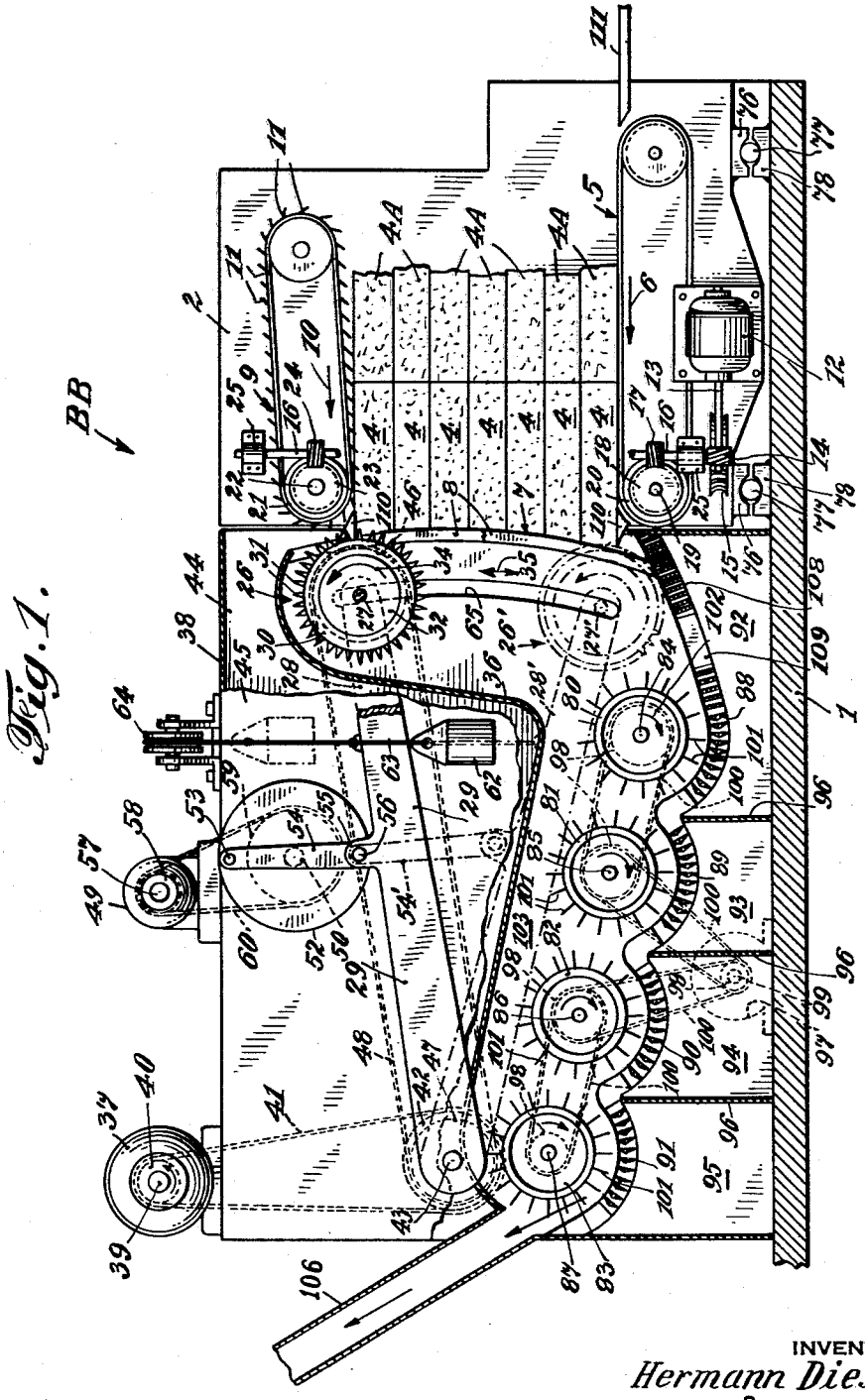
July 7, 1964 H. DIESEL 3,139,650

PROCESS AND APPARATUS FOR BREAKING AND TEASING COMPRESSED FIBROUS MATERIAL

Filed March 16, 1961 2 Sheets-Sheet 1

Fig. 1.



