Oct. 27, 1936. J. D. RUST ET AL 2,058,514

COTTON PICKING MACHINE

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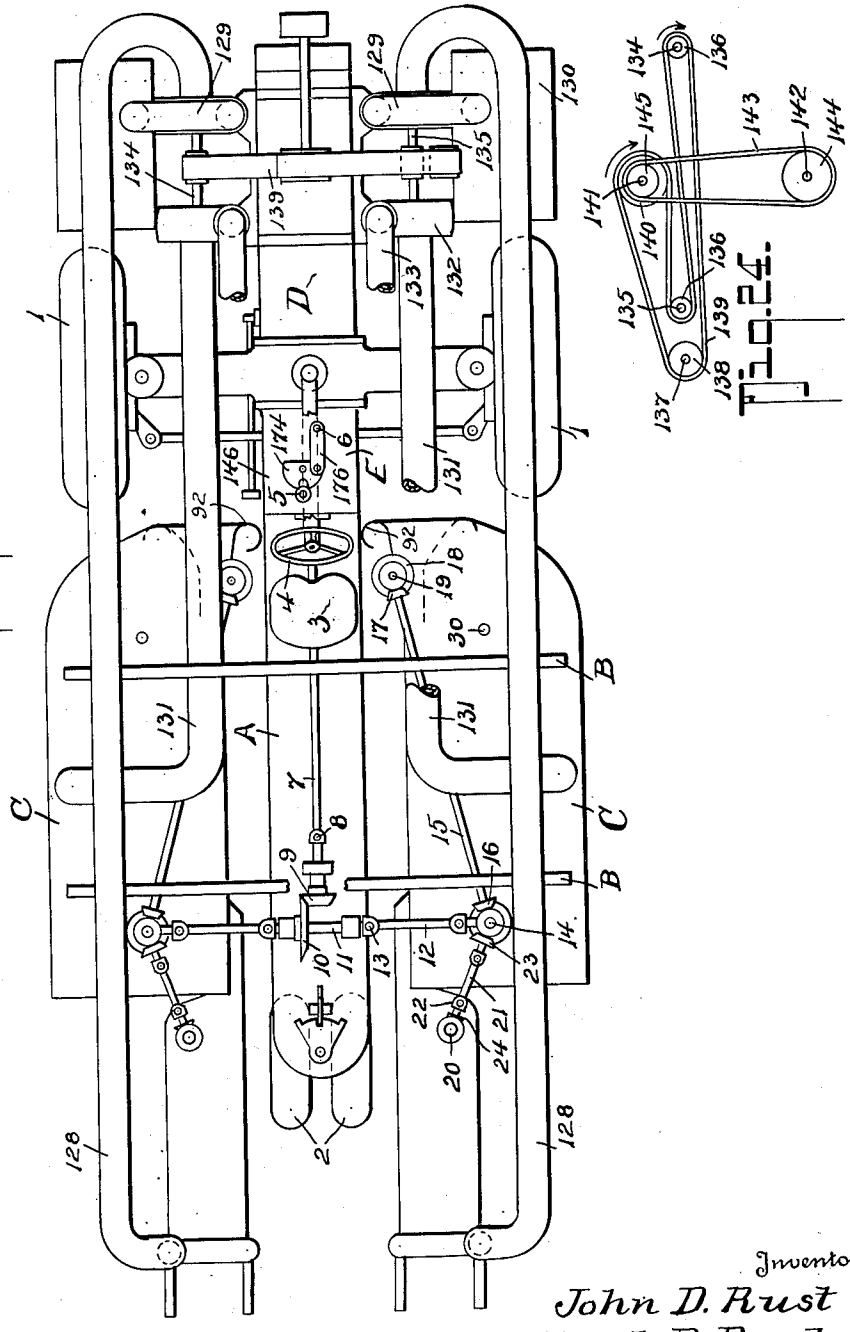


Fig. 1.

Fig. 2.

