

Sept. 22, 1953

M. D. RUST

2,652,676

COTTON-PICKING MACHINE

Filed May 16, 1950

6 Sheets-Sheet 1

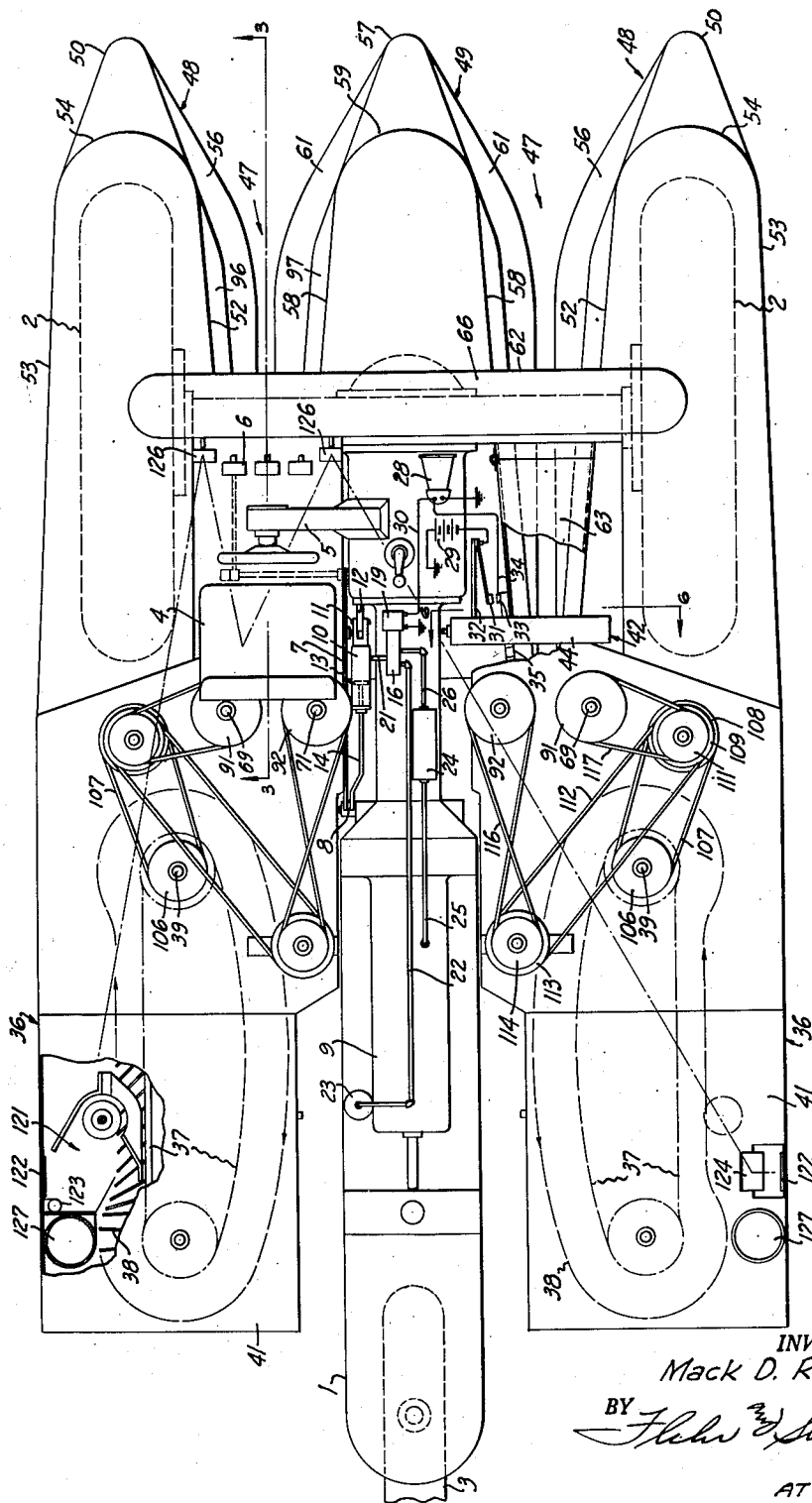


FIG. 1

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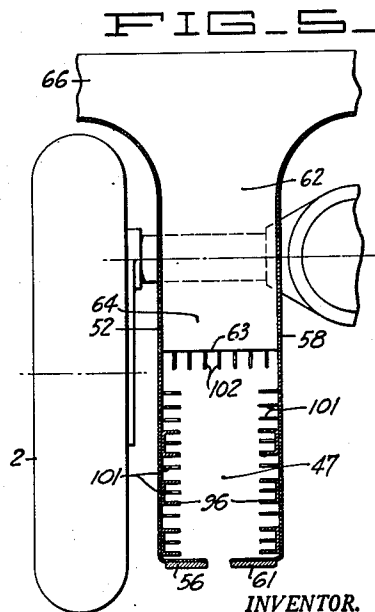
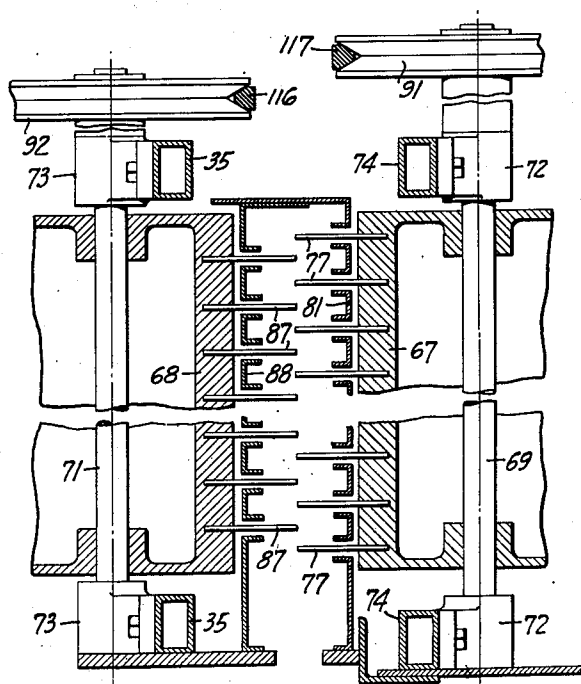
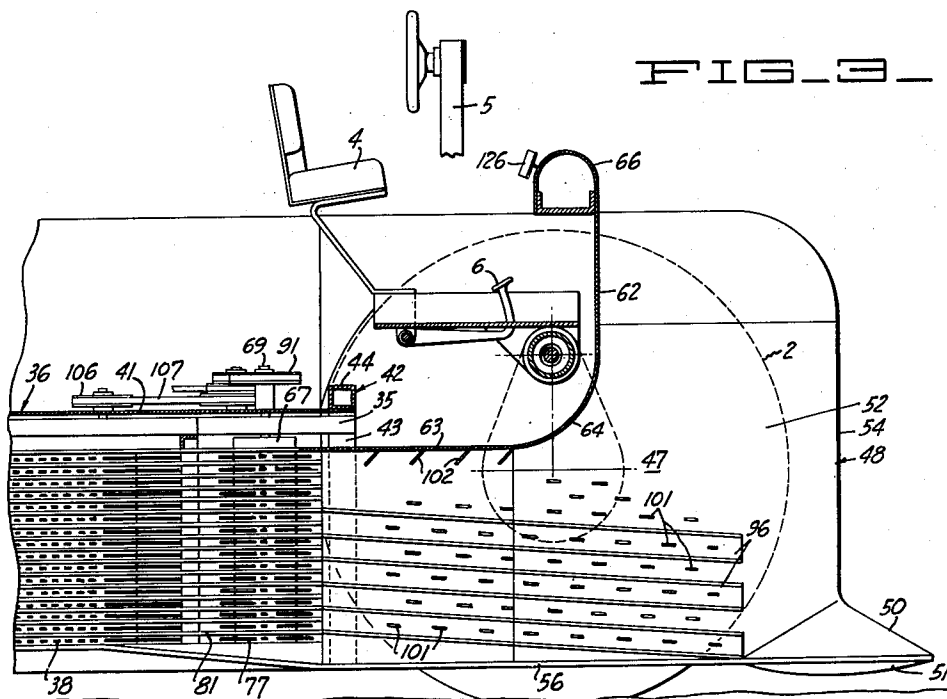
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6 Sheets-Sheet 3



