

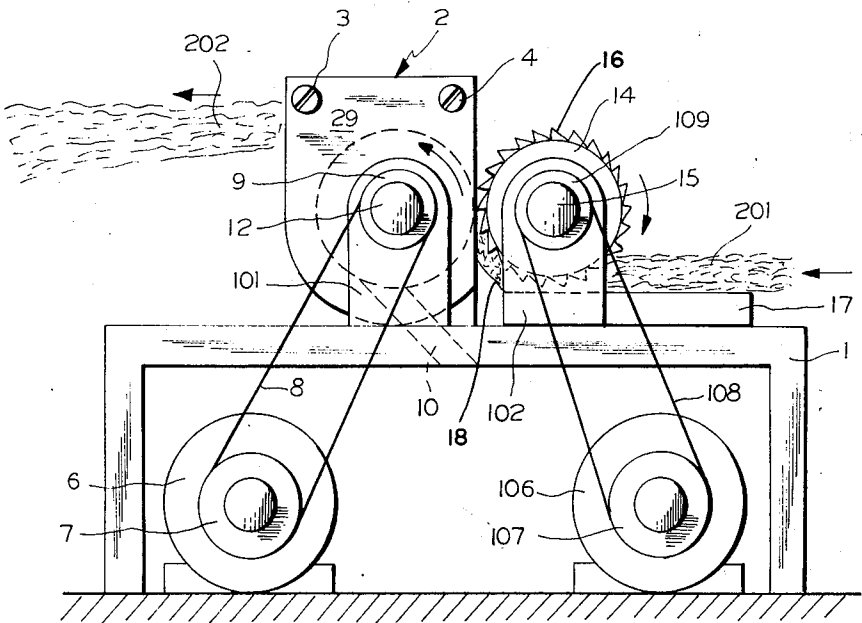
- [54] **CARD COVER WITH FIBER-CONVEYING CHANNELS**
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Agriculture**
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- [51] Int. Cl.**D01g 15/12**
- [58] Field of Search.....19/105, 106, 98, 99, 93, 90;
209/135, 142, 143, 138, 139, 250, 281, 283,
3

- [56] **References Cited**
- UNITED STATES PATENTS**
- 613,993 11/1898 Hart19/90
- FOREIGN PATENTS OR APPLICATIONS**
- 3,120 1865 Great Britain.....19/90
- Primary Examiner*—Dorsey Newton
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[57] **ABSTRACT**

A cover for a carding cylinder, is characterized by a series of fiber conveying channels adjacent the cylinder surface. The channels collectively take the form of an interrupted screw thread and function to move fiber across and around the cylinder in a helical path.

