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TEXTILE CARDING MACHINES

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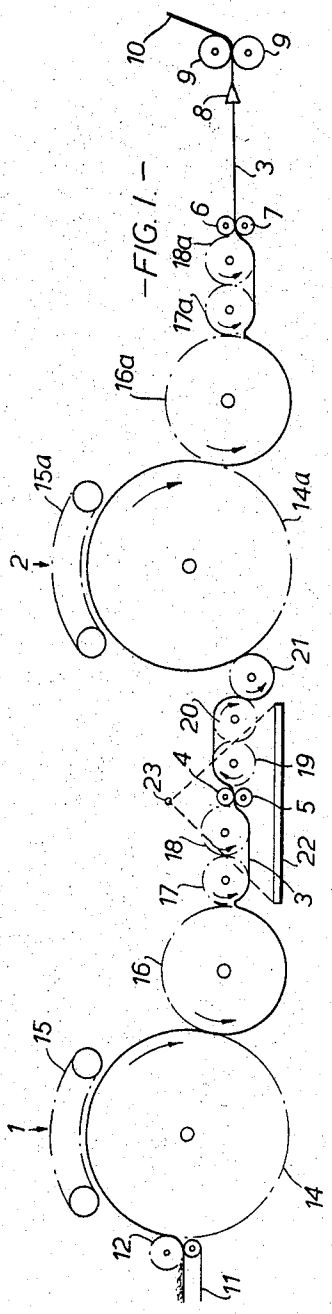

FIG. 1.

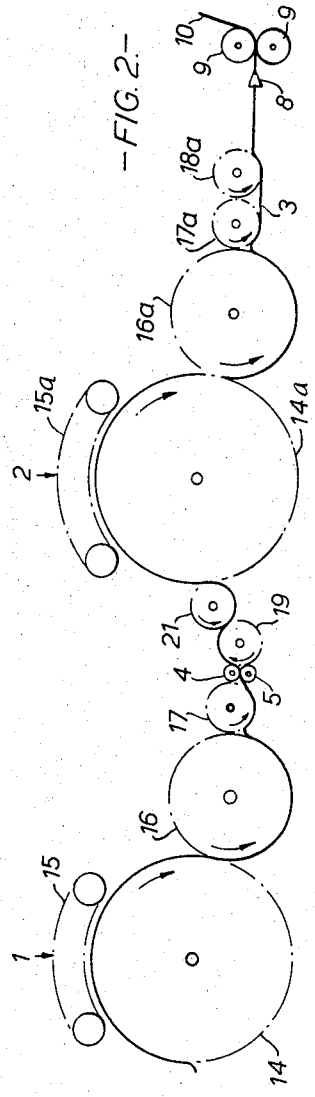

FIG. 2.

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TEXTILE CARDING MACHINES

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2 Claims. (Cl. 19—106)

This invention relates to the processing of cotton fibres and to cotton carding machines; the main components of which usually comprise a single card clothed cylinder co-operating with card clothed moving flats.

It was known practice several decades ago to subject cotton fibres to a double carding process by first passing the cotton through one card, producing a web, and then feeding this web to a second card. The web obtained from the second card was cleaner and contained less neps than a web treated only on a single card. Nevertheless, the process has been discontinued, presumably because the improvement in quality was not considered adequate to justify the extra expense.

According to this invention there is provided a method of processing cotton fibres consisting in submitting the fibres to a carding operation, transferring a thin uncondensed web of the carded fibres directly to a roller pressure applying stage, then transferring the web further in uncondensed form and submitting it to a second carding operation in one continuous process.

The invention includes apparatus including in combination a carding machine, a pressure roller assembly, and a second carding machine in that order, driven rotary means for transferring a thin web of cotton fibres from said first carding machine to the nip of the pressure rollers, and further driven rotary means for transferring the said web from the said pressure rollers on to the cylinder of the second carding machine for a further carding operation.

Thus it will be appreciated, that the invention consists essentially in the introduction of a pair of pressure rollers between two cotton carding machines. The pressure rollers are preferably positioned immediately on the exit side of the doffer of the first carding machine, so that they act upon the full width of the uncondensed carded web. As the web is very thin, the rollers not only smooth out (i.e. iron) the individual fibres, but they also crush neps and any impurities.

According to a preferred feature of this invention at least the doffer of each carding machine is driven at a higher surface speed (as herein defined) than is usually employed.

In reference to a "high surface speed," it has been found that it is possible to operate the machines to give an output up to seven times the normal output by using the method of controlling the web leaving the first doffer in accordance with the invention. Thus, whilst it is a well known mill practice to increase or decrease the doffer speed for different fibres or different qualities and counts of finished sliver, such variations in high speed have been variations only in degree (e.g. 10 percent faster or 5 percent slower) but the "high speeds" referred to herein are of a different order (e.g. 3 times as fast as normal). By "high speeds," therefore, is meant a speed which is above the ordinary range of mill variations. Cylinder speeds may be normal or almost double or more than double the speeds which would otherwise be employed for any particular fibre.