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COTTON PICKING MACHINE

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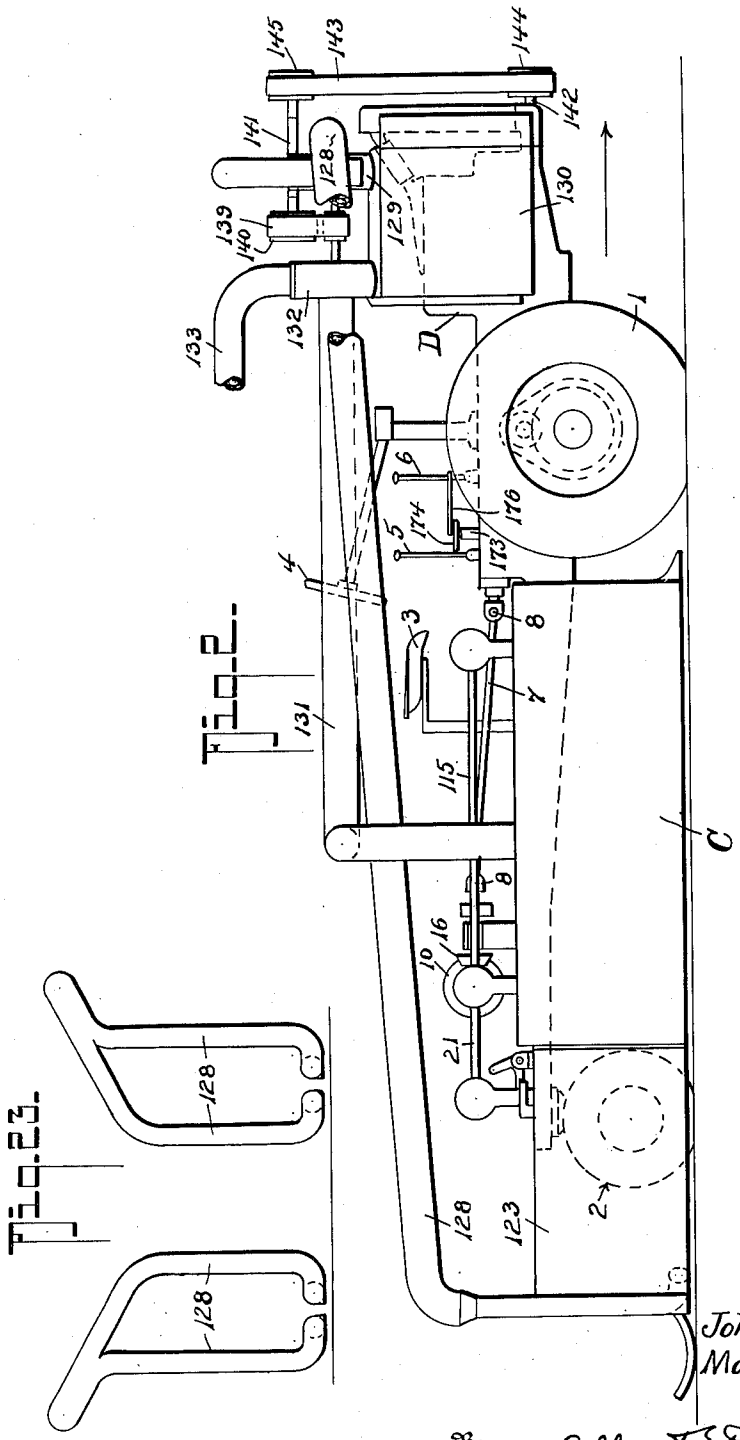


Fig. 2.

Fig. 2a.