4 Claims, 4 Drawing Figures



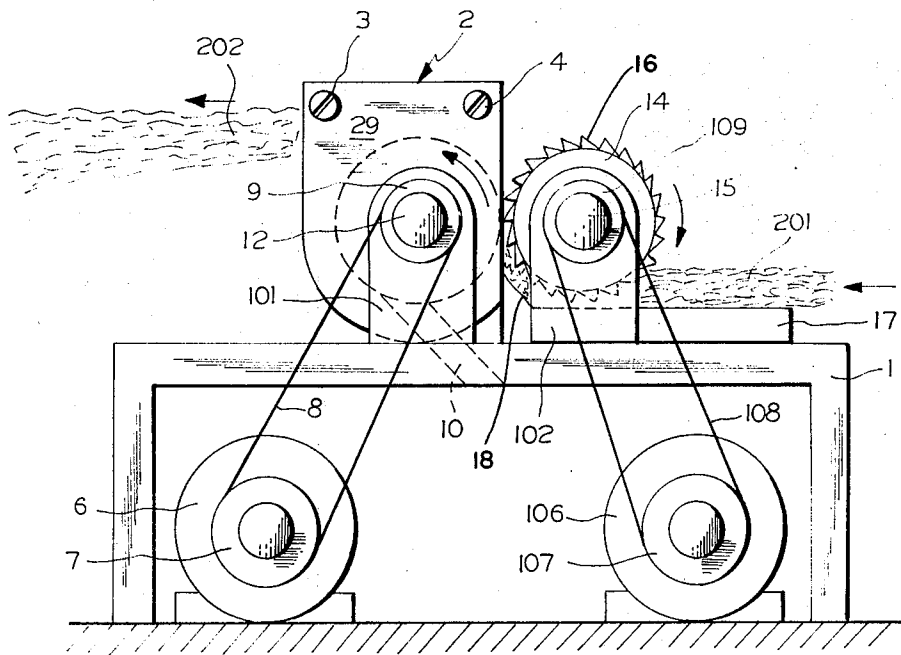


FIG. 1

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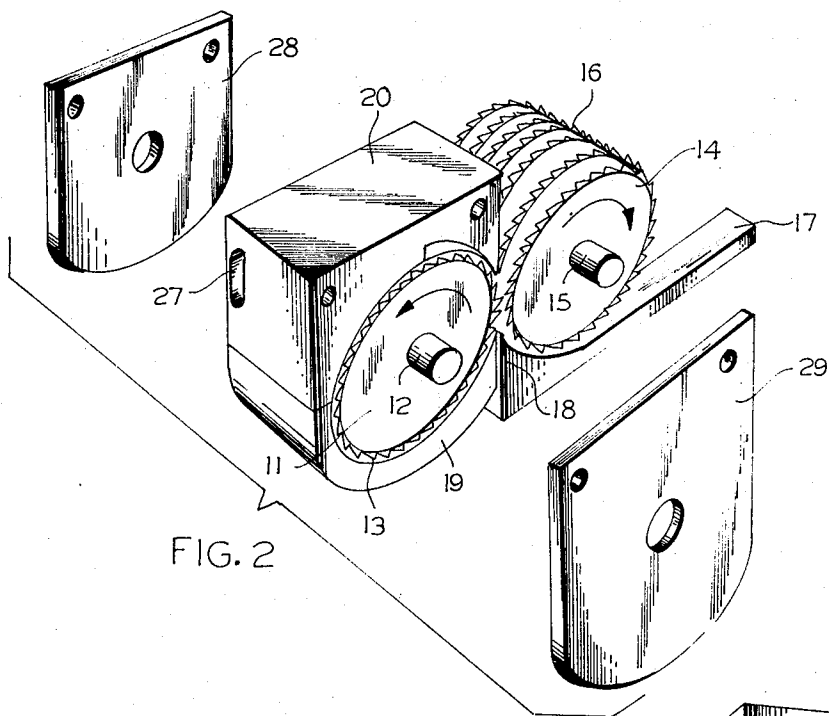


FIG. 2

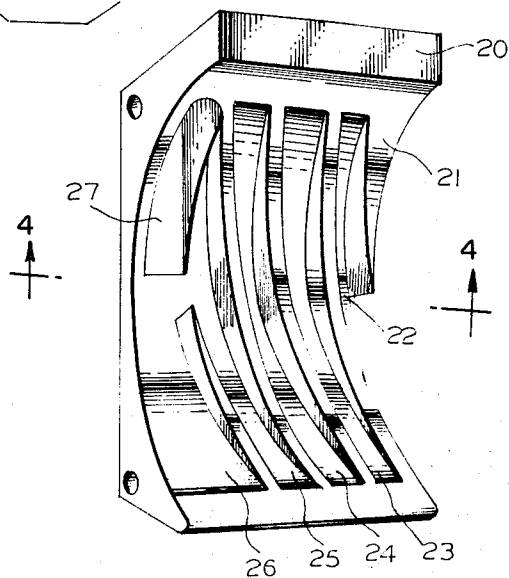


FIG. 3

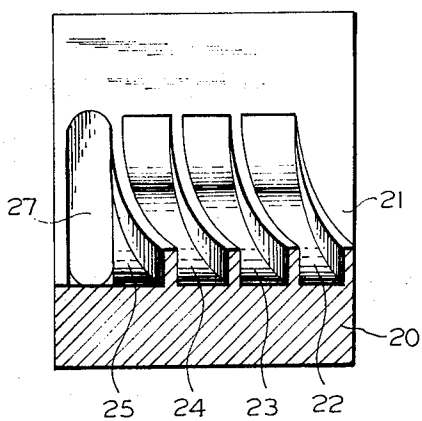


FIG. 4

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CARD COVER WITH FIBER-CONVEYING CHANNELS