The invention will now be more particularly described with reference to the accompanying drawing in which:

FIG. 1 is a substantially diagrammatic side view of one arrangement of two carding machines and two pressure roller assemblies; and

FIG. 2 is a similar substantially diagrammatic side view of a modified arrangement of the improved apparatus.

Referring to FIG. 1 there are two cotton type carding machines **1**, **2** arranged in tandem (i.e. so that the web **3** from the first carding machine can be fed to the second carding machine). Between the two carding machines there is a first pressure roller assembly **4**, **5** and a second pressure roller assembly **6**, **7** follows the second carding machine **2**. There is also a condenser trumpet **8** and calender rollers **9** for forming a sliver **10** from the web issuing from the second machine **2**, and there can be the usual provision for collecting the sliver, such as the well known sliver coiling can arrangement or so-called "Railroad."

The first carding machine **1** is conventional in construction, in that it has the usual feed lattice **11**, lickerin roller **12**, cylinder **14**, card clothed flats **15** and doffer **16**. Unlike the conventional machine however it is not fitted with a fly comb for stripping the doffer. Instead a card clothed stripper roller **17** is arranged to remove the carded web **3** from the doffer **16** and a transferring or redirecting roller **18** (which may be clothed with small tooth metallic wire) removes the web from the stripper roller **17** and forwards it to the nip of the first pressure rollers **4**, **5**. Roller **18** may be of less diameter than roller **17** but close to roller **4** (or **5**).

This first pair of pressure rollers **4**, **5** are pressed together under load for the purpose of smoothing the fibres of the carded web, and crushing impurities present in the web. These rollers act on the full width of the web, and are driven by gearing or belt drives from the first carding machine drive, or by independent motor. This drive can be so arranged that there is a drafting effect between the doffer **16** and the pressure rollers **4**, **5**.

A card clothed stripper roller **19** strips the web **3** from the first pressure roller assembly **4**, **5** and the web is transferred from this stripping roller **19** by means of an intermediate card clothed transfer roller **20** to the taker-in roller **21** of the second carding machine **2**. These rollers **19**, **20** are rotated so that the web **3** from the pressure rollers **4**, **5** passes on top of the stripper and intermediate roller on its way to the second carding machine. This ensures that the web is visible to the operator so that any fault may be detected easily. Also the quality and consistency of the web can be observed. Alternatively, the web may be passed under the axes of the rollers **19**, **20**. In yet another arrangement the rollers **19**, **20** may be rotated at a speed and in a manner that will break up the web before it passes to the second cylinder **14***a*.

The second carding machine **2** is like the first machine **1**, and its doffer **16***a* is stripped by an arrangement of a stripper roller **17***a* and transfer or redirecting roller **18***a*, which may be of different diameters, identical with that which strips the doffer **16** of the first machine **1**. The second pressure roller assembly **6**, **7** is identical with the first assembly **4**, **5**, but from these pressure rollers **6**, **7**, the further carded web **3** is led through the condenser trumpet **8** to the pair of calender rollers **9** and thence to the sliver collecting device or "Railhead."

Conveniently the assembly **4**, **5** (or each pressure roller assembly) together with its associated rollers **17**, **18**, **19**

and 20 and the drive for all these rollers, may be mounted on a single frame 22 so that the whole can be displaced as a unit from its operative position between the two carding machines 1, 2. The frame 22 may have sliding means 23 to be engaged by lifting tackle.

As there may be a tendency for some impurities and/or fibres to stick to one or the other of the pressure rollers, means may be provided for keeping them clear. For example, scraper blades may be pressed into engagement with the surface of each roller, either by springs or by weighted levers or both. However, any other convenient means may be provided for this purpose.

The pressure rollers may be cylindrical, but it may be desirable to make them slightly barrel shaped to compensate for deflection when pressed tightly together and so ensure contact along the entire lengths of the rollers. Another way of ensuring even distribution of pressure is to arrange the rollers with their axes slightly inclined to one another or crossed; that is, by swinging one roller about an axis which is radial to both rollers and passes through the mid point of both roller axes, such an arrangement being U.S. Patent No. 2,762,295.

The web taken from doffer 16 to the pressure rollers 4, 5 by the use only of a stripper roller 17 (FIG. 2), or by the use of one or more transfer rollers 18. Moreover, as shown in FIG. 2 the web passing from the nip of the pressure roller assembly 4, 5 can be stripped by stripper roller 19 (it may be taken therefrom by one or more transfer rollers) which in turn can be stripped by a taker-in roller 21 from which the web will be stripped by the cylinder 14*a* of the second carding machine 2. Also as shown in this view the second doffer 16*a* may be stripped by stripper roller 17*a* and the web taken therefrom by roller 18*a* for the web to be passed on through a trumpet 8 and between calender rollers 9 and thence to the usual type of sliver collecting means. It will be observed in this arrangement the second pressure roller assembly is dispensed with although of course it could be used if desired.