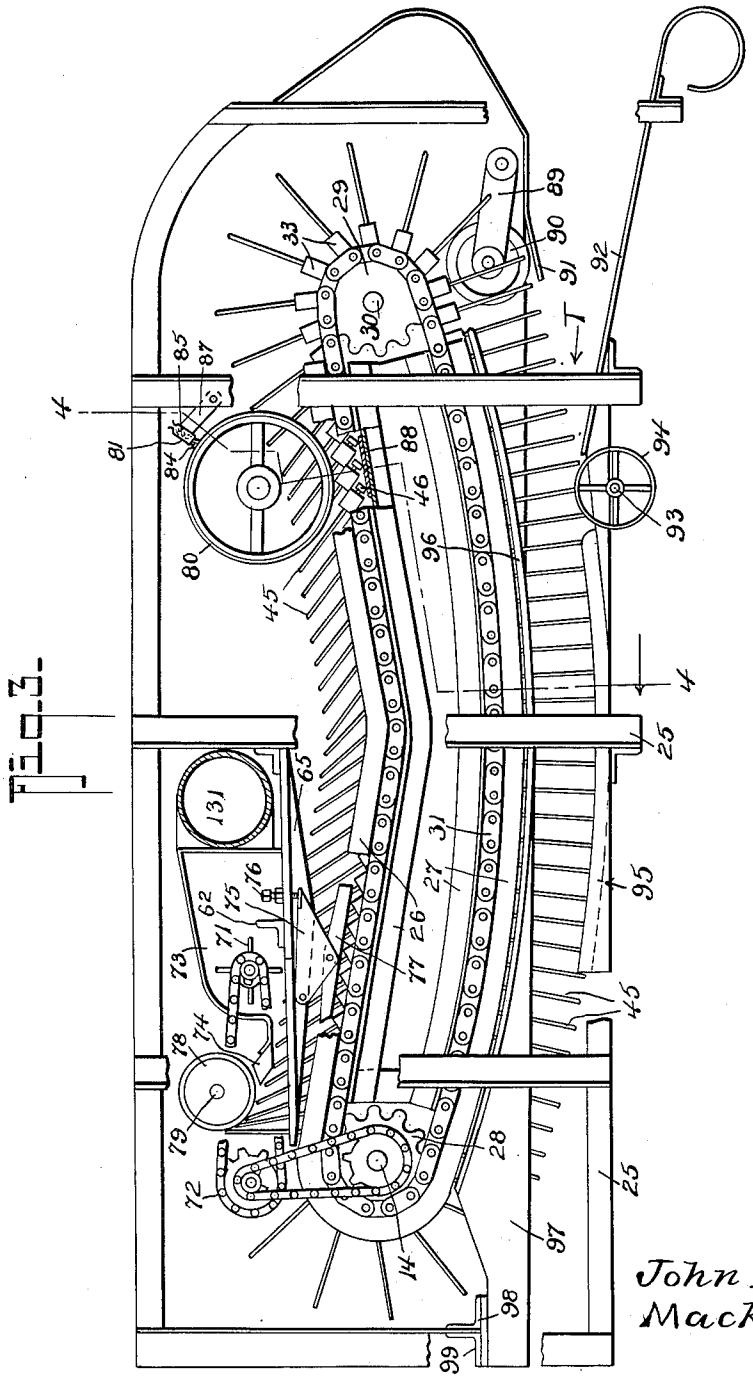
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COTTON PICKING MACHINE

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COTTON PICKING MACHINE

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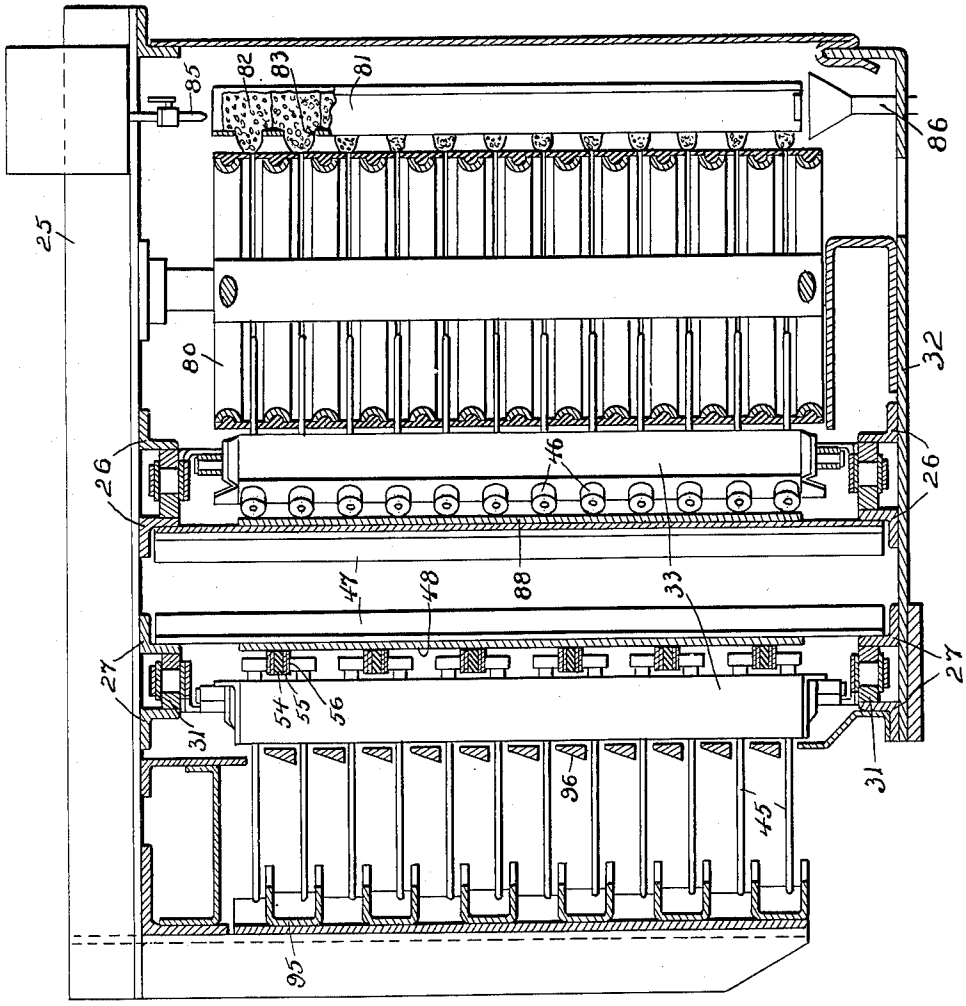


