

[54] **DEVICE FOR OPENING BALES OF TEXTILE FIBERS AND THE LIKE**[72] Inventor: **Walter Wirth**, Dulmen (Westfalen), Germany[73] Assignee: **Hergeth KG Maschinenfabrik und Apparatebau**, Dulmen (Westf.), Germany[22] Filed: **May 5, 1970**[21] Appl. No.: **34,765**[30] **Foreign Application Priority Data**

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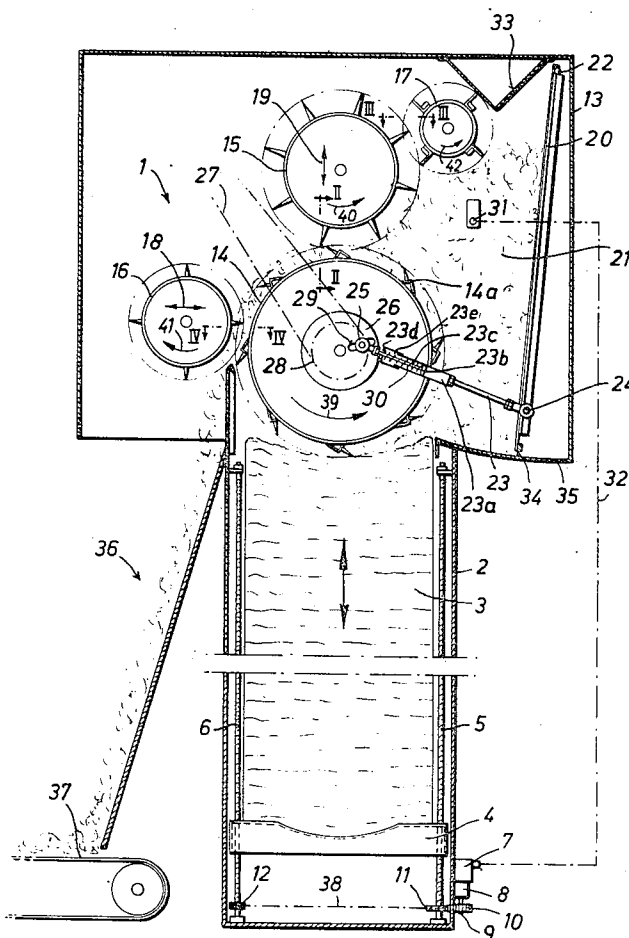
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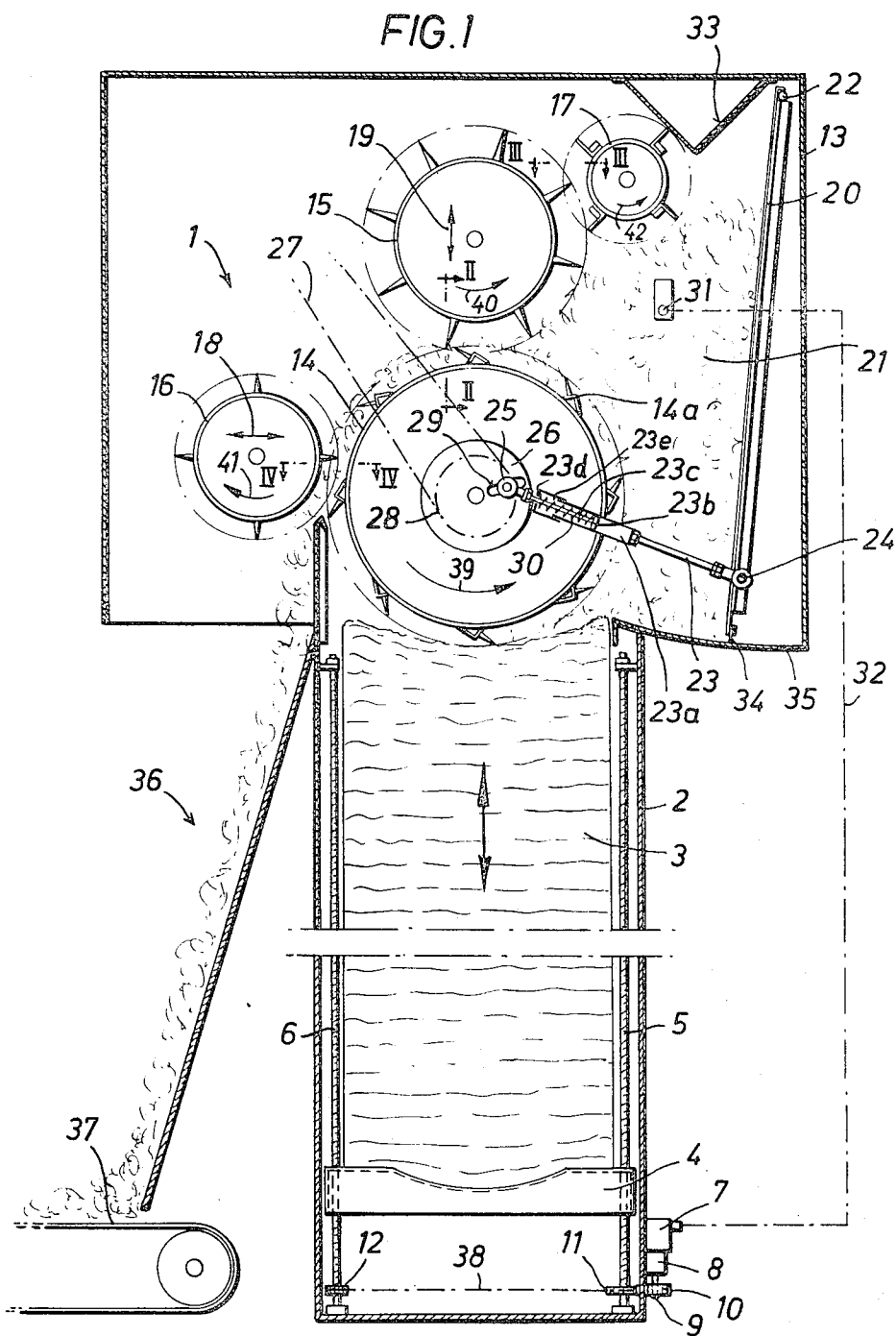
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*Primary Examiner*—Dorsey Newton*Attorney*—Lowry, Rinehart, Markva & Smith[57] **ABSTRACT**