INVENTOR
Hermann Diesel
BY Michael S. Striker
his ATTORNEY

July 7, 1964 H. DIESEL 3,139,650

PROCESS AND APPARATUS FOR BREAKING AND TEASING COMPRESSED FIBROUS MATERIAL

Filed March 16, 1961 2 Sheets-Sheet 2

Fig. 2

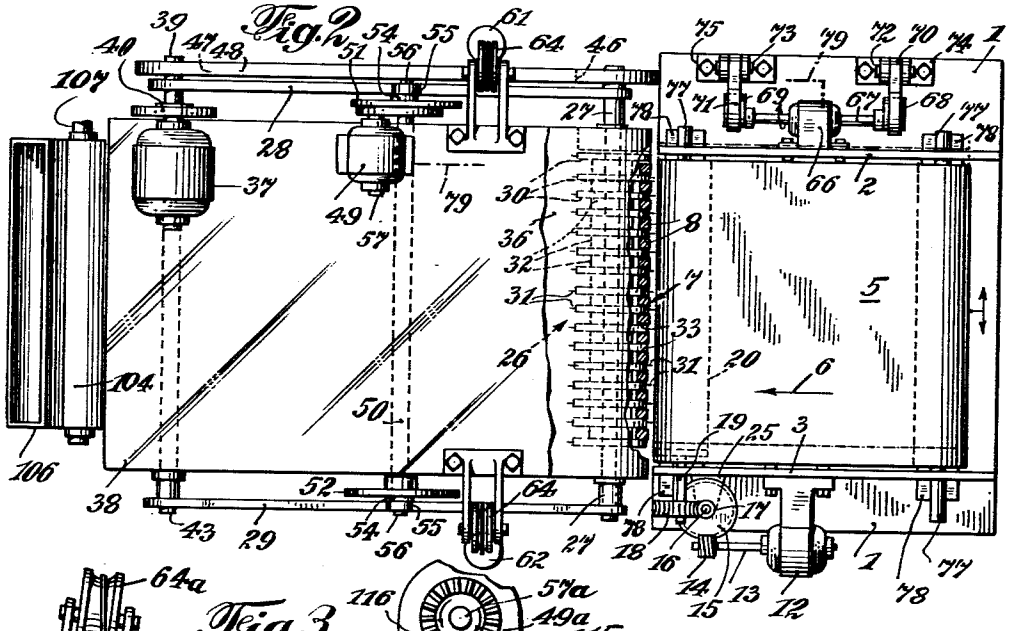
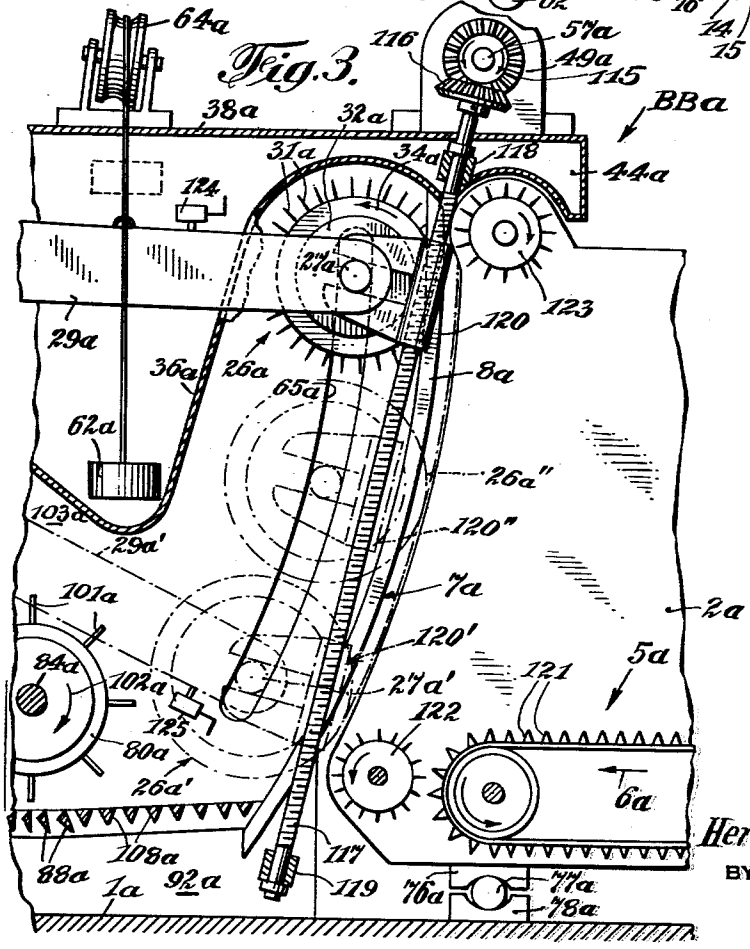


Fig. 3.



