United States Patent [19]

Varga et al.

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[54] **APPARATUS FOR HIGH SPEED STRIPPING OF CARDED COTTON WEBS**

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[21] Appl. No.: **766,365**

Related U.S. Application Data

[63] Continuation of Ser. No. 520,537, Dec. 6, 1965, abandoned, which is a continuation of Ser. No. 206,812, July 2, 1962, abandoned.

[30] **Foreign Application Priority Data**

July 20, 1961 Great Britain.....26,271/61

[52] **U.S. Cl.**.....**19/106 R,** 19/65 CR

[51] **Int. Cl.**.....**D01g 15/46**

[58] **Field of Search**.....19/106, 98, 99, 65, 19/109

[56] **References Cited**

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[57] **ABSTRACT**

An apparatus for converting carded fibers into a web comprises a card clothed doffer, a card clothed stripper roll, and a bare roll mounted respectively one after the other in the direction of movement of the web. The stripper roll is mounted with its teeth close to, but without penetrating, the teeth of the doffer so that the teeth of the stripper roll engage the fibers on the doffer for transferring the fibers from the doffer to the stripper roll. Means are provided, for detaching the fibers from the stripper roll in the form of a web, comprising a pair of superposed bare rolls rotating at a speed higher than that of the stripper roll and gripping the web therebetween to pull on the web with a force sufficient to detach it from the stripper roll.