A device for removing tufts of fibers from a compressed bale of textile fibers comprises an opener roller with teeth on its periphery to remove the fiber flocks and convert them to the desired flocculent form. A back-stripper roller then removes the insufficiently opened flocks from the opener roller after which the opened flocks are removed from the opener roller by a stripper roller. The insufficiently opened flocks are returned to the opener roller where they are compressed by an oscillating panel against the opener roller causing the teeth on the opener roller to again take up and flocculate the insufficiently opened flocks.

**9 Claims, 4 Drawing Figures**



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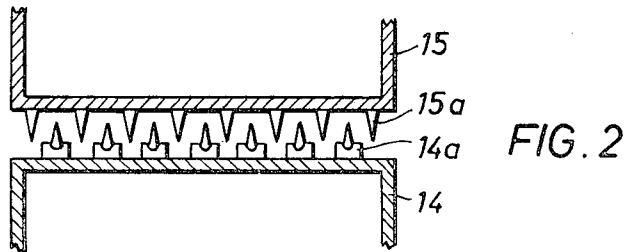


FIG. 2

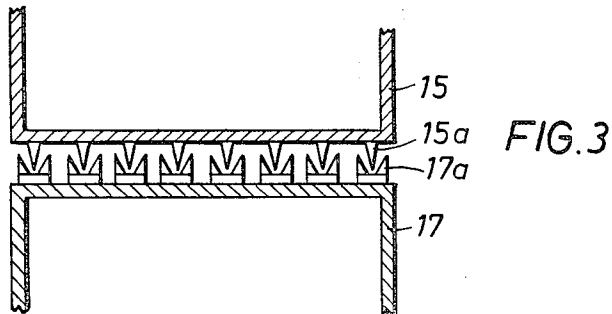


FIG. 3

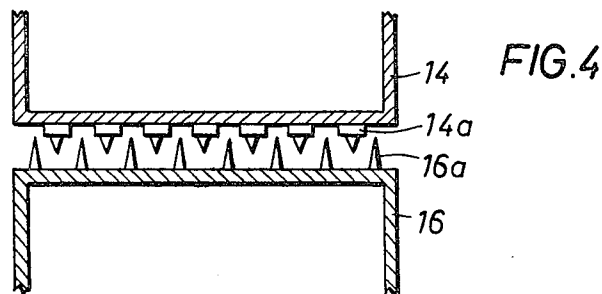


FIG. 4

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## DEVICE FOR OPENING BALES OF TEXTILE FIBERS AND THE LIKE

This invention relates to a device for removing tufts of fibers from a compressed bale of textile fibers and opening the flocks as they are removed from the bale.

Various devices and methods of removing and opening the flocks in compressed bales of textile fibers and the like are known. In one such device, the bales are opened at the top with the device being continuously lowered as the disintegration progresses. When the disintegration of a bale is completed the device is raised and moved laterally whereupon the flocks can drop away. With this arrangement open spaces must be left between the bales in a row to permit the flocks to drop onto a conveyor belt lying therebeneath. Such an installation is relatively costly and complicated.

In other devices the bale is disintegrated laterally from one side to the other. Difficulties arise with this arrangement since as the device approaches the opposite side of the bale the remainder of the bale becomes unstable so that regular removal of uniform amounts of flock material cannot be maintained.

In still another known method, bales are pressed upwardly against a device which consists of a spiked belt. The difficulty with this arrangement is that the device is generally suitable for loosening only a single bale as the spiked belt clogs, and the following bales in a row can no longer be uniformly disintegrated without first clearing the flocks from the spiked belt.

An object of the present invention is to provide an device for disintegrating a compressed bale of textile fibers and to dispense flocks of uniform and sufficient openness.

Another object of the present invention is to provide an device which will selectively separate insufficiently opened flocks from sufficiently opened flocks and recycle the insufficiently opened flocks to assure that flocks of uniform openness are dispensed.

Still another object of the present invention is to provide a device which may be maintained in continuous operation without shutdown to clear away jammed flocks.

A further object of the present invention is to provide a device in which the degree of openness of the flocks may be controlled and maintained uniform.

A still further object of the present invention is to provide an device capable of controlling the rate at which a compressed bale is fed towards the device whereby the device may be maintained at full operating capacity but not overloaded.

Briefly, the device for disintegrating a compressed bale of textile fibers comprises a rotatably mounted opener roller having a plurality of opener teeth mounted on the cylindrical surface thereof with means to progressively feed a bale of the fibers towards and against the opener roller. As the opener rotates the teeth dig into the surface of the bale and continuously remove and at least partially open flocks. A back-stripper roller is located adjacent the opener roller opposite the location of the bale and has teeth thereon which selectively remove the insufficiently opened flocks from the teeth of the opener roller as both the back-stripper and opener rollers rotate. Fully opened flocks still retained on the opener roller are then removed by a stripper roller. The insufficiently opened flocks are removed from the teeth of the back-stripping

roller by a cleaning roller and are then allowed to fall downwardly and to accumulate between the opener roller and an oscillating panel. Compression of the accumulated insufficiently opened flocks by the panel against the opener roller causes the insufficiently opened flocks adjacent the opener roller to be again caught by the opener teeth which completely opens the flocks. The result is that all of the flocks removed from the compressed bale by the stripper roller are in the desired flocculent form before being dispensed from the device.