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COTTON-PICKING MACHINE

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6 Sheets-Sheet 4

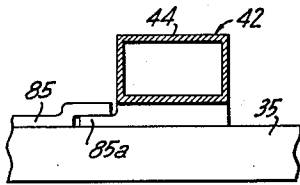


FIG. 10

FIG. 11

FIG. 11

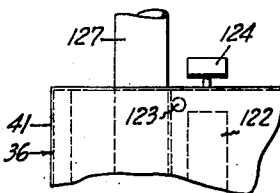
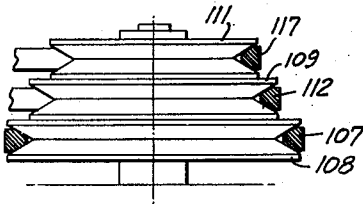


FIG. 9

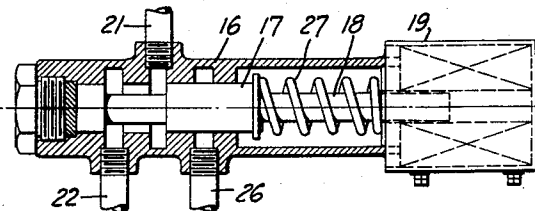


FIG. 7

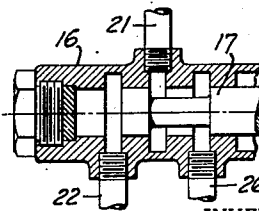
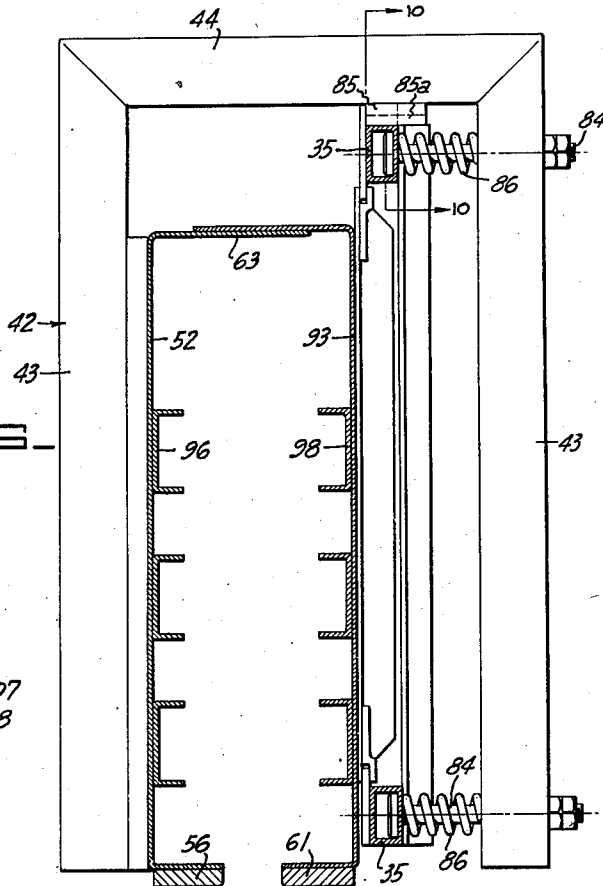


FIG. 8

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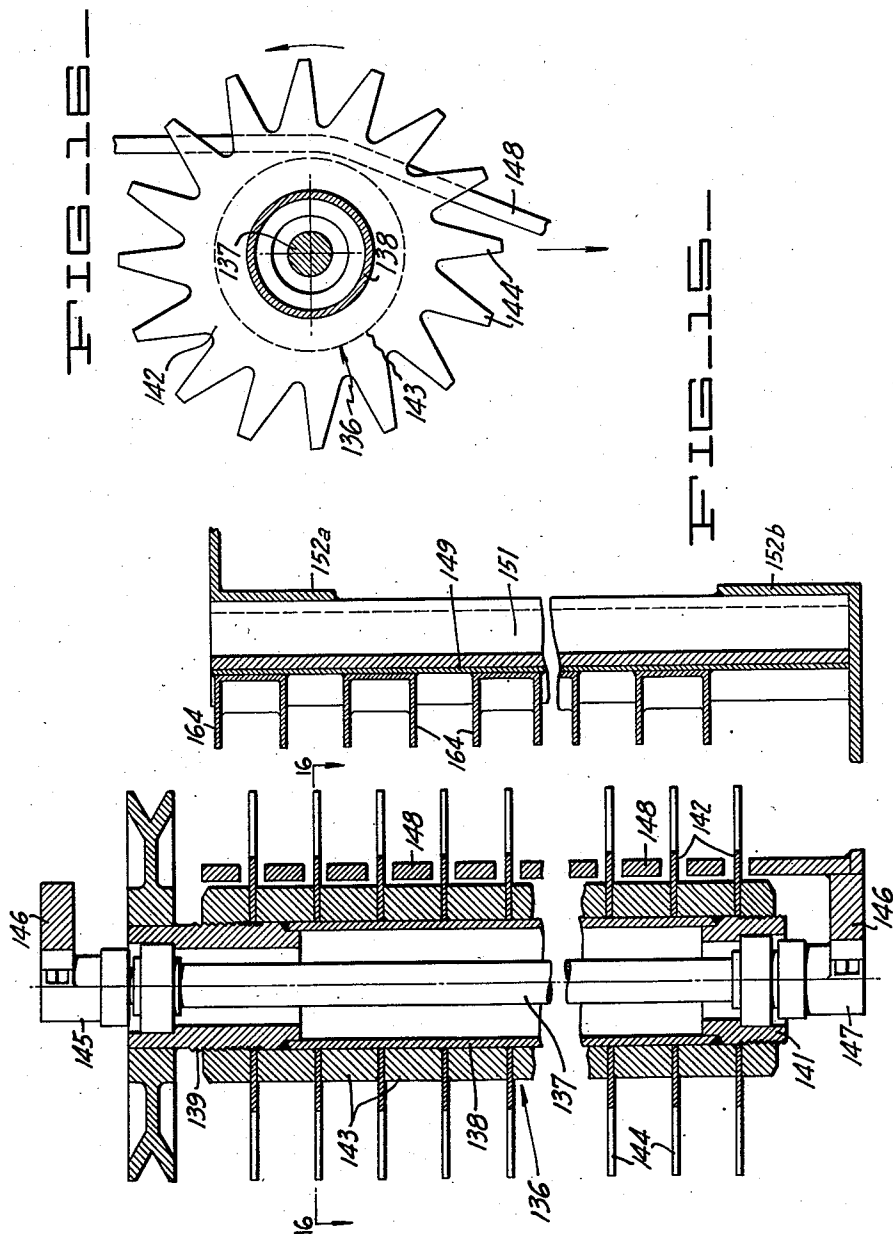
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2,652,676