5 Claims, 4 Drawing Figures

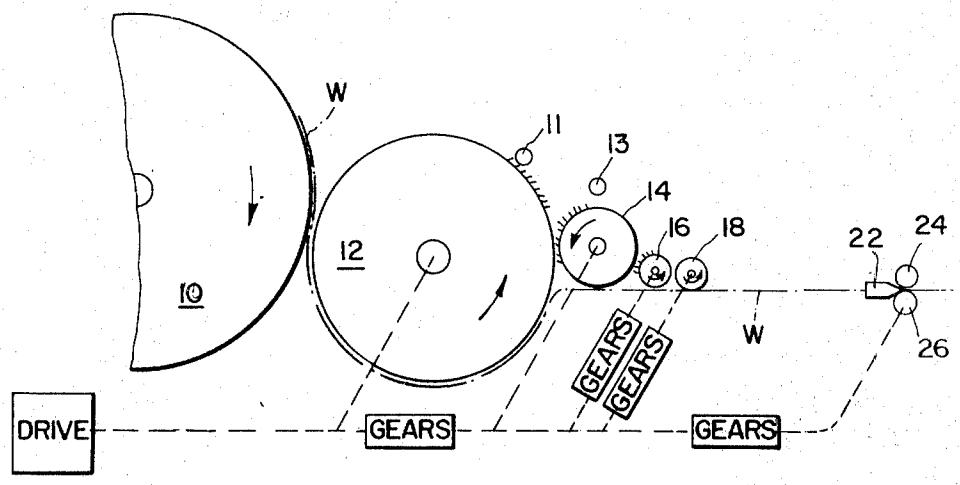


FIG. 1

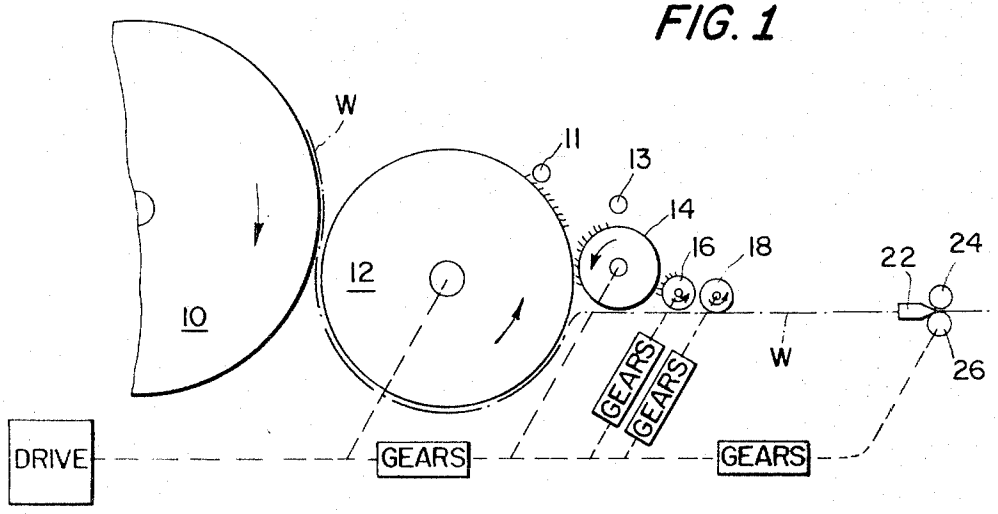
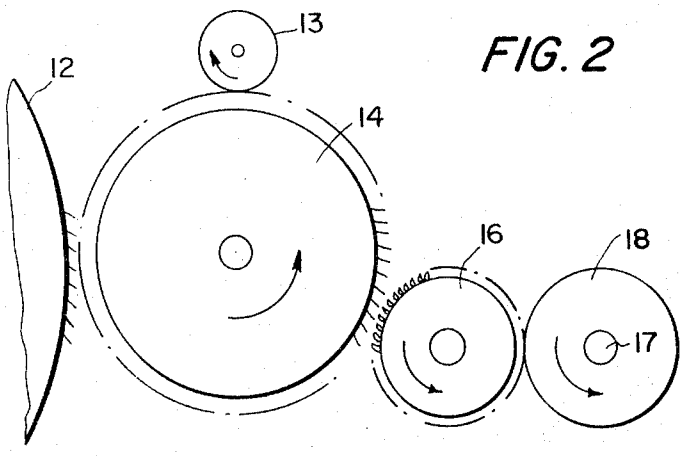


FIG. 2



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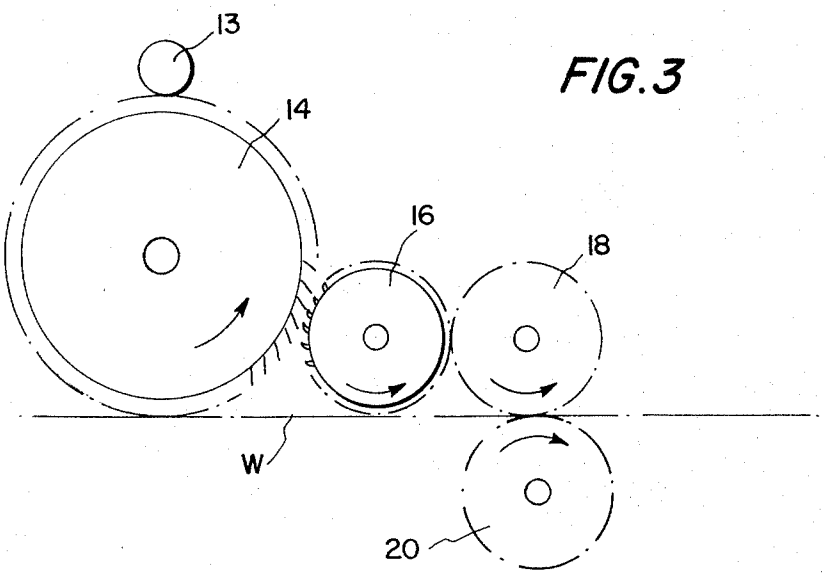