FIG. 4

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COTTON PICKING MACHINE

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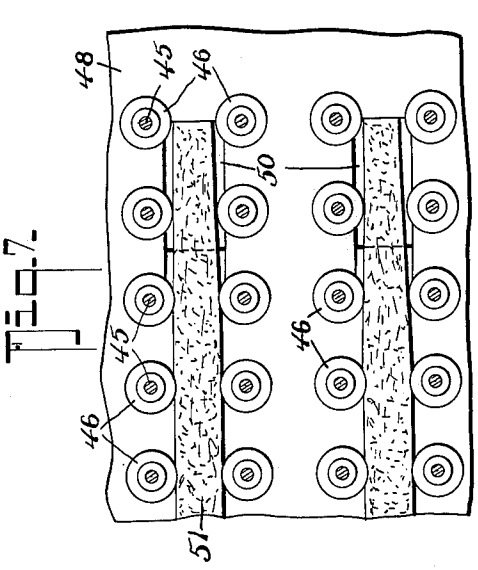


Fig. 7.

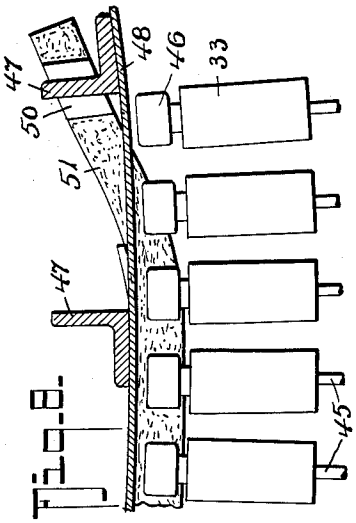


Fig. 8.

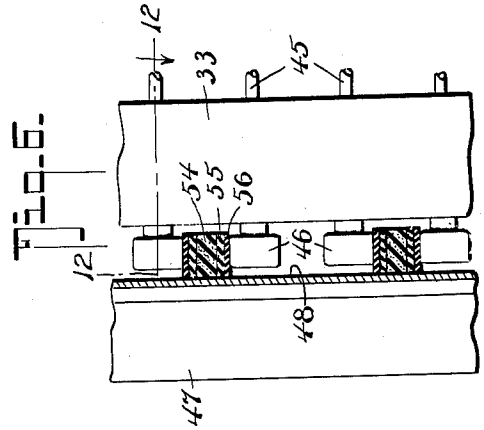


Fig. 6.

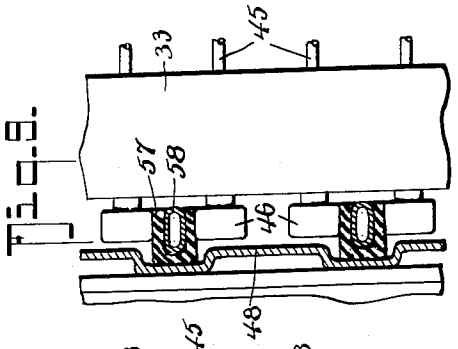


Fig. 9.