COTTON-PICKING MACHINE

Filed May 16, 1950

6 Sheets-Sheet 6



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2,652,676

COTTON-PICKING MACHINE

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Application May 16, 1950, Serial No. 162,165

35 Claims. (Cl. 56—42)

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This invention relates generally to cotton picking machines of the type making use of a plurality of rotating spindles for the removal of cotton fiber from the plant boll. The present application is a continuation-in-part of my copending application Serial No. 596,858, filed May 31, 1945, for "Cotton Picking Machine," and which has been abandoned in favor of the present application.

Conventional cotton picking machines of the rotating spindle type employ a large number of rotating spindles arranged in vertically spaced rows. The spindles are adapted to progress successively through a picking zone in which the spindles are extended into the plants, a stripping and doffing zone in which cotton carried by the spindles is removed and a moistening zone in which moisture is applied to the spindles before returning them to the picking zone. In one type of cotton picking machine, which can be referred to as of the Rust type (see for example Patents 1,894,198, 2,023,491 and 2,058,514). The spindles are carried by endless elongated belts or chains and rotated by friction drive means. The picking spindles employed are cylindrical rods of relatively small diameter. In another type which can be referred to as the International type, a drum carrier is provided for the spindles, and the spindles are rotated by a positive gear drive. Relatively heavy tapered spindles are employed, which have rows of struck out spurs to engage the fiber.

The efficiency of operation of such cotton picking machines is determined by the amount of cotton which it will effectively pick from the plants in one pass, in proportion to the total cotton available for picking. It is obviously desirable to maintain the picking efficiency relatively high whereby in passing substantially all of the cotton in open bolls is effectively removed.

In general a boll is in condition for picking when it has reached sufficient maturity to crack open and thus expose a portion of fluffy cotton. Under certain conditions a boll may be cracked open, but the exposed cotton fiber may be in such condition that it is not susceptible to winding up on a rotating picking spindle with which it contacts. This applies particularly to smooth surfaced spindles such as are used in the Rust type machines. For example the exposed cotton fiber may be smoothed over or matted down whereby there is no fluffy portion for adherence to the moistened surfaces of the spindles. This smoothing over or matting down of the fiber may be due to various causes, including conditions of moisture

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and dust, or inhibited development which prevents normal fluffing of the fiber when the boll cracks open.

In general it is an object of the present invention to provide an improved cotton picking machine of the above type having means which will act upon bolls having smoothed over or matted fiber whereby the fiber is fluffed and conditioned for effective picking.

It is a further object of the present invention to provide novel fluffing means carried by the frame of the machine in advance of the picking spindles, and which serves to perform a fluffing operation to promote efficient picking action.

It is a further object of the invention to provide a cotton picking machine of the above character having means tending to prevent dropping or a general downward crowding of the bolls toward the bottom of the stalk, where a part of the cotton may not be properly acted upon by the picking spindles.

Another object of the invention is to provide a novel and improved mouth construction for general gathering of the plants and for passing the plants through the various operating zones of the machine.

Another object of the invention is to provide means serving to signal the operator in the event undue pressure is applied to the walls of the mouth or to the fluffing means employed.

Another object of the invention is to provide safety means which serves to stop the machine in the event undue pressure is applied to the walls of the mouth or to the fluffing means employed.

Another object of the invention is to provide means whereby an operator can view the doffer chambers without leaving the operator's seat, thereby enabling him to stop the machine promptly should the doffer mechanism or the suction duct entrance become clogged.

Additional objects of the invention will appear from the following description in which the preferred embodiments have been set forth in detail in conjunction with the associated drawing.

Referring to the drawing:

Figure 1 is a top plan view of the machine embodying the present invention, certain parts being broken away.

Figure 2 is a view of the machine illustrated in Figure 1, certain parts being broken away and certain parts being in section.

Figure 3 is a detail vertical section taken along the line 3—3 of Figure 1.

Figure 4 is an enlarged detail cross-section

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taken on the line 4—4 of Figure 2, certain parts being broken away.

Figure 5 is an enlarged detail cross-section on the line 5—5 of Figure 2, certain parts being broken away.

Figure 6 is an enlarged detail cross-section taken along the line 6—6 of Figure 1.

Figure 7 is an enlarged detail view partly in section and partly in elevation, illustrating the clutch release valve.

Figure 8 is a detail view illustrating a portion of the clutch release valve.

Figure 9 is a detail side elevational view illustrating a part of the means which can be employed for viewing certain interior operating parts.

Figure 10 is a detail cross-sectional view taken along the line 10—10 of Figure 6, and on the same scale.

Figure 11 is a detail view on an enlarged scale illustrating one of the drive pulleys employed.

Figure 12 is a plan view illustrating another embodiment of the invention, and with certain parts being broken away.

Figure 13 is an enlarged cross-sectional detail showing the hinge connection for structure 152.

Figure 14 is an enlarged cross-sectional detail taken along the line 14—14 of Figure 12.

Figure 15 is an enlarged cross-sectional detail taken along the line 15—15 of Figure 12.

Figure 16 is a cross-sectional detail taken along the line 16—16 of Figure 15.

Referring first to that embodiment of the invention illustrated in Figures 1 to 11 inclusive, it consists of a suitable tractor 1 provided with the traction wheels 2, the guiding wheel 3, and the driver's seat 4. Conventional operating parts are provided such as the steering mechanism 5, clutch pedal 6, manual clutch release 7, the clutch release lever 8, and the driving motor 9.

For reasons to be presently described, it is desirable (but not essential) for the tractor to be provided with automatic means for releasing the clutch under certain operating conditions. Either pneumatic or hydraulic means can be employed for this purpose. Thus (Figures 1, 7 and 8) a vacuum cylinder 10 is shown attached by pivot 11 to the fixed support 12. The piston 13 which operates within this cylinder, has its piston rod 14 operatively connected to the clutch release lever 8. A suitable control valve of the plunger type can be used in conjunction with the pneumatic cylinder, and can be constructed as shown in Figures 7 and 8. In this instance the valve includes a body 16 which accommodates the slidable valve plunger 17. The rod 18 is attached to plunger 17 and forms the magnetic movable core of the operating solenoid 19. It should be understood that lever 8 is the one commonly found on agricultural tractors, and is located on the clutch shifting shaft which carries a fork which disengages the clutch when the lever 8 is moved in one direction. When lever 8 is released it permits the clutch to move to its engaged or "in" position.