A non-exclusive, irrevocable, royalty-free license in the invention herein described, throughout the world for all purposes of the United States Government, with the power to grant sublicenses for such purposes, is hereby granted to the Government of the United States of America.

This invention relates to the carding of textile fibers and is directed particularly to an extremely compact machine which is capable of continuously separating partially opened fibrous material into individual fibers.

The conventional carding machine used for the purpose of separating partially opened fibrous material into individual fibers comprises a cylinder of substantial diameter, for example, approximately four feet, which has a multiplicity of teeth projecting from its surface. The fiber is fed onto this cylinder and, as it revolves, the teeth pull the material against a toothed surface in close proximity to the cylinder. The large circumferential surface area of the cylinder is necessary to obtain complete separation of all the fibers against the toothed surface in proximity to it. Following this treatment, it is a practice to disengage the carded fibers from the teeth of the cylinder by a doffer roll approximately two to three feet in diameter. The doffer roll also has teeth on its periphery which are in close proximity to the teeth of the carding cylinder so as to lift the fibers from the teeth of the carding cylinder. A vibrating comb or toothed roll is used in turn, to separate the fibers from the teeth of the doffer.

The principal objective of this invention is to provide an extremely compact machine which is capable of continuously separating partially opened fibrous material into individual fibers, and conveys the fibers through and out of the machine without any external assistance.

A further objective of the present invention is to precisely control the number of carding cycles obtained within a spiralling type carding machine.

Other objectives of the invention and the manner in which they are accomplished are discussed in greater detail in the following description and the drawings illustrating a machine embodying the principles of the invention.

In particular this invention consists of a card cover contoured to encompass non-carding portions of a card cylinder. The cover surface proximate the card cylinder is provided with a plurality of smooth, uniformly spaced, regular shaped fiber conveying channels; the channels being curvilinearly parallel and disposed axially in a skewed array across the said surface, thereby forming collectively a fiber conveying channel in the form of an interrupted screw-thread with termini adjacent the opposite axial ends of the said surface. Thus, the cover coacts with an adjacent and rotating card cylinder to convey fiber in a substantially helical path around and across a card cylinder.

The invention is adapted to be used in the carding of various types of fibers, but is disclosed particularly in relation to the carding of cotton fibers.

In order that the invention may be fully understood, reference is made to the description which follows and to the accompanying drawings in which:

FIG. 1 is a side elevation of a complete apparatus assembly and as such shows the relative positions of the

fiber carding component which is the subject of this invention, the fiber feeding component, the associated support members and the driving means for a complete apparatus.

FIG. 2 is an exploded view of the carding apparatus showing the latter with the end cover plates removed, but with the cover in place.

FIG. 3 is an elevation, in perspective, of the cover of the carding apparatus, showing the disposition of the channels.

FIG. 4 is a cross section of the cover, taken on line 4—4 on FIG. 3, showing a portion of the channels and details of the exit port for the fibers.

Referring now to FIGS. 1 and 2, 1 is the main base for the assembled apparatus. Support 101 is secured to the main base and positions the fiber carding component 2. The end plate carry the carding cylinder and provide the bearing surfaces for the journaled ends of the carding cylinder shaft 12. Support 102 is likewise secured to the main base and positions the fiber feeding component which component comprises worker roll 14 and feed plate 17.

The axial ends of the fiber carding component are closed with end plates 28 and 29 secured by machine screws 3 and 4.

The carding cylinder is driven by electric motor 6 via motor pulley 7, belt 8, and carding cylinder shaft pulley 9 which pulley is secured to carding cylinder shaft 12.