The invention will now be described in greater detail with reference to the accompanying drawings wherein:

FIG. 1 is a side elevation in cross-section of the unraveling device including the bale feed mechanism;

FIG. 2 is a fragmentary cross-sectional view taken along the line II—II of FIG. 1;

FIG. 3 is a fragmentary cross-sectional view taken along the line III—III of FIG. 1; and

FIG. 4 is a fragmentary cross-sectional view taken along the line IV—IV of FIG. 1.

The unravelling device shown generally at 1 includes a vertical shaft 2 for accommodating a bale 3 of textile material. The bale rests on a platform 4 which is arranged to be raised and lowered on rotatably driven externally threaded spindles 5 and 6. The spindles are driven by a motor 7 through transmission 8 and gear 10 attached to the end of the shaft 9 from the transmission. Gear 11 is secured to the base of spindle 5 and meshes with driven gear 10. Gear 12 which corresponds to gear 11 and is secured to spindle 6 is driven simultaneously with gear 11 through an intermediate transmission means shown generally at 38 which may be for example a chain or toothed-belt drive.

An opener roller 14 is centrally located at the top end of shaft 2 in casing 13. Cooperating rollers also contained in case 13 include a back-stripping roller 15 with which a cleaning roller 17 is associated and a stripper roller 16. The cylindrical surface of the opener roller 14 includes rows of opener teeth 14a which project in a forward direction with respect to the direction of rotation of the opener roller as indicated by arrow 39. As the opener roller 14 rotates slowly, the teeth 14a will penetrate the top surface of the bale 3 and remove the compressed flocks. During their removal the flocks tend to be opened or flocculated. When the flocks impaled on the opener teeth 14a reach the back-stripping teeth, many of the flocks will have been flocculated to the desired extent while other flocks will not be sufficiently opened. Back-stripping roller 15 includes radially extending teeth 15a which are arranged such that as the back-stripping roller 15 rotates in the same direction (arrow 40) as opener roller 14 the insufficiently opened flocks are selectively removed from the opener roller 14, the fuller opened flocks remaining on the roller 14 and being removed by stripper teeth 16a on stripper roller 16. The stripper roller rotates in the opposite direction (arrow 41) from opener roller 14 and dispenses the opened flocks 36 onto conveyor 37.

The extent of expansion of the flocks can be controlled by adjustment of the distance between opener roller 14 and back-stripping roller 15 as indicated by arrow 19. By adjusting this distance, the density of the flocks which are permitted to remain on opener roller 14 and to be removed by stripper roller 16 can be con-

trolled, and all flocks having a heavier density than desired are removed by back-stripping teeth 15a. Also, the distance between stripper roller 16 and opener roller 14 may be controlled as indicated by arrow 18 whereby the removal of all flocks from the opener roller 14 can be assured.

The insufficiently opened flocks removed from opener roller 14 are carried upwardly on back-stripping teeth 15a until they are removed by the cleaning teeth 17a on cleaning roller 17 which rotates in the same direction as back-stripping roller 15 as indicated by arrow 42. The insufficiently opened flocks are deposited and accumulate in gathering space 21. The gathering space is defined by the opener roller 14, back-stripping roller 15, cleaning roller 17, a guide plate 33, a shaker panel 20, and a curved box wall 35. The partially opened flocks are precipitated into the lower portion of the gathering space 21 where they are compressed intermittently by shaker panel 20. With each compression the partially opened flocks contiguous to the opener roller 14 are again impaled on opener teeth 14a and are flocculated as the opener roller rotates. If the flocks have then attained the proper density, they will not be removed from the opener roller by the back-stripping teeth 15a but instead will pass between the rollers and be dispensed by stripper roller 16 in the same manner as the fully flocculated flocks removed directly from bale 3.