It will be understood that when the web is taken from a roller such as 17 or 19 by a roller such as 18 or 20 so that the web extends over the arc between rollers, the succeeding roller has a slightly faster surface speed to cause this and may have a slight drafting effect.

The carding machines may be driven at cylinder speeds from normal up to approximately 320 revolutions per minute with the doffers 16, 16*a* rotating at say 26 revolutions per minute. The speeds of the doffers may be up to 5 or 6 times the ordinary doffer speed.

At these high speeds, both carding machines work the fibre stock at a much greater rate of feed than is usual. This is the result of the increased doffer speeds. Increased cylinder speeds enable the machines to perform the carding action more efficiently, because (a) the density of the fibres on the cylinder surface is reduced, and (b) the cylinder wires act more severely on the fringe of fibres caught by the flats and doffer. The effect of this greater carding efficiency will show itself in the quality of the sliver produced by the tandem machines, although there is an improvement even at normal cylinder speeds.

The pressure rollers 4, 5, 6 and 7 have a purifying action upon the web. This action is greatly improved when used in conjunction with the tandem carding, even if only one pressure roller assembly is provided between the two carding machines. Where a second pressure roller assembly 6, 7 is also fitted after the second carding machine 2 the resultant improvement in the carded web 3 and sliver 10 produced from that web is even greater. It will be appreciated that impurities crushed in the first pair of pressure rollers 4, 5 are disintegrated by the carding action of the second carding machine 2. The second pair of pressure rollers 6, 7 then act upon a fibre web that approaches the ideal as regards fibre distribution, levelness and cleanliness. A few remaining impurities which might have escaped disintegration previously because they were cushioned in fibre agglomerations in the web at the end of the first machine are almost certain to be fully exposed to the crushing action of the second pressure rollers 6, 7. Moreover, the disintegrated bits of the impurities produced on the second carding machine will probably be thrown under the cylinder and doffer of that machine, and extracted in the flat and cylinder waste. This removal of impurities during carding means that less waste is produced in subsequent processes.

It is found that by using the present invention, the quality of the cotton sliver obtained from the second card is a great improvement on that obtained from a single card. In fact, the quality approximates to that of combed cotton as regards the absence of trash and/or neps. Moreover, the yarn spun from such a sliver is fuller and rounder than if the cotton had been combed and, of course, the loss of fibres in the second card is considerably less than would be extracted by combing the sliver that had been carded once only.

What is claimed is:

1. In a high speed high production cotton carding apparatus the combination comprising, a first cylinder and doffer and drive means rotating same about their axes, means including a first stripping roller disposed immediately adjacent said doffer for removing a fiber web from said first doffer, means rotating said stripping roller about its axis and in the same angular direction as said doffer, and also including a first transfer roller positioned immediately subsequent to said stripping roller to receive the web therefrom and rotating in the same angular direction as said stripping roller, a pair of smooth surfaced web ironing and impurity crushing rollers positioned subsequent to said transfer roller in the line of advance of said web and adapted to receive the web uncondensed and in full width, means including a second stripping roller arranged to rotate about its axis in an angular direction opposite to that of said first stripper roller and positioned subsequent to said ironing and crushing rollers to receive the web from the nip of same and also including a second transfer roller positioned immediately subsequent to said second stripping roller to receive the web therefrom, and a second cylinder and doffer adapted to receive the web from said last-mentioned means, said web passing over the top of one of said means so as to be visible for inspection during production.

2. In a high speed high production cotton carding apparatus the combination comprising, a first cylinder and doffer and drive means rotating same about their axes, means including a first stripping roller disposed immediately adjacent said doffer for removing a fiber web from said first doffer, means rotating said stripping roller about its axis and in the same angular direction as said doffer, and also including a first transfer roller positioned immediately subsequent to said stripping roller to receive the web therefrom and rotating in the same angular direction as said stripping roller, a pair of smooth surfaced web ironing and impurity crushing rollers positioned subsequent to said transfer roller in the line of advance of said web and adapted to receive the web uncondensed and in full width, means including a second stripping roller arranged to rotate about its axis in an angular direction opposite to that of said first stripper roller and positioned subsequent to said ironing and crushing rollers to receive the web from the nip of same and also including a second transfer roller positioned immediately subsequent to said second stripping roller to receive the web therefrom, a second cylinder and doffer adapted to receive the web from said last-mentioned means, said web passing over the top of one of said means so as to be visible for inspection during production, means including a stripping roller and transfer roller positioned subsequent to said second cylinder and doffer and each arranged to rotate in the same angular direction of said sec-

ond doffer and to receive the web from said second doffer, and a second pair of web ironing and impurity crushing rollers receiving the web in their nip in full width from said last-mentioned stripping roller.

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