Slot 10 is an opening that provides communication between the inside of the carding cylinder lower cover and the outside. The slot extends transverse the fiber carding component, axially parallel to the carding cylinder and provides an outlet for the trash as it is removed from the fibers during the carding operation.

Worker roll 14 is driven by electric motor 106 via motor pulley 107, belt 108, and worker roll shaft pulley 109 which pulley is secured to worker roll shaft 15. Partly opened fiber in the form of a narrow lap 201 (i.e. from a fiber condenser) enters the apparatus via the worker roll and feed plate 17. Opened fiber 202 exits the fiber carding component.

In the apparatus as illustrated in FIG. 2, the carding cylinder comprises a metal drum 11 that may be any size and length but is preferably 2 inches to 6 inches in diameter and 2 inches to 6 inches long. The cylinder is provided with an axle 12 which is journaled in suitable bearings not shown, in a conventional manner. The cylinder is driven by a suitable power source as shown in FIG. 1. The peripheral surface of carding cylinder 11 is surfaced with any one of the various surfaces that are commonly used for carding purposes, such as metallic card clothing 13.

A worker roll 14 is positioned adjacent to the periphery of carding cylinder 11, its axis parallel to axis of carding cylinder 11 and is provided with an axle 15 also journaled in suitable bearings, not shown, in a conventional manner. The worker roll 14 is driven from a suitable power source as shown in FIG. 1. The peripheral surface 16, of worker roll 14, may be covered or surfaced with any material which will offer resistance to the fiber tufts being carried by the clothing 13 of the carding cylinder 11. For efficient performance we prefer to use a surface wound metallic wire 16 having approximately 16 points per inch. The worker roll 14 may be the same size as the carding cylinder 11.

A narrow width feed plate 17 is positioned at one end of and adjacent to the worker roll 14, with its nose 18 in close proximity to the periphery of carding cylinder 11.

The lower portion of the carding cylinder 11 is enclosed with a close fitting cover 19 in which any suitable opening such as 10 shown in FIG. 1 is provided to permit trash removal. The cover 19 may be of any desired configuration such as perforated metal or grid bars, which prevents the escape of fibers from the periphery of the carding cylinder 11. Also the surface of the cover 19 adjacent to the periphery of the carding cylinder 11 may be covered or surfaced with any material which will offer resistance to the fiber tufts being carried by the clothing 13 on the carding cylinder 11. For efficient performance we prefer surface 19 to be smooth and continuous except for one small opening such as 10 shown in FIG. 1 for trash removal.

The upper portion of the carding cylinder 11 is enclosed by a specially constructed cover 20, the details of which are shown in FIGS. 3 and 4. The cover 20 has a contoured inner surface 21 which is contoured to essentially the same radius as the carding cylinder 11. The contoured surface 21 contains a plurality of individual channels 22, 23, 24, 25, and 26 positioned at an angle to the axis of the carding cylinder 11. Channels 22, 23, 24, 25, and 26 commence at a point on contoured surface 21 and traverse any portion of the circumference of carding cylinder 11, preferably 1/3 of the circumference. Said channels 22, 23, 24, 25, and 26 end at an axially advanced point on surface 21. The discharge of the first channel 22 is circumferentially aligned with the entrance of the second channel 23, the discharge of the second channel 23 is circumferentially aligned with the entrance of the third channel 24, and so on for the remainder of the channels 25, 26. A discharge aperture 27 is located in the cover 20 near the end diagonally opposed to the position of the feed plate 17. The angle of the channels 22, 23, 24, 25, and 26 causes the fibers to follow a spiral type path from the feed plate 17 at one end of the carding cylinder 11 to the discharge aperture 27, in the cover 20 at the other end of the carding cylinder 11. End plates 28 and 29 are provided for sealing each end of the assembly. The feed plate 17, upper and lower covers 19, 20, and end plates 28, 29, are secured in their respective locations, as shown in FIGS. 1 and 2, by machine screws (not shown).