FIG. 3

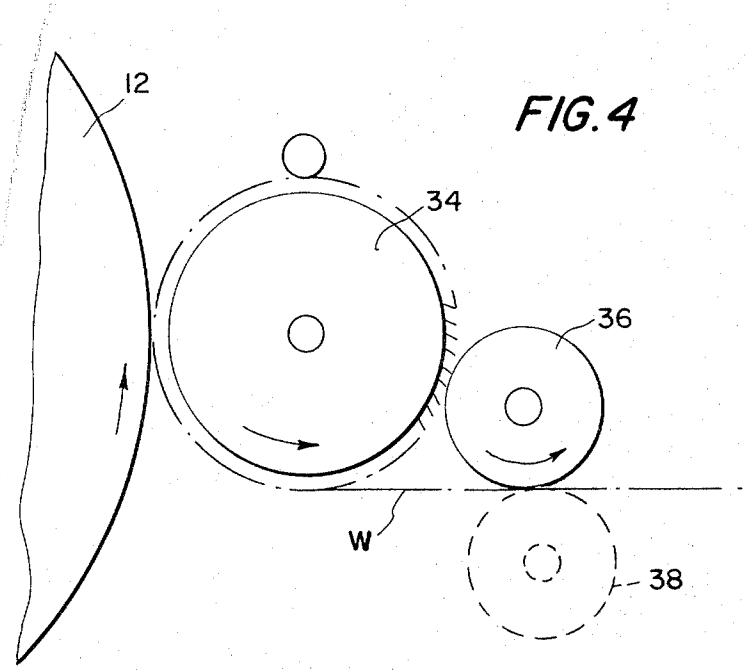


FIG. 4

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APPARATUS FOR HIGH SPEED STRIPPING OF CARDED COTTON WEBS

The instant application is a continuation of our prior U.S. application Ser. No. 520,537 filed Dec. 6, 1965, now abandoned, which was in turn a continuation of our still earlier U.S. application Ser. No. 206,812 filed July 2, 1962, now abandoned.

The present invention relates to novel means for stripping a carded web of fibers from the doffer of a cotton card.

The function of the doffer of a cotton card is to doff a thin, evenly distributed fleece of carded fibers from the surface of the card cylinder. This fleece must in turn be stripped from the doffer in the form of a fragile but self-supporting web which can be pulled through a trumpet by the calender rolls and thereby condensed into a sliver.

The instrumentality heretofore most commonly used for stripping the doffer of a cotton card is the fly comb, also called a doffer comb. The oscillatory principle upon which the fly comb operates imposes a limitation upon the speed and output rate at which the card can safely and reliably be operated. It is generally considered impracticable to operate a cotton card of the usual 40-inch width equipped with a fly comb, producing an average 55 grain per yard sliver, at an output rate of more than about 20 lbs. per hour.

Persons skilled in the art have long sought to de-vise alternative methods and instrumentalities for stripping the doffer which would enable higher operating speeds than are permissible with the use of a fly comb. One such alternative consists of a pair of take-off rolls, the construction and operation of which are described in United States Pat. No. 2,910,736. While take-off rolls are not subject to the speed restrictions imposed by the oscillatory fly comb, such devices, because of other difficulties and problems attendant upon their use, have not achieved widespread acceptance.

Another such alternative which has been proposed is shown in British Pat. No. 942,540. That proposal relies upon differential air pressures applied to the insides of the card cylinder and doffer, both of which have perforated sur-faces, to assist in transferring fibers onto the doffer from the card cylinder and to assist in stripping the web from the doffer without the necessity for using a fly comb.

While the proponents of the above described attempts to eliminate the fly comb have recognized the limitations imposed by that device, as far as we are aware neither of these proposed alternatives has been commercially successful to any appreciable extent. In spite of all efforts to devise alternative means, the use of the conventional fly comb has, up to the present time, remained standard in the cotton industry.

In woolen carding, on the other hand, a card-clothed stripper roll has sometimes been used for stripping the doffer. Being held less tenaciously by the clothing of the stripper roll than by the clothing of the doffer, the web of relatively long wool fibers, which is relatively heavy and oily, detaches itself from the stripper roll by gravity, and falls onto a moving lattice beneath whereby it is supported in full width and carried forward. To guard against occasional tendencies of the web to cling to and wrap around the stripper roll a bare peeler roll is arranged with its axis parallel to that of the stripper roll and with its surface in close proximity to

that of the stripper roll. As and when the clinging wool web starts to be carried up and around by the clothed surface of the stripper roll it enters the arc of cooperation between the stripper and peeler rolls, and is peeled from the former by the oppositely moving surface of the latter. Such an arrangement is shown in British Pat. No. 3168 of 1869.

Inasmuch as it has a rotary rather than oscillatory motion, the stripper roll is not subject to the speed limitations of the fly comb. Until now, however, the stripper roll principle has not been successfully adapted to cotton carding. The web which has to be stripped from the doffer of a cotton card, which is free of oil and weighs less per unit area than a woolen web, will not detach itself by the action of gravity from a card-clothed stripper roll under normal operating conditions. Neither can such a web be peeled from the card-clothed surface of a stripper roll by the action of a cooperating bare peeler roll, because the web will tend to go through the arc of cooperation between the stripper and peeler rolls and wrap around the former, causing an end down.

If reliance should be placed solely upon the pulling action of the calender rolls to detach the web from a stripper roll in cotton carding, parts of the web, especially the selvage edges, will soon tear and adhere to and wrap upon the stripper roll, due to the tenacity with which the fibers cling to the clothing of the stripper roll and to angular direction of the pull exerted by the calender rolls on portions of the web.