INVENTOR
Hermann Diesel
BY Michael S. Striker
his ATTORNEY

United States Patent Office 3,139,650 Patented July 7, 1964



3,139,650

# PROCESS AND APPARATUS FOR BREAKING AND TEASING COMPRESSED FIBROUS MATERIAL

Hermann Diesel, Ingolstadt, Germany, assignor to Rapp & Seidt Maschinenbau, Esslingen (Neckar), Germany

Filed Mar. 16, 1961, Ser. No. 96,221
9 Claims. (Cl. 19—145.5)

The present invention relates to a process for processing fibrous materials, and more particularly to a process for breaking and teasing packages in the form of stacked cotton slabs or raw cotton bales in a continuous operation. Still more particularly, the invention relates to a process according to which the breaking of compressed packages occurs simultaneously with a thorough mixing of tufts prior to and during the teasing operation.

An important object of the present invention is to provide a process for consecutively breaking raw cotton bales or cotton slabs in a continuous operation.

Another object of the invention is to provide a process according to which compressed fibrous material is uniformly reduced to tufts and according to which the formation of large tufts is effectively prevented at all times.

A further object of the invention is to provide a process of the above outlined characteristics according to which tufts removed from one or more compressed packages of fibrous material may be subjected to a series of teasing, mixing and cleaning actions in a fully automatic way.

A concomitant object of the invention is to provide a process of the above described type according to which various impurities contained in the packages are automatically sorted and separated while the fibrous material advances from the intake to the discharge end of a bale breaking apparatus.

An additional object of the invention is to provide a process for breaking, mixing and teasing fibrous materials which insures that the tufts simultaneously removed from different bales or slabs are thoroughly intermixed and are automatically separated from ferrous and/or nonferrous impurities which might be contained in the compressed fibrous material.

Still another object of the instant invention is to provide a process for breaking, mixing, teasing and cleaning of a variable number of different fibrous substances according to which the extent to which the slabs or bales are compressed does not influence the mixing and/or cleaning operation.

A further object of the invention is to provide a process for breaking, mixing and teasing of compressed fibrous material according to which the packages may be broken up and subdivided into tufts to the very end, i,e., according to which each package is completely consumed before the breaking of the next package begins.

With the above and certain other objects in view, the invention resides in the provision of a process for consecutively breaking packages consisting of stacked slabs or bales of compressed fibrous material with reciprocating plucking instrumentalities, the latter preferably assuming the form of revolving toothed wheels which together form a plucking roller, the process comprising the steps of moving a first package into the path of the plucking instrumentalities to remove from the package tufts of fibrous material, and moving additional packages into the path of the plucking instrumentalities as soon as the breaking of the preceding package is completed. Each package preferably assumes the form of a parallelpiped or cube one face of which moves into the preferably at least nearly vertical path of the plucking roller, and each package is preferably advanced intermittently into the range of the teeth on the plucking roller so that the later removes a layer of predetermined thickness during each



of its reciprocatory movements with respect to the package. Additional packages may be formed before the first package is completely consumed, and such additional packages are consecutively advanced into the range of the revolving teeth in order to insure that the breaking of packages, which may contain slabs or bales of various thicknesses and which may consist of different fibrous materials, may be carried out to the very end of each package and without any interruption in the operation.

It is further preferred to subject the tufts separated from the packages to immediate teasing action of one or more teasing rollers and to permit any impurities or solid particulate matter which might have been entrapped in the slabs or bales of the packages to become separated from the teased fibrous material and to follow the force of gravity while the ultimate product, i.e. the mixture of finely divided tufts, is entrained by suction to a further processing station.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved process itself, however, together with additional features and advantages thereof, will be best understood from the following detailed description of certain specific embodiments of a bale breaking apparatus when read in connection with the accompanying drawings, in which:

FIG. 1 is a somewhat schematic side elevational and partly sectional view of a first bale or slab breaking, mixing and teasing apparatus;

FIG. 2 is a smaller-scale top plan view of the apparatus with certain parts omitted and with certain parts broken away for the sake of clarity; and

FIG. 3 is an enlarged fragmentary side elevational and partly sectional view of a modified apparatus.

Referring now in greater detail to the illustrated embodiments, and first to FIGS. 1 and 2, there is shown a bale or slab breaking apparatus BB comprising a frame including a base plate 1 and two side walls 2, 3 which define between themselves a space through which a package consisting of one or more bales or several slabs 4 of compressed fibrous material may be introduced onto an endless lower belt or chain conveyor 5. As is known, such slabs are formed by cutting or slicing a compressed bale into several plate-like sections. The upper run of this conveyor 5 is driven anticlockwise to advance the compressed fibrous material in the direction indicated by the arrow 6 toward the convex side of an arcuate grid 7 consisting of spaced substantially vertically arranged arcuate bars 8. The upper side of the uppermost slab 4 is engaged by the lower run of a second endless conveyor 9 which moves in clockwise direction as is indicated by the arrow 10. The apron of the upper conveyor 9 is inclined downwardly and forwardly, as seen in the direction in which the stack of compressed fibrous material 4 is advanced, and this apron is provided with a plurality of forwardly inclined spikes 11 which penetrate into the uppermost slab 4 and help to advance the entire stack of slabs in a direction to the left, as viewed in FIG. 1. The downwardly inclined lower run of the conveyor 9 preferably at least slightly compresses the package of stacked slabs 4 as they advance endwise toward the outer or right-hand side of the grid 7.