In operation, a continuous supply of partially opened fibers in the form of a narrow strip 201 (i.e., from a fiber condenser machine) is provided to the feed plate 17, where the fibers are engaged by the surface 16 of the worker roll 14. The worker roll 14 performs as a feed roll in conjunction with the feed plate 17 and its speed is governed (a) by the carding capacity of the carding component, and (b) by the through put rate at which it is desired to operate the machine. The fibers are carried forward to the point where they are engaged by the metallic card clothing 13 on the carding cylinder 11 which is operated with a surface speed sufficiently high to impart a centrifugal force to the fibers so as to project said fibers away from the carding cylinder 11, i.e., approximately 5,000 r.p.m. for a 3-inch diameter cylinder. Due to the high surface speed of the carding cylinder 11, all fibers are combed or carried away from the surface 16 of the worker roll 14 and carried under the specially constructed cover 20 where

they encounter the initial channel 22. The centrifugal force acting on the fibers cause them to leave the clothing 13 of the carding cylinder 11 and follow the channel 22 along the carding cylinder 11. Leaving the channel 22 the fibers are re-engaged by the clothing 13 and are carried past the lower cover 19 where foreign matter is ejected through a cleaning slot 10 shown in FIG. 1. The fibers are then carried by the clothing 13 past the worker roll 14 where they are intensely carded by the interaction of the carding clothing 13, and surface 16 of worker roll 14. The carding action is greatly intensified at this point due to the fibers being projected by centrifugal force into the carding area bounded by the surfaces of the carding cylinder 11 and the worker roll 14. All fibers are again removed from the surface 16 of the worker roll 14 by the clothing 13 of carding cylinder 11, and carried under the upper cover 20 to enter the second channel 23, and subsequently the advancing-, cleaning-, carding-cycle is repeated. The number of cycles is determined by the number of channels 22, 23, 24, 25, and 26 in upper cover 20 which may be any number desired.

The channels 22-26 provide a positive means of traversing fiber along the axis of the carding cylinder 11, thus eliminating the possibility of fiber remaining in the system for too many cycles. Particularly, the configuration of the upper cover 20 provides a means of positively traversing the fibers along the axis of the carding cylinder 11 without any external assistance.

We claim:

1. Carding apparatus comprising:

- a. a support member;
- b. a carding cylinder rotatably mounted on said support member;
- c. means for feeding partially opened fibers to the carding cylinder comprising a feed plate and a worker roll rotatably mounted on said support member adjacent and axially parallel to said carding cylinder, said worker roll being provided with a surface which will offer resistance to tufts of fiber being carried by the carding cylinder, said feed plate being located tangentially adjacent the fiber-feed end of the worker roll, said feed plate being so disposed as to present partially opened fibers to the carding cylinder, said carding cylinder and worker roll coacting to separate said partially opened fibers;
- d. separate means for rotating said carding cylinder and worker wall; and
- e. upper and lower cover means together enclosing substantially all of the periphery of the carding cylinder, each of said cover means having an inner surface adjacent to and contoured to conform to the surface of said carding cylinder, the upper cover means being provided on the surface adjacent the carding cylinder with a plurality of smooth, uniformly spaced, curvilinearly parallel fiber conveying channels disposed axially in a skewed array across said surface to form an interrupted helical screw thread with termini adjacent opposite ends of said upper cover means and with an exit port for separated fibers at one of said termini, said upper cover means coacting with the rotating carding cylinder to convey fibers in a substantially helical path around and across said carding cylinder.

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2. The apparatus of claim 1 wherein the feed plate comprises a narrow, elongated plate having a flat fiber carrying surface adjacent to and extending past the periphery of the worker roll in the direction of the carding cylinder, said plate having a nose portion terminating adjacent the periphery of the carding cylinder, said worker roll coacting with said plate to urge fibers onto the surface of the carding cylinder.

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3. The apparatus of claim 1 wherein the feed plate is located at one end of the carding cylinder and wherein the exit port in the upper cover means is located at its end axially opposite the feed plate.

5 4. The apparatus of claim 1 wherein the lower cover means is provided with an exit port for discharging trash separated from fibers being carded.

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