We have achieved by our invention an effective solution to the problems presented and have constructed a highly successful web removal means based on the striper roll concept for use on a cotton card. Through the use of our invention output rates of upwards of 60 lbs. per hour, and more, can safely and reliably be achieved, using a cotton card of normal width producing an average 55 grain per yard sliver.

According to our invention a carded web of fibers is removed from the doffer of a cotton card by means of a train of rollers consisting of one or more card-clothed rollers followed by a bare roller, and by exerting a drafting action upon the web between the first and last rollers of the train, using for that purpose either the calender rolls or a pair of crush rolls as more fully hereinafter described. The first roller of this train is a card-clothed stripper roll, which is arranged and so rotated as to strip the web from the doffer in the normal manner. One or more card-clothed redirecting rolls may be placed between this stripper roll and the bare roller. For a brief interval during initial threading, the last bare roller of the train serves as a peeler roll vis-a-vis the card-clothed roll which immediately precedes it in the train, but as soon as the system is in operation, be-cause of the drafting action referred to, the bare roller ceases to serve as a peeler roll and assumes two other essential functions: (1) it acts to maintain the web in substantially full width as it is detached from the card-clothed roller which precedes it, thereby preventing any substantial angularity of pull upon the selvage edges of the web as it is so detached; and (2), because of its vertical placement vis-a-vis the card-clothed roller which precedes it, the bare roller ensures that the web will be detached from said card-clothed roller (by the pull exerted by the calender or crush rolls) at or

near the bottom-most point of the circumference of the latter, and before the web can enter the arc of cooperation between the bare roll and said card-clothed roll.

The last, bare roller of the train is without card clothing, but it may have a somewhat roughened surface in order to enable it better to perform its functions previously described. It is preferred that the bare roller be one of a pair of crush rolls.

Wherever used in this patent application, "to exert a drafting action upon the web," or "to draft the web," means merely to pull upon the web with a force sufficient to detach it. To produce this drafting action the calender rollers or crush rolls, as the case may be, should be rotated at a sur-face speed of from about 3 percent to about 40 percent greater than that of the stripper roller. The selection of a suitable speed ratio for any given set of operating conditions will be within the skill of the art, and in any case the draft should be sufficient to prevent a wrap-up of the web on the card-clothed rollers but not so great as to tear the web.

The invention will now be more particularly described by reference to the drawings, wherein:

FIG. **1** is a diagrammatic side view of a cotton card, showing the environment of the invention;

FIG. **2** is a diagrammatic side view of the train of rollers shown in FIG. **1** on a larger scale;

FIG. **3** is a diagrammatic side view of a train of rollers showing another arrangement in which the last, bare roller is the upper one of a pair of crush rolls; and

FIG. **4** shows an arrangement like that of FIG. **3** but without a redirecting roller.

Referring first to the arrangement shown in FIGS. **1** and **2** of the drawings, **10** is the card cylinder and **12** the doffer of a cotton card of the usual type. The cylinder is illustrated as rotating in a clockwise direction and the doffer in a counter-clockwise direction. The carded fleece of fibers (indicated by the chain line *w*) passes into the arc of cooperation between the cylinder and doffer and thence down and under the doffer. At the opposite side of the doffer from the cylinder is a card-clothed stripper roller **14**. The drive to the stripper roller is ordinarily such that it rotates in the same angular direction as the doffer, as shown in FIGS. **1** and **2**, but the stripper roller could be made to rotate in an angular direction opposite to that of the doffer, as is well understood, in which case the fleece *w* would pass up and over the stripper roll. In any case the inclination of the clothing teeth on the doffer and stripper roller is such as to produce back-to-back working of the teeth. The surface speed of the stripper roll should be more or less the same as that of the doffer.

As shown in FIGS. **1** and **2**, the stripper roller strips the carded fleece from the doffer as it enters the arc of cooperation between the doffer and such stripper roller, and the fleece is carried down and under the stripper roller. As shown in FIGS. **1**, **2** and **3**, a card-clothed redirecting roller **16** may be provided to strip the carded fleece from the stripper roller by back-to-back working of the clothing teeth. The redirecting roller is usually driven in the same angular direction as the stripper roller. Its surface speed should be more or less the same as that of the stripper roller.