Shaker panel 20 is pivotally mounted on shaft 22 which is secured in casing 13. The free end of shaker panel 20 includes a sealing strip 34 which contacts the interior surface of curved box wall 35 and insures that the flocks will remain to the left of the shaker panel 20. The shaker panel is oscillated by connecting rod 23 which is pivotally connected at one end to the shaker panel at 24 and at the opposite end to disk 26 by a bolt 25 slidably secured in slot 29. Belt 27 drives the disk 26 through pulley 28 giving an eccentric drive to the connecting rod 23.

The connecting rod 23 includes biased resilient means for extending the rod length automatically depending upon the volume of the accumulated flocks retained between the shaker panel 20 and the surface of opener roller 14. The resilient means includes cylinder 23a in which a piston rod 23c and piston 23b are located. A spring 23e is retained on the piston rod 23c between the piston 23b and collar 23d mounted on the cylinder 23a and through which the piston rod 23c slides. With an increasing volume of flock material between the shaker panel 20 and the opener roller 14, the connecting rod will be extended during the compression stroke to accommodate the greater volume without increasing the compression on the flocks. The shaking movement of panel 20 is thus self-regulating with respect to changes in the accumulated flock volume so that the flocks are pushed with the same pressure against the opener roller 14.

The incompletely opened flocks can accumulate to completely fill the gathering space 21. Guide plate 33 prevents accumulated flocks from escaping by passing over the cleaning roller 17. Automatic control means, however, is provided to prevent the gathering space 21 from becoming jammed with flock material and at the same time assure a sufficient supply of the flock material in the gathering space to assure efficient operation of

the device. A sensor 31 is located in a wall of the gathering space 21 which may advantageously be of the ultrasonic type so that the degree to which the gathering space 21 is filled can be sensed. The sensor 31 is connected by electrical cable 32 to motor 7 and serves to regulate the speed of motor 7 depending upon the amount of flock material contained in the gathering space. Thus, when the level of the flock material in the gathering space is below a predetermined normal level, the motor will operate at a higher speed causing the bale 3 to be moved upwardly at a faster rate and increasing not only the rate at which the opened flocks 36 is dispensed but also increasing the accumulation of insufficiently opened flocks in the gathering space 21. As the accumulation of flocks in the gathering space increases, the sensor 31 will cause motor 7 to slow down to reduce the rate at which the bale 3 is fed upwardly and assure that the gathering space will not become overly filled with insufficiently opened flocks.

When the bale 3 has been completely consumed by opener roller 14, further upward motion of platform 4 will be arrested by activation of an end switch whereupon the platform 4 will be automatically and rapidly returned to its position at the bottom of shaft 2 to receive a fresh compressed bale.

This device is exceptionally efficient, and bales can be disintegrated to the point where only a negligible amount, e.g., 100 to 300 grams, remains on the platform 4. A recessed top surface in the platform 4 permits the opener roller 14 to remove nearly all of the flocks.

Several of the present devices may be used simultaneously to supply conveyor 37 with a sufficient amount of textile fibers. Also, where a mixture of several fiber components is desired, each of the devices may be equipped with an automatic weighing device, thus serving to feed predetermined relative amounts by weight of the various fibers in a constant ratio.

Having now described the invention, it is to be understood that it is not intended that the invention in any way be limited to the specific description, and that it is limited only as defined in the appended claims.