Pipe 21 serves to connect the body of the valve with the cylinder 10 and duct 22 connects to the atmosphere through the air cleaner 23. A suction or vacuum reservoir 24 is connected to the intake manifold of the engine through the suction pipe 25 and to the valve body by pipe 26. A compression spring 27 urges the valve plunger 17 to the left as viewed in Figure 7, and when solenoid 19 is not energized the plunger assumes a position in which it interrupts communication between

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pipes 21 and 26, but permits communication between pipes 21 and 22. For this position of the control valve vacuum is not applied to the cylinder 10 and the clutch is engaged. When solenoid 19 is energized the plunger is moved to the position shown in Figure 8, in which communication between pipes 21 and 22 is interrupted, and pipe 21 placed in communication with pipe 26, whereby vacuum is applied to cylinder 10 to disengage the clutch.

The electrical circuit means for operating the solenoid 19 can include a suitable signal such as an electric horn 28, which has its one side grounded, and its other side connected by wire 34 (through control contacts hereinafter described) to one terminal of the battery 29. Wire 30 connects the same terminal of the horn 28 with one terminal of solenoid 19, and the other terminal of the solenoid is grounded as illustrated. The battery is connected in series with a pair of electrical control contacts. One spring mounted contact 31 is carried by the fixed support arm 32. The other contact 33 is carried by a movable frame bar 35 which will be presently described in detail. When contacts 31 and 33 are closed current flows through both the signal 28 and the solenoid 19. It may be explained at this point that under certain operating conditions, the plants passing through the machine may clog against confining side walls, and under such conditions frame bar 35 is moved to close the contacts 31 and 33 to engage solenoid 19. As will be evident from the foregoing, when solenoid 19 is energized the plunger valve is moved to a position to establish communication between pipes 21 and 26, thus applying vacuum to the cylinder 10 to disengage the tractor clutch and thereby stop the machine. At the same time the signal 28 is energized.

The machine of Figures 1 to 12 inclusive preferably includes two cotton picking units 36 for operating upon two plant rows. In general it is assumed that these units are constructed the same as prior machines of the Rust type. The customary parts of these units are illustrated diagrammatically, including the endless chains 37 for carrying the spindles 38, and the vertical shafts 39 which carry sprockets for engaging the chains 37. The parts just described are generally enclosed within the housings 41, and are attached to frame parts (not shown) which in turn connect with the tractor frame. A forward extension of the machine frame carries yokes 42 each comprising vertical structural members 43 which have their upper ends connected by members 44.

As disclosed in the aforementioned prior patents, in operation the spindles 38 for each unit are progressed as indicated by arrows in Figure 2, whereby they continuously pass through the picking zone 46. While in the picking zone the moist spindles are continuously rotated to wind up cotton fiber with which they contact. After the spindles leave the picking zone they progress through the housing 41, where they are acted upon by stripping and doffing means to remove fiber, after which they are moistened to prepare the same for subsequent picking.

To form a machine according to the present invention certain parts are carried in advance of the picking units and serve to operate on the plants. Thus at the forward end of the machine, mouth forming structures are provided for forming a plant receiving tunnel or passage 47 for each picking unit. The two passages are formed by the side structure 48 in conjunction with the

intermediate structure 49. Each structure 48 can comprise a forward shoe or nose 50 which is generally pointed as illustrated in Figure 2, and which preferably is formed with the bottom convex wall 51 (Figure 3). Vertical side sheet metal walls 52 and 53 are connected at their forward edges by the curved front wall 54. The lower end of each structure 48 is enclosed by a bottom wall and is formed to provide the longitudinally extending bottom flange 56 (Figure 2).

The intermediate structure 49 is formed similar to structures 48. Thus it includes the shoe or nose 57, together with side vertical sheet metal walls 58, which are connected at their forward edges by curved wall 59. Lower longitudinally extending flanges 61 are provided for both sides of structure 49, and at the lower end of the same.

It will be evident from the foregoing and from Figure 2 that the structures 48 and 49 form plant receiving passages 47 which confine the plants laterally and which converge rearwardly. The side walls 52 and 58 of the two structures 48, 49 are directly connected by the vertical wall 62, the horizontal wall or ceiling 63, and the connecting curved wall 64 (Figure 3). The upper edges of walls 62 can be formed integral with the cross-beam or cowl 66 (Figure 3). When the machine moves over a plant which is taller than the effective height of the picking zone, such a plant is engaged by the walls 62, 63, 64 and bent forwardly, whereby all portions of the bent over plant pass through the picking zone and are properly acted upon by the spindles.

In advance of each picking zone I provide fluffing means for fluffing or loosening the fiber as previously explained. The fluffing means includes a pair of rollers or drums 67, 68 which are mounted upon opposite sides of the path of movement of the plant. These drums are carried by the vertical shafts 69, 71 which are carried by the journals 72, 73. Journal blocks 72 are mounted upon the fixed bars 74, which in turn are secured to the structural members 43, and to the vertical frame part 76. A plurality of fluffing pins 77 are carried by the periphery of the drum 67, and these pins are disposed sufficiently close together to insure engagement with substantially all of the bolls passing through the machine. The pins 77 are preferably disposed in vertically spaced rows, and stationary fingers 81 extend adjacent one side of the drum and between the rows of fingers. It will be noted that the forward ends of the fingers 81 are attached to a frame part 43, and that their rear ends are attached to the frame part 76.

The journal boxes 73 for the drum 68 are carried by the frame bars 35 previously mentioned in connection with electrical circuit contacts 31 and 33.

The rear ends of frame bars 35 are pivotally carried by the machine frame at 80, thereby permitting limited swinging movement of the bars 35 and the drums 68 in a horizontal direction. The rear ends of the bars 35 terminate adjacent the forward edges of the vertically spaced guide slats 82, which serve to confine the plants within the picking zone. The upper and lower bars 35 can be connected forwardly of the drum 68 by the vertical structural members 83a and the upper bar 35 can be slidably suspended by bracket 85 (Figure 10) which slidably engages flange 85a on frame part 44. Rearwardly of the drum 68 the bars 35 are connected by vertical member 83b and form a part of a frame which includes

longitudinally extending and vertically spaced ribs for engaging and confining the plants.

Spring means is provided for continuously urging each drum 68 toward its cooperating drum 67. Thus guide pins 84 are slidably carried by the vertical structural members 43, and are connected to the upper and lower bars 35. Compression springs 86 act between the frame parts 43 and the bars, thereby urging the bars together with each associated drum 68 toward the cooperating drum 67.