A bare roller **18** is set close enough to the redirecting roller to enable it to peel the web from the redirecting roller as the machine is initially set in operation. As is known in the art, this setting depends on such things as staple length, surface character of the bare roller, and the desired web thickness. The bare roller **18** is always driven in the same angular direction as the redirecting roller **16**. The surface speed of the bare roller should be greater than that of the redirecting roller. It will be noted that the web is detached, because of the placement of the bare roller **18** and by the action of the draft exerted upon it, from the redirecting roll **16** at or near the bottom-most point of the rotating surface thereof. As shown in FIG. **1** the web *w* is pulled to the right, and thus drafted, by calender rolls **24**, **26**, through a trumpet **22** and thence to a sliver collecting device (not shown).

Crush rolls may be, and preferably are, used for providing the requisite draft in the web leaving the stripper roll or the redirecting roll, as the case may be, as shown in FIGS. **3** and **4**, in which case the calender rolls should be rotated at a still higher surface speed than that of the crush rolls. For purposes of the present invention it is necessary only that the crush rolls grip the web sufficiently to exert the requisite drafting action upon it.

In the modification shown in FIG. **3** bare roll **18** constitutes the top roll of a pair of crush rolls **18** and **20**. The carded web *w* passes through the nip of the crush rolls, and the requisite draft is imparted to the web by rotating the crush rolls at a surface speed higher than that of the stripper and redirecting rolls **14**, **16**, as previously described.

Referring now to the arrangement shown in FIG. **4**, a card-clothed stripper roll **34** strips the doffer in exactly the same manner as does the stripper roll **14** described in the arrangement shown in FIGS. **1** and **2**. A bare roller **36**, which in this case, too, is one of a pair of crush rolls, is positioned so as initially to peel the carded web *w* from the stripper roller **34**. After initial threading, because of the drafting action exerted by the roll pair **36**, **38**, and the position of the roll **36**, the web *w* is prevented from wrapping upon roll **34** due either to angularity of pull on the web or to the web entering the the arc of cooperation between the rollers **34** and **36**.

The stripper roller should preferably be considerably larger than conventional stripper rolls such as are used to strip worker rolls on some types of cards, and of the order of 6½ inches in diameter (measured over the clothing).

In each of the modifications described herein, drive means, shown diagrammatically in FIG. **1**, are provided to operate the various rolls and rollers in the manner described and those persons skilled in the art will find no difficulty in arranging such drive means accordingly.

The bare roller, and the redirecting roller or rollers if used, are preferably about **3** inches in diameter.

Clearer rollers of any suitable type, as shown at **11** and **13**, are provided to clear all card-clothed rollers of the system, including the doffer **12** and the stripper roller **14**.

If on occasion the last, bare roller fails initially to peel the web from the card-clothed roller which precedes it in the train, a slight wetting of its surface is ordinarily sufficient to start the peeling action to enable threading.

As previously noted, the carded fleece or web may be caused to pass up and over, rather than down and under, the stripper roll so that it may be viewed from above during operation.

We claim:

1. A cotton card for converting fibers into a web, said card comprising a card clothed doffer, a card clothed stripper roll, at least one further card clothed roll and a bare roll mounted respectively one after the other in the direction of movement of the web, each said roll having a length at least equal to the width of said web and the axes of rotation thereof being substantially parallel, means for rotating said doffer and said stripper roll at substantially the same surface speeds, said stripper roll being mounted with its teeth close to, but without penetrating, the teeth of said doffer so that the teeth of said stripper roll engage the fibers on the doffer for transferring the fibers from the doffer to the stripper roll, said further roll being mounted with its teeth close to, but without penetrating, the teeth of said stripper roll, and with its teeth engageable with fibers on said stripper roll, means for rotating said further roll with a surface speed substantially equal to that of said stripper roll, means for detaching the fibers from said further roll in the form of a web, said means comprising a pair of crush rolls, one of which constitutes said bare roll, positioned to grip said web therebetween, said bare roll being mounted with its surface close to the teeth of said further roll and engageable with fibers on the latter, and means for rotating said bare roll in the same angular direction as said further roll with a surface speed greater than that of said further roll.

2. The apparatus of claim 1 wherein said means for rotating said doffer and said stripper roll includes means for rotating said stripper roll in the same angular direction as said doffer.

3. The apparatus of claim 1 including a clearer roll mounted for rotation adjacent said stripper roll.

4. The apparatus of claim 3 including a further clearer roll mounted for rotation adjacent said doffer.

5. The apparatus of claim 1 including a trumpet, and a pair of calender rolls for pulling said web from said bare roll through said trumpet for forming said web into a sliver.

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