The means for driving the conveyors 5 and 9 comprises an electric motor 12 which is secured to the wall 3 and whose shaft 13 carries a worm 14 meshing with a worm wheel 15 mounted on a vertical drive shaft 16. This shaft 16 carries a lower worm 17 which meshes with a worm wheel 18, and the latter is coaxially mounted on the horizontal shaft 19 of the front sprocket 20 forming part of the lower conveyor 5. The front sprocket 21 of the upper conveyor 9 is mounted on a horizontal shaft 22 and is driven by a worm wheel 23 which is also

mounted on the shaft 22 and which meshes with an upper worm 24 on the drive shaft 16. The shaft 16 is rotatably mounted in two or more spaced bearings 25 which are secured to the wall 3. It will be readily understood that the worm drives 17, 18 and 23, 24 may be replaced by a system of bevel gears or by a pair of V-belt drives, if desired.

The means for breaking the slabs 4 into tufts comprises a plucking roller 26 whose horizontal shaft 27 is rotatably mounted in the right-hand ends of two elongated arms 28, 29. The pluncking roller 26 is a composite structure consisting of uniformly spaced plucking wheels 30 which are provided with teeth 31, and of spacer elements in the form of disks 32 which alternate with the wheels 30. The teeth 31 of each wheel 30 project through and beyond one of the substantially vertical slots 33 formed between the adjacent bars 8 of the grid 7 to engage the left-hand faces of the slabs 4 when the roller 26 rotates about the axis of the shaft 27 in the anticlockwise direction indicated by the arrow 34 and when this roller is reciprocated in a predetermined path located in in a substantially vertical plane in directions indicated by the double arrow 35. The roller 26 is received in a housing 36 which is supported by the base plate 1 and whose open right-hand or intake end extends to the grid 7. The width of the slots 33 preferably equals the width of the bars 8.

The means for rotating the roller 26 in the direction indicated by the arrow 34 comprises an electric motor 37 which is mounted on a platform 38 located above the housing 36 and whose shaft 39 carries a driver pulley 40 which latter, through a V-belt 41, rotates a driven pulley 42 mounted on the horizontal shaft 43 which is journalled in a pair of upright supporting walls 44, 45 for the platform 38, these walls being secured to the base plate 1 and preferably constituting the lateral walls of the housing 36. The roller shaft 27 carries a driven pulley 46 which is rotated by a V-belt 48 driven by a driver pulley 47 mounted on the shaft 43. The pulleys 40, 42, 46, 47 and the V-belts 41, 48 may be respectively replaced by sprockets and chains, if desired.

The left-hand ends of the arms 28, 29 are pivotably mounted on the shaft 43 and are rockable in directions of the double arrow 35 by a reversible electric motor 49 which is mounted on the platform 38 and which drives a horizontal shaft 50 mounted in the walls 44, 45 and drivingly connected with two crankwheels or disks 51, 52 disposed externally of the walls 44, 45, respectively. Each disk is provided with an eccentric pin 53 for one end of a link 54 whose other end is pivoted to a bracket 55 of the respective arm by a pin 56. The driving connection between the shaft 57 of the motor 49 and the shaft 50 comprises a driver pulley 58, a driven pulley 59 and a V-belt 60. The arms 28, 29 are respectively connected with counterweights 61, 62 whose cables 63 pass over sheaves 64 mounted on the platform 38. The arms 28, 29 are located externally of the housing 36, and the roller shaft 27 extends through arcuate slots 65 (only one shown in FIG. 1) which are provided in the supporting walls 44, 45 and whose center of curvature coincides with the axis of the arm shaft 43. When the motor 49 rotates, the arms 28, 29 reciprocate the roller 26 in its path at the left-hand side of the grid 7.