Each drum 68 is similarly provided with a plurality of fluffing members 87, which are preferably arranged in vertically spaced rows, to thereby accommodate the stationary vertically spaced fingers 88. The forward and rear ends of the fingers 88 are suitably secured to the frame which includes the bars 35.

Figure 4 illustrates the manner in which the fluffing pins or members of the two drums extend between the fingers 81 and 88 to points in proximity with each other. In other words the zone of operation of the fluffing pins completely encompasses the space through which the plants must pass.

In practice it is desirable to positively rotate the drums 68, 69 in the direction as indicated by arrows in Figure 2. Thus the upper ends of the shafts (Figure 4) are provided with drive pulleys 91, 92 which are connected to drive belts as will be presently explained.

Extending between the rear edges of the walls 58 and the fluffing drums 68, are the wall sections 93 which are pivoted at 94 for movement laterally. It will be noted that the rear edges of wall sections 93 overlap the forward extremities of the bars 35. When sufficient plant pressure is applied to the wall sections 93, they move against the forward extremities of bars 35 to urge the same against the springs 86 to ultimately close the electrical contacts 31 and 33.

In addition to the parts previously described, I preferably provide means in conjunction with the forward structures 48, 49 which tends to prevent pressing of the bolls downwardly toward the bottom part of the plant. For this purpose the wall 52 of each structure 48 is provided with a plurality of vertically spaced and longitudinally extending guide ribs or fins 96, which are approximately horizontal. Similarly the walls 58 are provided with the vertically spaced guide ribs 97, and the wall sections 93 with the ribs 98. All of these ribs preferably have vertical spacing which is in excess of the normal boll diameter, and the ribs are inclined, that is, they are elevated at their rear ends (Figure 3), thereby tending to raise the bolls upwardly for proper passage through the picking zone. It will be evident that these ribs have a guiding action upon the plant bolls because the plant is gradually compressed to urge the bolls against the edges of the ribs, and to thereby tend to cause the bolls to follow along the ribs.

As additional fluffing means it is desirable to provide fluffing members in the form of pins 101 mounted between the ribs (see Figure 3) and which can be inclined rearwardly as illustrated (Figure 2). These pins exert a tearing action upon the sides of the boll to thereby fluff exposed matter or smoothed over fiber. As shown particularly in Figure 5 a number of such pins can be mounted above the uppermost rib and similar pins 102 can be mounted upon and extend rearwardly from the horizontal wall or ceiling 63.

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Suitable drive means for the fluffing drums is illustrated in Figures 1 and 11. A driving pulley 106 is attached to the upper end of one of the shafts 39 of the adjacent picking unit. This pulley is connected by belt 107 with the lowermost one of the three connected pulleys 108, 109 and 111. Pulley 109 is connected by belt 112 with the lowermost one of the two idler pulleys 113, 114. Pulley 114 is connected by the crossed belt 116 with the pulley 92. Belt 117 serves to connect pulley 91 with the pulley 111. The location of the idler pulley 114 facilitates lateral movement of the pulley 92.

Preferably the rate of rotation of the fluffing drums is such that the fluffing pins or other boll penetrating members carried by the same move slightly faster than the forward advance of the machine. This tends to cause the end of a pin to penetrate or pierce a boll, to move relative to the boll in a direction longitudinally of the direction of movement of the machine and while in the boll, and then to be retracted while such relative motion is taking place. This action is deemed desirable in securing effective fluffing action of matted fiber. In addition to the foregoing, I prefer to drive one drum at a speed slightly greater than the other whereby when a boll is engaged by the pins of both drums, such pins move relative to each other and to the boll, to promote effective fluffing action.

In Figure 1 the stripping and doffing means for one of the picking units has been indicated diagrammatically at 121, and is located within the chamber 41. It is desirable to enable the operator to view the stripping and doffing means while the machine is in field operation. For this purpose I provide windows 122 in one of the chamber walls to admit light, and in addition I provide an electric illuminating lamp 123. A sight opening is provided in the top wall or cover of each doffing chamber, and above the side wall there is an inclined viewing mirror 124. Additional mirrors 126 are mounted in front of the operator, and positioned whereby the operator may, by use of mirrors 126 and 124, view the interior of each doffing chamber. In addition he may view the entrance to the suction conduit 127, and through which removed fiber is conveyed, thus determining whether or not this entrance opening is blocked.

Operation of the machine illustrated in Figures 1 to 12 inclusive can be reviewed as follows: Although the machine can operate upon a single plant row, it is intended for normal operation upon two rows simultaneously. As the machine proceeds along two rows of plants, the picking unit is driven continuously with continual movement of the spindle carrying means, and with continuous rotation of the spindles within the picking zone. The fluffing drums 67 and 68 are driven continuously and in opposite directions as indicated by the arrows in Figure 2. As plants enter the passages 47 they are initially compressed laterally, and then plants beyond a certain height are compressed vertically. Note that the compression vertically follows lateral compression, whereby vertical compression will not serve to force the lower bolls toward the bottom of the plant stalk. This is because lateral compression which has taken place by the time the plant is compressed vertically, causes the lower bolls to be engaged with the ribs 96, 97 whereby at the time of vertical compression they tend to remain and follow along the ribs, rather than to be forced downwardly. The ribs 96, 97

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and 98 are spaced vertically a sufficient amount whereby bolls may enter between the same to engage the fluffing pins 101, also by virtue of engagement with the wall or ceiling 63, the upper bolls are engaged by the fluffing pins 102. Movement across the fluffing pins just mentioned tends to cause a fluffing effect upon exposed matted or smoothed over fiber.

The bolls are next acted upon by the fluffing pins 77, 87 of the fluffing drums. These fluffing pins are so distributed that substantially all of the bolls are penetrated by the pins, and while a pin is within a boll it is advanced rearwardly faster than the boll and then retracted. This causes an outward tearing effect (i. e. fiber pulling) which tends to break the matting of the fiber, and to leave fluffed masses of cotton. The bolls now proceed through the picking zone where the fluffed cotton is contacted by the moistened and rotating picking spindles, to carry out a picking operation as with conventional machines of the Rust type.

If at any time serious crowding occurs within the region of the fluffing drums or immediately in advance of the same, the drums 68 are permitted to move laterally to cause closing of the electrical contacts 31 and 33. This causes sounding of the alarm 28 together with automatic energization of solenoid 19, with resulting release of the tractor clutch. Thus the forward advance of the machine is stopped and the machine made inoperative until the clogging is relieved. While the machine is in operation the operator may at all times view the doffing and stripping means, and also the inlets to the pneumatic conduits 127, thus making certain that these parts are operating properly.

Figures 12 to 16 illustrate another embodiment of the invention in which a single fluffing drum is utilized in conjunction with each picking unit, in place of the two fluffing drums of Figures 1 to 11 inclusive. Thus in this instance the picking unit 131 is the same as previously described, and is associated with the forward structures 132, 133 corresponding to structures 48, 49 and which form the plant entrant passage 134.