I claim:

1. A device for removing tufts of textile fibers from a compressed bale and dispensing said tufts of fibers comprising
  - a. a rotatably mounted opener roller having a plurality of opener teeth mounted on the cylindrical surface thereof to remove and open flocks from said bale,
  - b. shaft means including means for feeding said bale into contact with said opener teeth at a first position adjacent said opener roller while said opener roller is rotating to continuously remove and open flocks from said bale, the width of said shaft means and the diameter of said opener roller being substantially the same,
  - c. a rotatably mounted back-stripper roller adjacent said opener roller at a second position downstream of said first position considering the direction of rotation of said opener roller and having back-stripper teeth on the cylindrical surface thereof for selectively removing insufficiently opened flocks from said opener teeth,

- d. a rotatably mounted cleaning roller positioned adjacent said back-stripper roller and spaced from said opener roller for removing and freeing said insufficiently opened flocks from said stripper teeth,
  - e. a panel extending from a position adjacent said cleaning roller to a position adjacent said opener roller,
  - f. said opener, back-stripper, and cleaning rollers and said panel being so arranged to substantially define a gathering chamber for receiving and containing said insufficiently opened flocks,
  - g. said panel being pivotally mounted at said position adjacent said cleaning roller, and means being provided for continuously oscillating said panel towards and away from said opener roller to compress said free insufficiently opened flocks in said gathering chamber against said opener roller while said opener roller is rotating whereby said insufficiently opened flocks are recycled to said opener roller and are engaged and opened by said opener teeth, and
  - h. means downstream from said second position for removing and dispensing the opened flocks from said opener teeth,
  - i. whereby only completely opened flocks are dispensed from said compressed bale.
2. A device for removing tufts of textile fibers from a compressed bale and dispensing said tufts of fibers comprising:
- a. opener means for withdrawing and opening flocks from said bale, said opener means comprising a plurality of opener teeth and means continuously moving said teeth along a closed path,
  - b. shaft means including for progressively feeding said bale to a first position along said path for action by said opener teeth passing therethrough to continuously remove and open flocks from said bale, the widths of said shaft means and opener means being substantially coextensive,
  - c. first stripper means at a second position along said path downstream of said first position for selectively removing from said opener teeth insufficiently opened flocks;
  - d. cleaning means positioned adjacent said first stripper means and spaced from said opener means for removing and freeing said insufficiently opened flocks from said opener teeth,
  - e. a panel extending from a location adjacent said first stripper means to a location adjacent said cleaning means,

- f. said opener means, first stripper means, cleaning means, and panel being so arranged to substantially define a gathering chamber for receiving and containing insufficiently opened flocks,
  - g. said panel being pivotally mounted at said location adjacent said first stripper means, and means being provided for continuously oscillating said panel towards and away from said opener means to compress said free insufficiently opened flocks against said opener means while said opener means is operating whereby said insufficiently opened flocks are recycled to said opener means to be engaged and opened by said opener teeth, and
  - h. second stripper means at a third position along said path downstream of said second position for removing and dispensing from said opener teeth the opened flocks,
  - i. whereby only completely opened flocks are dispensed from said compressed bale.
3. A device as claimed in claim 2 wherein said opener means comprises a rotatably mounted opener roller, said opener teeth being mounted on the cylindrical surface of said roller and projecting forwardly with respect to the direction of rotation of said opener roller.
4. A device as claimed in claim 2 wherein said first stripper means comprises a rotatably mounted back-stripper roller having back-stripper teeth on the cylindrical surface thereof for selectively removing insufficiently opened flocks from said opener teeth.
5. A device as claimed in claim 2 wherein said second stripper means comprises a rotatably mounted stripper roller having stripper teeth on the cylindrical surface thereof for removing and dispensing opened flocks from said opener teeth.
6. A device as claimed in claim 2 wherein said cleaning means comprises a cleaning roller.
7. A device as claimed in claim 2 wherein said means for oscillating said panel comprises rotary crank means and connecting means extending between said crank means and said panel.
8. A device as claimed in claim 7 wherein said connecting means is resilient whereby the compression applied by said panel will remain substantially constant with varying amounts of insufficiently opened flocks between said panel and said opener means.
9. A device as claimed in claim 2 further comprising sensor means for detecting the amount of insufficiently opened flocks accumulated by said pivotally mounted panel to control said bale feeding means.

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