In order to insure uniform removal of fibrous material from the left-hand end faces of the slabs 4, the apparatus BB comprises means for reciprocating the slabs in a horizontal plane and in a direction enclosing right angles with the direction of the arrow 6 and with the longitudinal direction of the slots 33. The means for bringing about such transverse reciprocatory movements of the slabs 4 may assume a number of forms and, in the embodiment of FIGS. 1 and 2, includes an electric motor 66 which is mounted at the outer side of the wall 2 and whose shaft 67 carries two eccentrics 68, 69. The straps 70, 71 of these eccentrics are pivotable about a pair of



coaxial journals 72, 73 mounted in bearings 74, 75 which are fixed to the base plate 1. The undersides of the walls 2, 3 are provided with bearings 76 which are movable along transversely extending guide rails 77 mounted on bearings 78 carried by the base plate 1. The stroke of the eccentrics 68, 69 is selected in such a way that, when the shaft 67 is turned through 180 degrees, the slabs 4 are shifted transversely of the grid 7 through a distance equal to the width of the slots 33 so that the roller 26 will remove a complete layer of fibrous material from the left-hand end face of each slab during each complete revolution of the shaft 67. The motor 66 is operated intermittently, i.e. it is arrested during the movement of the roller 26 in directions indicated by the arrow 35 and is set in motion when the roller 26 reaches the upper or the lower end of its stroke. It is preferred to provide an operative connection between the motors 49 and 66 to insure that the reciprocatory movements of the roller 26 and the intermittent rotary movements of the shaft 67 are synchronized. The exact construction of this operative connection (indicated by the phantom line 79 in FIG. 2) forms no part of the present invention.

It will be seen that the walls 2, 3 and the conveyors 5, 9 form a transversely reciprocable unit which causes a preferably intermittent forward movement of the slabs 4 in the direction of the arrow 6 and preferably intermittent transverse movements of the slabs with respect to the stationary grid 7 to insure uniform breaking of the slabs by the teeth of the revolving and reciprocating roller 26 when the apparatus is in actual use. Of course, it is equally possible to fix the side walls 2, 3 to the base plate 1 and to provide means for reciprocating the conveyors 5 and 9 with respect to the fixed side walls. The unit may be further simplified by omitting the upper conveyor 9 in its entirety or by replacing this conveyor by a forwardly and downwardly inclined baffle plate which then performs the function of the lower run of the conveyor 9 and which may be biased into requisite compressive engagement with the uppermost slab 4.

The tufts of fibrous material removed from the slabs 4 and entrained through the slots 33 by the teeth 31 of the roller 26 are hurled against the adjacent transversely extending wall portion of the housing 36 and descend in this housing to be engaged by the first of a series of teasing rollers or pin wheels 80–83 which are mounted on transversely extending parallel shafts 84–87, the latter rotatably supported by the walls 44, 45. These teasing rollers are respectively located above the grates 88–91 which form slotted covers for four receptacles or waste boxes 92–95 formed between the base plate 1 and the walls 44, 45 and separated from each other by partitions 96. The means for driving the teasing rollers 80–83 comprises an electric motor 97 mounted on the base plate 1, suitable pulleys or sprockets 98 on the motor shaft 99 and on the shafts 84–87, and a plurality of V-belts 100 which drivingly connect the pulleys 98 with each other in a manner plainly illustrated in FIG. 1. This illustration also shows that the rollers 80–83 are driven at different speeds, i.e. that the r.p.m. of the roller 81 is less than the r.p.m. of the roller 82 but more than the r.p.m. of the roller 80, and that the r.p.m. of the roller 83 is more than the r.p.m. of the other rollers. Furthermore, the number and density of substantially radial teasing pins 101 on the roller 81 is preferably more than the number of pins on the roller 80 but less than the number of pins on the roller 82, and the number and density of pins on the roller 83 is preferably more than the number of pins on each of the other rollers. All teasing rollers are assumed to rotate continuously in clockwise direction as is indicated by the arrows 102. The grates 88–91 and the top wall of the housing 36 define between themselves a tuft duct 103 which accommodates the rollers 80–83 and which extends from the enlarged compartment for the plucking roller 26 (i.e. from the grate 7) to the discharge end 104 of the housing 36.

This discharge end is connected to a suction duct 106. The negative pressure in this suction duct 106 is produced by a suction fan (not shown) in known manner and prevents the escape of fly dust and impurities from the housing 36 into the surrounding atmosphere. As shown in FIG. 1, the tuft duct 103 is preferably inclined upwardly in a direction from the grid 7 toward the suction duct 106.

The right-hand receptacle 92 is covered in part by the grate 88 and in part by a grate 108 which preferably extends all the way to and eventually beyond the grid 7 and which accommodates between its parallel bars one or more magnets 109 adapted to collect particles of ferrous material which might be contained in the tufts separated by the teeth 31.

Externally adjacent to the grid 7, there is provided a pair of guide members in the form of wedges 110 which are secured to the walls 44, 45 and extend transversely across the space for the slabs 4. These wedges guide the front ends of the slabs and prevent the slabs from becoming displaced by the teeth 31 when the apparatus BB is in actual use. A fixed supporting plate 111 may be provided at the intake end of the apparatus to facilitate the movement of slabs 4 onto the lower conveyor 5.

