled power supply.

8. A carding engine according to claim 7 in which the calender unit and the motor are part of an assembly that is separate from the remainder of the carding engine.

9. A carding engine according to claim 8 in which the assembly includes an autoleveller and a coiler.

10. A carding engine according to claim 8 or claim 9 in which the assembly is free-standing with respect to the remainder of the carding engine.

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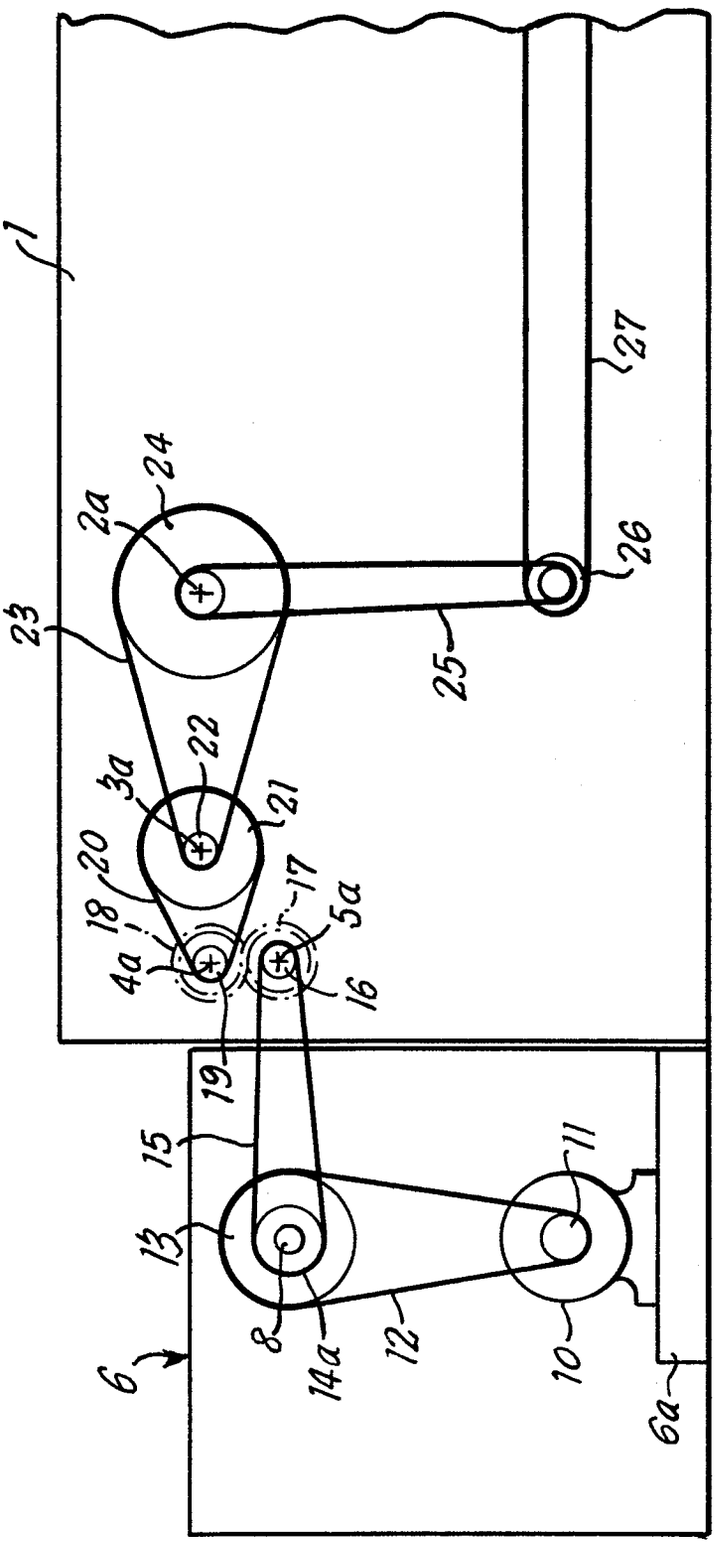
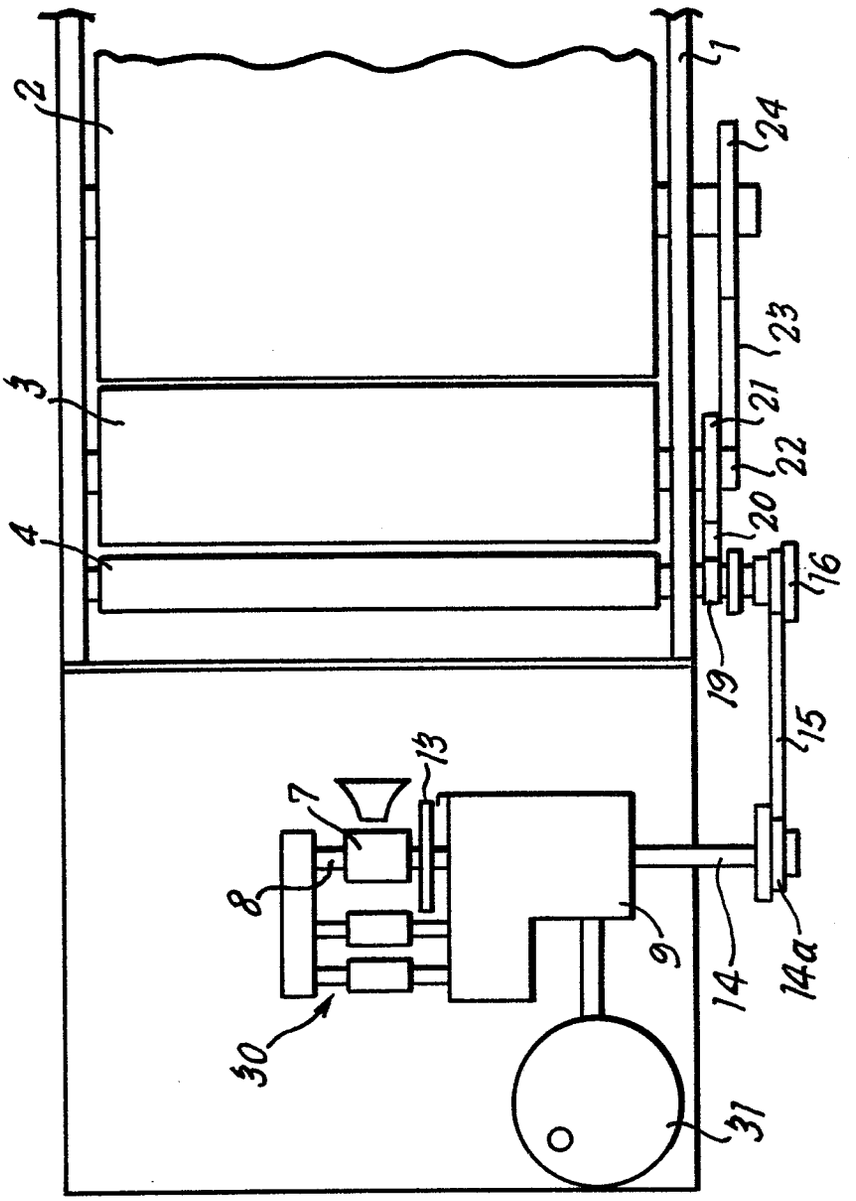


FIG. 1

FIG.2



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EUROPEAN SEARCH REPORT

0097025
Application number

EP 83 30 3326

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	GB-A- 614 568 (H. LISTER & SONS LTD.) * Page 3, lines 41-114; page 4, lines 7-61; figures 1-3 *	1	D 01 G 15/36
A	GB-A-1 092 364 (TMM LTD.) * Page 2, lines 45-80; figure 1 *	1,3	
A	GB-A- 793 680 (CARDING SPECIALISTS (CANADA) LTD.)		
A	US-A-3 703 023 (P. KRAUSS et al.)		

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

D 01 G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29-09-1983	MUNZER E.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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