The single fluffing drum 136 can be constructed as shown in Figures 15 and 16. Thus the vertical shaft 137 serves to mount the tubular hub 138, and which has threaded end portions 139, 141. A plurality of relatively flat circular discs 142 are positioned upon the hub 138, and are retained apart in spaced vertical relationship by the spacer rings 143. Each disc has its periphery formed to provide the saw-shaped teeth 144.

The upper end of shaft 137 is carried by the block 145, which in turn is carried by the upper support bar 146 (Figure 15). The lower end of the shaft can be carried by the block 147, which is carried by the lower support bar 146 of the machine. Fingers 148 are arranged to extend between the teeth 144, the same as the fingers 81 and 88 of Figure 2.

Adjacent one side of the drum 136 (Figure 12) there is a vertically extending wall 149, which is carried by vertical structural member 151 and the frame 152, the latter including the upper and lower members 152a, 152b and the vertical members 152c and 152d. Pivotal connections 153 connect the rear edge of frame structure 152 with the adjacent edge of the frame 155 and corresponds to the pivotal connection 80 of Figure 2. Frame 155 includes horizontal strips or rails which are vertically spaced and which extend between the outer ends of the picking spindles to

confine plants in the picking zone. The forward edge of the frame structure 152 is guided by the slidable guide pins 154, and is urged toward engagement with the plants by the compression springs 156. The electrical contacts 31, 33 previously described with reference to Figures 1 to 11, are associated with the structure 152, and are closed when the structure is moved by the pressure of plants applied to the same. The structure 132 is provided with longitudinally extending ribs 157 corresponding to the ribs 96 of Figure 2, and the structure 133 is similarly provided with ribs 158, 159 which correspond to the ribs 97 and 98. Ribs 159 are carried by the wall section 161, corresponding to wall section 93, and carried by the hinge 162. Stationary fluffing pins 163 can be associated with the ribs just described, and can correspond to the stationary fluffing pins 101 of Figure 2. The plant engaging wall 149 is provided with longitudinally extending ribs 164, which are spaced vertically and disposed in planes intermediate the planes of the teeth 144. Rearwardly of the wall 149 the frame structure 152 can be provided with longitudinally extending ribs 166 (Figure 14).

Figure 14 shows means which can be employed to yieldably support the frame 155. Thus frame extension 168 can be pivotally attached at 169 to the arms 171, and these arms can be pivotally attached at 172 to the support plates 173. These support plates in turn are pivotally connected at 174 to frame members 176, which form a portion of the frame of the picking unit. Bolts 177 and 178, which extend through slots, permit adjustable clamping of the arms 171 to the plates 173 and adjustable clamping of the plates to the frame members 176. Thus adjustments can be made to raise or lower the pivots 169 relative to the frame members 176, or to adjust the same laterally. Bolts 179 slidably extend through the structural frame members 181, and are attached to the extensions 168. These bolts carry the compression springs 182 which act to hold the frame 155 in its normal operating position. With this arrangement it is evident that pressure applied to the frame 155 by plants passing through the picking unit, may move this frame outwardly a limited amount.

The drum 136 can be driven in the same manner as each of the drums of the preceding embodiment. The direction of drive is preferably such that teeth 144 move in the direction shown in Figure 16, and at such a rate that these teeth after penetration of a boll move rearwardly relative to the boll before their complete retraction. This causes a pulling out and loosening of the fiber, thus providing fluffed portions for engagement by the rotating picking spindles.

It will be noted that as plants pass through the machine they are first operated upon by the ribs 157, 158, 159, the same as in the embodiment of Figures 1 to 11 inclusive, and also by the stationary fluffing pins 163. As the plants continue through the machine, they are then acted upon by the fluffing drum 136, and as they pass through the region of operation of this drum, the bolls are crowded against the fluffing teeth or boll penetrating members 144, whereby these teeth are caused to penetrate the bolls. Immediately thereafter lateral pressure upon the plant and the bolls is partially relieved, and the plant passes along the ribs 166, to enter the picking zone.

It will be evident that the embodiment of Figures 12 to 16 inclusive is considerably simpler than the first described embodiment, particular-

ly in that only one fluffing drum is required for each picking unit. In addition the fluffing drum employed is simpler to manufacture than the pin type of drum illustrated in the first described embodiment.

It will be noted that by fluffing the fiber prior to the picking operation, the machine is made capable of operating under a wider range of field conditions with good picking efficiency. Smoothed over or matted fibers are fluffed in such a manner that they are engaged by the picking spindles, the same as a boll which shows naturally fluffed cotton. In this fluffing operation no substantial amount of cotton is removed from the bolls, and practically all of the cotton is permitted to remain on the plant to thereby permit the desired cotton recovery in the picking operation.

I claim:

1. In combination with a cotton picking machine wherein rotatable cotton picking spindles are employed and the plants caused to pass through means providing a picking zone into which the spindles extend, means providing a passage adjacent the entrant end of said zone for entrance of a plant and for passing the plants to the picking zone, and cotton fluffing means disposed adjacent said passage to engage plants passing through the same in advance of contact of the plants with the picking spindles.

2. In combination with a cotton picking machine wherein rotatable cotton picking spindles are employed and the cotton plants caused to pass through means providing a picking zone into which the spindles project, means providing a passage adjacent the entrant end of said zone for receiving the plants and for passing the plants to the picking zone, and cotton fluffing means disposed adjacent said passage to engage plants passing through the same in advance of contact of the plants with the picking spindles, said fluffing means comprising boll piercing members, and means for actuating said members to recurrently cause the same to penetrate bolls and to retract from the same to thereby fluff cotton.

3. In combination with a cotton picking machine wherein rotatable cotton picking spindles are employed and the cotton plants caused to pass through means providing a picking zone into which the spindles extend, means providing a passage adjacent the entrant end of the zone for receiving cotton plants and for passing the plants to the picking zone, and cotton fluffing means disposed adjacent said passage to engage plants passing through the same in advance of contact of the plants with the spindles, said fluffing means including at least one rotatable drum provided with outwardly projecting boll piercing members, said drum being disposed alongside the path of movement of plants through said first means to thereby cause said members to pierce and retract from the bolls of the plant to fluff the cotton fiber prior to engagement of the bolls by the spindles.

4. In combination with a cotton picking machine wherein rotatable cotton picking spindles are employed and the cotton plants caused to pass through a picking zone into which the spindles project, means providing a plant adjacent the entrant end of the zone passage for receiving plants and for passing the plants to the picking zone, and cotton fluffing means disposed adjacent said passage to engage plants passing through the same in advance of contact

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of the plants with the spindles, said fluffing means including at least one rotatable drum provided with outwardly projecting boll piercing members, said drum being disposed alongside the path of movement of plants to thereby cause said members to pierce and retract from the bolls of the plant to fluff the cotton fiber prior to its engagement of the same by said spindles, and means for driving said drum to cause said boll piercing members to move relative to engaged bolls while in boll penetrating position.

5. In combination, a cotton picking machine having rotatable cotton picking spindles for removing cotton from the plants, means providing a plant receiving picking zone for operation of the spindles, cotton fluffing mechanism located on the machine in advance of said zone, said mechanism including a plurality of fluffing pins disposed to engage the cotton bolls as the machine travels over the plants.