The apparatus of FIGS. 1 and 2 is operated as follows:

In the first step, layers or slabs 4 of requisite thickness are cut from different bales whose material is to be mixed, and the slabs 4 are stacked on the supporting plate 111 to build up a stack preferably assuming the shape of a parallelepiped block or a cube. Though it is preferred to arrange the slabs 4 in horizontal planes, the apparatus will operate with equal effectiveness if the slabs are disposed in vertical planes. The lowermost slab 4 is then engaged by the conveyor 5 and is advanced in the direction of the arrow 6 toward the convex outer side of the grid 7. Once the front faces of the slabs 4 are advanced into the range of the teeth 31, the operation of the conveyors 5, 9 may become intermittent so that they advance the stack to the left, as viewed in FIG. 1, after the plucking roller 26 completes a stroke in upward and a subsequent stroke in downward direction, or vice versa, i.e. after the roller 26 removes a complete layer from the front faces of the slabs 4. In order to syncronize the operation of the motor 12 with the operation of the reversible motor 49, there may be provided an operative connection between these motors so that the movements of the slabs 4 in forward direction and the reciprocatory movements of the plucking roller 26 take place in a predetermined rhythm, e.g. simultaneously.

Before the stack of slabs 4 is consumed, the operator or operators may move a second stack of slabs 4A into abutment with the rear end faces of the slabs 4 so that the operation of the apparatus BB need not be interrupted when the slabs 4 are consumed, and also that the remnants of the slabs 4 are completely broken up by the teeth 31 before the roller 26 engages the front end faces of the slabs 4A. In other words, the provision of the conveyors 5, 9 and of the wedges 110 renders it possible to completely break a stack or package and also to immediately advance a next stack of slabs 4A into position to be engaged by the teeth 31 so that the feeding of stacks may be continued for any desired length of time. Furthermore, the guide means 111, 5, 9 and 110 for the stacks of cotton slabs render it possible to change the mixture of cotton tufts at will merely by cutting slabs from different types of bales and by stacking the slabs onto the plate 111 prior to the introduction into the space between the conveyors 5 and 9.

The purpose of the grid 7 is to prevent breaking of large tufts from the stack of slabs 4 or 4A. Even if a large batch is torn from a stack supported on the conveyor 5, the bars 8 of the grid prevent the transfer of such large batches from the right-hand side, through the slots 33, and to the left-hand side of the grid 7, so that each batch must be comminuted prior to its entry into the housing 36. It is usually preferred to arrange the roller 26 in such a way that the length of the teeth 31 projecting through and beyond the slots 33 equals between one-sixth and one-third of the total tooth length. In fact, it is not necessary to advance the front end faces of the slabs 4 all the way into abutment with the grid 7 as long as the length of the teeth 31 is sufficient to engage the slabs even if they are somewhat spaced from the grid. In such instances, the grid again constitutes a barrier for large batches of fibrous material though it is not in actual abutment with the slabs. For example, the length of the teeth 31 may be selected in such a way that only about one-third to one-sixth of their portions projecting beyond the grate 7 comes into actual engagement with the slabs 4 so that there develops a gap between the slabs and the grid whose width may equal a multiple of the thickness of a layer removed from the stack during two successive strokes of the roller 26.

As stated before, the motor 66 reciprocates the conveyors 5, 9 in a predetermined rhythm so that, provided the plucking roller 26 has just reached its uppermost position which is shown in full lines in FIG. 1, the motor 66 is started to rapidly turn the eccentrics 68, 69 through 180 degrees with respect the position of FIG. 2 whereby the stack of slabs 4 is moved downwardly, as viewed in FIG. 2, through a distance equal to the width of the slots 33. Thus, during the subsequent stroke of the roller 26 to its phantom-line position 26′ of FIG. 1, the teeth 31 engage such portions of the slabs 4 which were aligned with the bars 8 during the preceding (upward) stroke of the roller 26. To bring about a downward stroke of the roller 26 to the position 26′, the motor 49 turns the shaft 50 and the disks 51, 52 through 180 degrees in order to move the links 54 to the phantom-line position 54′ whereby the roller shaft 27 assumes the position 27′ which corresponds to the phantom-line position 28′ of the arm 28. The operation of the motor 37 which rotates the roller 26 need not be interrupted when the roller reaches the upper or the lower end of its stroke.