6. In combination with a cotton picking machine wherein rotatable cotton picking spindles are used and cotton plants are passed through a picking zone into which the spindles project, structural means providing a passage to receive plants and for passing the plants to the picking zone, said means including vertically extending walls defining the sides of the passage and converging rearwardly, and boll engaging cotton fluffing members carried by and projecting from said side walls and adapted to engage bolls passing therethrough.

7. In combination with a cotton picking machine wherein rotatable cotton picking spindles are used and cotton plants are passed through a picking zone into which the spindles project, structural means providing a passage to receive plants and for passing the plants to the picking zone, said means including vertically extending walls defining the sides of the passage and converging rearwardly, and a plurality of vertically spaced ribs carried by said side walls and adapted to engage and guide bolls passing through the passage.

8. In combination with a cotton picking machine wherein rotatable cotton picking spindles are used and cotton plants are passed through a picking zone into which the spindles project, structural means providing a passage to receive plants and for passing the plants to the picking zone, said means including vertically extending walls defining the sides of the passage and converging rearwardly, and a plurality of vertically spaced ribs mounted upon said walls and adapted to engage and direct bolls moving through the passage, said ribs being elevated at their rear ends to provide a lifting effect upon bolls.

9. In combination with a cotton picking machine wherein rotatable cotton picking spindles are employed and the cotton plants pass through a picking zone into which the spindles extend, structures providing a plant receiving passage for the machine and serving to pass plants to the picking zone, said structure including a pair of walls defining the sides of the mouth and disposed to converge rearwardly to squeeze plants between the same, a plurality of vertically spaced and rearwardly extending guide ribs mounted upon said walls to engage plants passing therethrough, and boll engaging fluffing pins mounted upon said side walls and distributed to engage the bolls passing through the mouth.

10. In combination with a cotton picking machine wherein rotatable cotton picking spindles are employed and the plants caused to pass through a picking zone into which the spindles

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extend, structures providing a passage for receiving plants and for passing plants to the picking zone, said structures providing side walls disposed in a general vertical position and converging rearwardly toward each other to squeeze plants passing therethrough, and upper walls extending between said side walls commencing at a region spaced rearwardly of the forward edges of the side walls, said upper walls serving to direct the tops of oversized plants downwardly whereby such top portions are caused to pass through the picking zone, and a plurality of vertically spaced guide ribs mounted upon the side walls and extending forwardly of said upper walls and beneath the same, said ribs extending generally longitudinally of the direction of movement of the machine and serving to engage and guide bolls to thereby prevent dropping of the same.

11. In a cotton picking machine wherein sets of cotton gathering spindles are used, the improvement which includes: means providing a passage for the plants before the plants are engaged by the picking spindles, and means for fluffing the cotton on the plants in said passage, said fluffing means includes a pair of revolving drums disposed on opposite sides of the passage and provided with outwardly projecting cotton-engaging elements operating to penetrate, withdraw from the open cotton and fluff the open cotton while on the plants, and means for driving said drums at approximately the speed of travel of the machine along the row of plants.

12. In a cotton picking machine wherein sets of cotton gathering spindles are used, the improvement which includes: means providing a passage for the plants before the plants are engaged by the picking spindles, means for fluffing the cotton on plants in said passage, said fluffing means including a pair of revolving drums provided with outwardly projecting cotton-engaging elements operating to penetrate, withdraw from the open cotton and fluff the open cotton while on the plants, and means for driving said drums at approximately the speed of travel of the machine along the row of plants, with one drum rotating slightly faster than the other.

13. In a cotton picking machine wherein sets of cotton gathering spindles are used and the cotton plants are passed through a tunnel into which the spindles project, the improvement comprising means at the entrant end of the tunnel providing an elongated plant receiving mouth, said means including side walls extending forward from the tunnel and provided with approximately horizontally disposed fins.

14. The machine of claim 13 wherein means are provided to deflect at least one of said side walls relative to the other side wall when a predetermined plant pressure is encountered.

15. In a cotton picking machine wherein sets of cotton gathering spindles are used and the cotton plants are passed through a tunnel into which the spindles project, the improvement comprising means at the entrant end of the tunnel having an elongated plant receiving mouth, said means including side walls extending forward from the tunnel entrance and provided with longitudinally disposed channel members forming plant engaging fins.

16. In a cotton picking machine wherein sets of cotton gathering spindles are used and the cotton plants are passed through a tunnel into which the spindles project, the improvement comprising means at the entrant end of the tunnel having an elongated plant receiving mouth,

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said means including side walls extending forward from the tunnel entrance and provided with approximately horizontally disposed plant engaging fins and a plurality of inwardly projecting cotton-engaging elements carried by said side walls.

17. In a cotton picking machine wherein sets of cotton gathering spindles are used and the cotton plants are passed through a tunnel into which the spindles project, the improvement comprising means at the entrant end of the tunnel having an elongated plant receiving mouth, said means including side walls extending forward from the tunnel entrance and provided with longitudinally disposed channel members forming fins and a plurality of inwardly projecting cotton-engaging elements carried by said side walls.

18. In a cotton picking machine wherein sets of cotton gathering spindles are used and the cotton plants are passed through a tunnel into which the spindles project, the improvement comprising means at the entrant end of the tunnel having an elongated plant receiving mouth, said means including side walls extending forward from the tunnel entrance and provided with approximately horizontally disposed plant engaging fins and a plurality of inwardly projecting cotton-engaging elements carried by said side walls and projecting into the passageway between said side walls to encounter the cotton and rake the same.

19. In a cotton picking machine wherein sets of cotton gathering spindles are used and the cotton plants are passed through a tunnel into which the spindles project, the improvement comprising means at the entrant end of the tunnel having an elongated plant receiving mouth, said means including side walls extending forward from the tunnel entrance and provided with longitudinally disposed channel members forming plant engaging fins and a plurality of inwardly projecting cotton-fluffing elements carried by said side walls and projecting into the passageway between said side walls to engage the cotton and rake the same.

20. In a cotton picking machine wherein sets of cotton gathering spindles are used and the cotton plants are passed through a tunnel into which the spindles project, the improvement comprising means at the entrant end of the tunnel defining an elongated plant receiving mouth, said means including side walls extending forward from the tunnel entrance, and longitudinally disposed fins inclining upwardly, slightly, from the front toward the rear of the mouth, said fins being mounted on the opposed faces of the side walls.

21. In a cotton picking machine wherein sets of cotton gathering spindles are used and the cotton plants are passed through a picking zone into which the spindles project, the improvement comprising means at the entrant end of the picking zone defining an elongated plant receiving mouth, said means including side walls extending forward from the entrance of the picking zone, and approximately horizontally disposed plant engaging fins carried by said side walls, and a cotton fluffing device located at the rear of the mouth and adjacent the front end of the picking zone of the machine.