The impurities including non-ferrous and/or ferrous particles which might have been contained in the slabs 4 or 4″ drop onto and through the grate 108 to be collected in the receptacle 92. Any ferrous particles which are too light or too bulky so that they do not or cannot pass through the spaces between the bars of the comparatively coarse grate 108 are collected by the magnet or magnets 109 before advancing into the range of the first teasing roller 80. This roller further comminutes and further mixes the tufts removed from the slabs by the roller 26, and any impurities contained in the tufts are free to pass through the grate 88 to be collected in the left-hand portion of the receptacle 92. It will be readily understood that the receptacle 92 may be subdivided into two chambers, one for particles passing through the grate 108 and the other for particles separated from the tufts by the pins 101 of the roller 80. The teasing and mixing of the tufts is then continued as the tufts pass through the duct 103 toward the suction duct 106, i.e. the tufts are consecutively engaged by the pins of the continuously revolving rollers 81, 82, 83, and any impurities exposed by the pins 101 are free to pass through the grates 89, 90 and 91 to be respectively collected in the receptacles 93, 94 and 95. The intensity of the current of air produced by a suction fan (not shown) connected to the upper end of the suction duct 106 depends on the configuration of the housing 36 and on the number of apertures (including the arcuate slots 65) in its walls. It is desirable that the vacuum produced in the housing 36 be sufficient to prevent escape of tufts, dust and/or impurities from the duct 103 and to insure that the current of air flowing toward the suction duct 106 is sufficient for proper intake, dust extraction and further advance of the tuft material.

FIG. 3 illustrates a slightly modified apparatus BB*a* wherein all parts idenetical with or analogous to those described in connection with FIGS. 1 and 2 are denoted

by the same reference numerals followed by the letter *a*. Such parts will be described only insofar as is necessary for better understanding of the manner in which the modified apparatus performs its functions. The means for rotating the plucking roller **26***a* has been omitted for the sake of clarity and, while the front wall of the housing **36***a* is broken away, the front arm **29***a* is shown to facilitate the understanding of the modified arrangement which reciprocates the roller **26***a* between its full-line position at the upper end of its stroke and its phantom-line position **26***a'*, the latter corresponding to the phantom-line positions **27***a'*, **29***a'* of the roller shaft **27***a* and of the arm **29***a*, respectively. FIG. 3 further shows an intermediate position of the roller **26***a* which is identified by the reference numerals **26***a''*.

The shaft **57***a* of the reversible motor **49***a* is rigid with a bevel gear **115** which meshes with a second bevel gear **116** mounted at the upper end of an inclined spindle **117** which is rotatable in two bearings **118**, **119** carried by the front upright wall (not shown) of the housing **36***a*. The threads of the spindle **117** mesh with the internal threads of a forked motion transmitting element **120** whose prongs define an open recess for the end portion of the shaft **27***a* whereby, when the spindle **117** is driven in a direction to move the element **120** toward and beyond its intermediate position **120''** to the end position **120'**, the roller **26***a* is also moved to its lower end position **26***a'*. The movement of the roller **26***a* is reversed when the spindle **117** is rotated in the opposite direction. The arm **29***a* and its companion arm (not shown) merely serve as a means for properly supporting the shaft **27***a* in the slots **65***a* and for insuring smooth operation of the motor **49***a*, such smooth operation being enhanced by the provision of the counterweights (only the counterweight **62***a* shown) which compensate for the weight of the arms. It is preferred to provide two spindles **117** and two motion transmitting elements **120**, one at each end of the roller shaft **27***a*.

The modified apparatus BB*a* comprises a single endless belt or chain conveyor **5***a* whose apron is provided with spikes **121** to engage the lowermost slab of a package (not shown) and to advance the slabs toward the grid **7***a*. Adjacent to the outer side of this grid, there is provided a pair of spiked guide rollers **122**, **123** which replace the wedges **110** and which properly retain the package during the reciprocation of the plucking roller **26***a*. The means for driving the spiked rollers **122**, **123** at predetermined intervals may be coupled with the motor of the conveyor **5***a*.

The grates **88***a*, **108***a* may consist of a magnetic material so that the magnet or magnets **109** may be dispensed with. The grates of the apparatus BB or BB*a* are preferably adjustable, i.e. they may be formed with removable bars in order that an operator may readily change the spacing between the adjacent grate bars by inserting differently dimensioned and/or configurated bars, or the individual bars of each grate may be movable toward and away from each other to change the spacing therebetween and to insure that impurities up to a given size may drop into the respective receptacles.

The arm **29***a* operates an upper limit switch **124** when the roller **26***a* reaches the upper end of its stroke, and this switch is operatively connected with and reverses the motor **49***a* in order to start the motion transmitting element **120** in downward direction. A suitable time-lag relay may be installed in the connection between the switch **124** and the motor **49***a*. A second limit switch **125** is adjacent to and is operated by the arm **29***a* when the latter reaches the lowermost position **29***a'*; the switch **125** reverses the motor **49***a* to start the element **120** and the roller **26***a* in upward direction.

The plucking roller **26** or **26***a* is driven in anti-clockwise direction (i.e. in a direction to loosen and to mix the tufts in the right-hand compartment of the housing **36** or **36***a* before the tufts reach the first teasing roller **80** or **80***a*) in order to prevent a clogging of the housing at a point adjacent to the grid **7** or **7***a* and eventual interference with the reciprocatory movements of the plucking roller. The motor **49** or **49***a* which reciprocates the roller **26** or **26***a* may be arrested in a fully automatic way in response to impulses produced by a control element.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic and specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A process for breaking packages of compressed fibrous material with reciprocating plucking instrumentalities which comprises the steps of moving a first package into the path of said reciprocating instrumentalities to remove from the package tufts of fibrous material; and moving additional packages into the path of said instrumentalities upon completed breaking of the preceding package.

2. A process for breaking packages of compressed fibrous material with reciprocating plucking instrumentalities which comprises the steps of stacking a plurality of slabs into the form of a parallelepiped package; moving one face of the package into the path of said reciprocating instrumentalities to remove from the package tufts of fibrous material; forming additional packages of stacked slabs; and moving the additional packages into the path of said instrumentalities upon completed breaking of the preceding package.

3. A process for consecutively breaking stacked slabs of compressed fibrous material with reciprocating plucking instrumentalities which comprises the steps of stepwise advancing a first stack of slabs into the path of said reciprocating instrumentalities to remove from the slabs tufts of fibrous material; forming additional stacks of slabs; and stepwise advancing the additional stacks into the path of said instrumentalities upon completed breaking of the preceding stack.

4. A process for consecutively breaking stacked slabs of compressed fibrous material with a toothed plucking roller which comprises the steps of rotating and simultaneously reciprocating the roller in a predetermined path; forming a first stack of slabs and moving the slabs endwise into the path of the reciprocating roller whereby the latter removes from the slabs tufts of fibrous material; forming additional stacks of slabs; and consecutively moving the additional stacks into said path upon completed breaking of the preceding stack.

5. A process for consecutively breaking stacked slabs of compressed fibrous material with a toothed plucking roller which comprises the steps of rotating and simultaneously reciprocating the roller in a path located in a substantially vertical plane; forming a first stack of horizontal slabs and moving the stack into the path of the reciprocating roller whereby the latter removes from the stack tufts of fibrous material; forming additional stacks of horizontal slabs; and consecutively moving the additional stacks into said path upon completed breaking of the preceding stack.

6. A process for consecutively breaking stacked slabs of compressed fibrous material with a toothed plucking roller which comprises the steps of rotating and simultaneously reciprocating the roller in a predetermined path; forming a first stack of slabs consisting of different fibrous materials and moving the slabs endwise into the path of the reciprocating roller whereby the latter removes from the slabs tufts of fibrous material; forming additional stacks of slabs; and consecutively moving the additional stacks into said path upon completed breaking of the preceding stack.

7. A process for consecutively breaking stacked slabs

of compressed fibrous material with a toothed plucking roller which comprises the steps of rotating and simultaneously reciprocating the roller in a predetermined path; forming a first stack of slabs and moving the slabs endwise into the path of the reciprocating roller whereby the latter removes from the slabs tufts of fibrous material; subjecting the tufts to the teasing action of at least one teasing roller; forming additional stacks of slabs; and consecutively moving the additional stacks into said path upon completed breaking of the preceding stack.

8. A process for breaking packages of fibrous material with a toothed plucking roller, comprising the steps of rotating and simultaneously reciprocating a plucking roller in a predetermined plane; stacking a plurality of bales consisting of at least two different materials to form parallelepiped packages; and feeding the packages consecutively and endwise into said predetermined plane so that the reciprocating plucking roller removes tufts simultaneously from the end faces of all bales which form a package whereby tufts of different materials are automatically intermixed during breaking of consecutive packages.



9. A process for breaking packages of fibrous material with a toothed plucking roller, comprising the steps of rotating and simultaneously reciprocating a plucking roller in a predetermined plane; feeding a series of packages consecutively and endwise into said predetermined plane whereby the reciprocating plucking roller removes tufts from the end faces of and breaks the consecutive packages; and moving the packages back and forth at right angles to the direction of reciprocation of the plucking roller while the packages are in engagement with the plucking roller.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 1,400,008 | Stancliff | Dec. 13, 1921 |
| 2,334,940 | LeTourneau | Nov. 23, 1943 |
| 2,509,823 | Hughes | May 30, 1950 |
| 2,710,583 | Fava | June 14, 1955 |
| 2,800,180 | Jensen | July 23, 1957 |
| 2,803,304 | Kessler | Aug. 20, 1957 |
| 2,844,847 | Smith | July 29, 1958 |