22. In a cotton picking machine wherein sets of cotton gathering spindles are used and the cotton plants are passed through a picking zone into which the spindles project, the improve-

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ment comprising means at the entrant end of the picking zone defining an elongated plant receiving mouth, said means including side walls extending forward from the entrance end of the picking zone and provided with a roof, the side walls extending forwardly of the roof, and inwardly projecting longitudinally disposed fins mounted on the side walls.

23. In a cotton picking machine wherein sets of cotton gathering spindles are used and the cotton plants are passed through a picking zone into which the spindles project, the improvement comprising means at the entrant end of the picking zone defining an elongated mouth, said means including side walls extending forward from the forward end of the picking zone and provided with a roof, the side walls extending forwardly of the roof, and inwardly projecting longitudinally disposed fins inclining slightly upward from front to back of the mouth and carried by the side walls.

24. In a cotton picking machine wherein sets of rotating cotton gathering spindles project into and are carried along a tunnel through which the plants are passed, the improvement which includes: said tunnel having an elongated plant-receiving mouth at its entrant end, said mouth comprising side walls and a roof extending forwardly from said tunnel, said roof at its forward end extending upwardly to form a front wall which the plants engage and by which the plants are bent over into position to pass through the tunnel, said side walls extending forwardly of said front wall to embrace the plants and concentrate them as they approach said front wall, and cotton-fluffing pins on said side walls and being directed rearwardly-inwardly of the tunnel.

25. In a cotton picking machine wherein sets of rotating cotton gathering spindles project into and are carried along a tunnel through which the plants are passed, the improvement comprising means forming an elongated plant-receiving mouth at the entrant end of the tunnel, said mouth comprising side walls and a roof extending forwardly from said tunnel, said roof at its forward end extending upwardly to form a front wall which the plants engage and by which the plants are bent over into position to pass through the tunnel, said side walls extending forwardly of said front wall to embrace the plants and concentrate them as they approach said front wall and longitudinally disposed inwardly projecting fins on the opposed faces of said side walls.

26. In a cotton picking machine wherein sets of rotating cotton gathering spindles project into and are carried along a tunnel through which the plants are passed, the improvement which includes: said tunnel having an elongated plant-receiving mouth at its entrant end, said mouth comprising side walls and a roof extending forwardly from said tunnel, said roof at its forward end extending upwardly to form a front wall which the plants engage and by which the plants are bent over into position to pass through the tunnel, said side walls extending forwardly of said front wall to embrace the plants and concentrate them as they approach said front wall and inwardly projecting fingers on said side walls for purposes described.

27. In a cotton picking machine wherein sets of rotating cotton gathering spindles project into and are carried along a tunnel through which the plants are passed, the improvement which includes: the entrant end of the tunnel having a

plant-receiving mouth, said mouth comprising side walls and a roof extending forwardly from said tunnel, said roof at its forward end extending upwardly to form a front wall which the plants engage and by which the plants are bent over into position to pass through the tunnel, said side walls extending forwardly of said front wall and diverging forwardly to embrace and concentrate the plants as they approach said front wall and longitudinally disposed inwardly projecting fins on the opposed faces of said side walls together with inwardly projecting fingers on said opposed faces.

28. In combination, a cotton picking machine having sets of cotton gathering spindles for removing cotton from the plants, cotton fluffing mechanism located on the machine in advance of said spindles, said mechanism including elements for entering the cotton while it remains on the plant and fluffing the cotton without removing the cotton from the plant, said elements including approximately horizontal stationary rows of pins for engaging the cotton as the machine travels over the plants, by virtue of all of which the cotton on the plant is prepared for easy and substantially complete removal from the plant by the spindles.

29. In combination, a cotton picking machine having sets of cotton gathering spindles for removing cotton from the plants, cotton fluffing mechanism located on the machine in advance of said spindles, said mechanism including elements for entering the cotton while it remains on the plant and fluffing the cotton without removing the cotton from the plant, said elements including rotating members having cotton-fluffing pins on their peripheries, longitudinal rows of cotton-fluffing pins located in advance of said rotating members, and means for rotating said elements at predetermined speeds, by virtue of all of which the cotton on the plant is prepared for easy and substantially complete removal from the plant by the spindles.

30. In combination with a cotton picking machine having an entrance tunnel and cotton picking spindles at the rear of the tunnel entrance, means located in advance of said spindles for engaging and fluffing cotton on the plants before the cotton is acted on by the spindles and without removing the cotton from the plant, said means including rotating bodies having cotton fluffing elements that engage and fluff the cotton while it is retained on the plant, and longitudinal rows of cotton-fluffing pins in the tunnel in advance of said rotating bodies.

31. In combination with a cotton picking machine having an entrance tunnel and cotton picking spindles at the rear of the tunnel entrance, means located in advance of said spindles for engaging and fluffing cotton on the plants before the cotton is acted on by the spindles and without removing the cotton from the plant, said means including rotating bodies having cotton fluffing elements that engage and fluff the cotton while it is retained on the plant, and longitudinally disposed fins along the tunnel in advance of said rotating bodies.

32. In combination with a cotton picking machine having an entrance tunnel and cotton picking spindles at the rear of the tunnel entrance, means located in advance of said spindles for engaging and fluffing cotton on the plants be-

fore the cotton is acted on by the spindles and without removing the cotton from the plant, said means including rotating bodies having cotton fluffing elements that engage and fluff the cotton while it is retained on the plant, longitudinally disposed fins along the tunnel in advance of said rotating bodies, and longitudinal rows of cotton-fluffing pins in the tunnel in advance of said rotating bodies.

33. In combination with a cotton picking machine wherein sets of cotton gathering spindles are used and the cotton plants are passed through a picking zone into which the spindles project, a structure forming a mouth for the tunnel, and cotton fluffing means disposed adjacent said mouth to engage and disengage plants passing through the same in advance of contact of the plants with the spindles, said fluffing means consisting of two of said revolvable drums disposed in proximity with each other and on opposite sides of the path of movement of plants through said mouth, said drums being disposed alongside the path of movement of plants through said mouth to thereby cause said pins to penetrate and retract from the balls of the plant to fluff the cotton fiber prior to engagement of the same by said spindles.

34. In a cotton picking machine wherein rotatable cotton spindles are employed and the plants passed through a picking zone into which the spindles project, the improvement comprising means forming a mouth for receiving plants and for passing the plants through the picking zone, a movable member forming a side wall portion of said mouth and movable laterally of the path of movement of the plants therethrough, said wall portion being adapted to be moved by the pressure of plants upon the same, means for yieldably urging said wall portion in a direction toward the plants passing through said structures, and signalling means responsive to movement of said wall portion by the pressure of plants passing through the machine.

35. In combination with a wheeled cotton picking machine wherein the wheels of the machine are driven by motive means and sets of cotton gathering spindles are employed, the cotton plants being caused to pass through a picking zone into which the spindles project, structural means forming a mouth to receive plants and for passing the plants to the picking zone, the structure forming said mouth including a wall portion forming one side of the mouth and adapted to be engaged by plants passing there-through, yieldable means for urging said wall portion toward plants passing therethrough, and means responsive to movement of said member by plants passing through the mouth to disable said motive means.

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