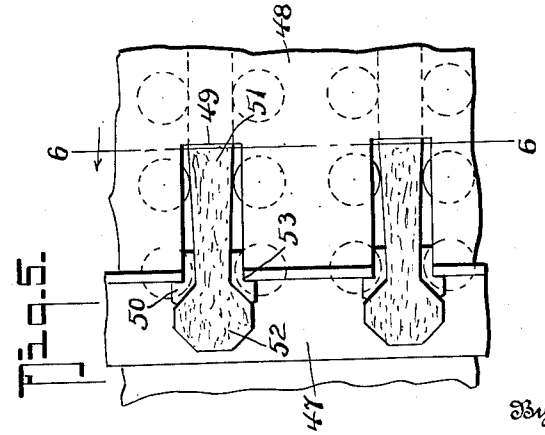


Fig. 5.

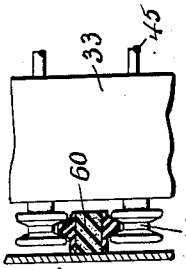


Fig. 10.

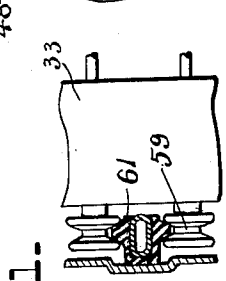


Fig. 11.

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COTTON PICKING MACHINE

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Fig. 14.

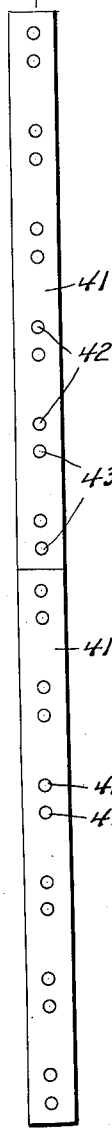


Fig. 15.

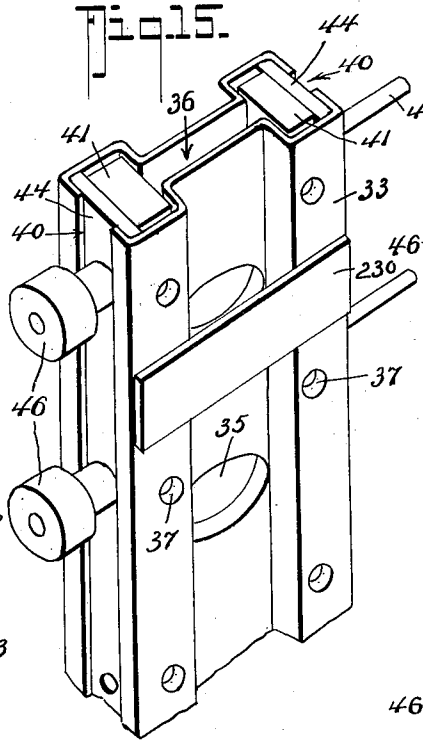


Fig. 12.

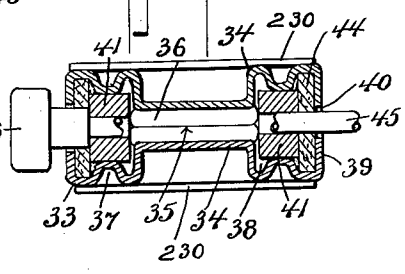


Fig. 13.

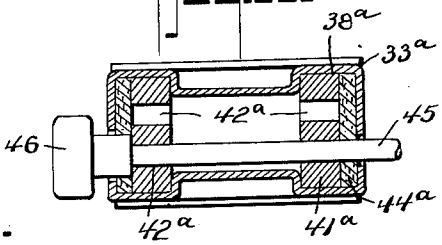


Fig. 31.

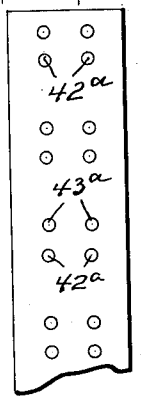


Fig. 32.

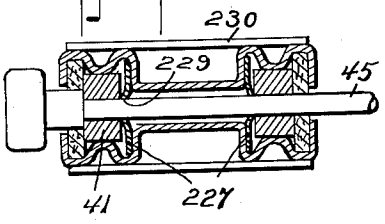
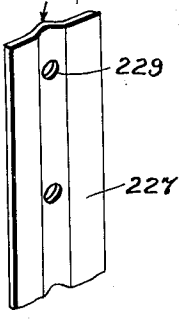


Fig. 33.



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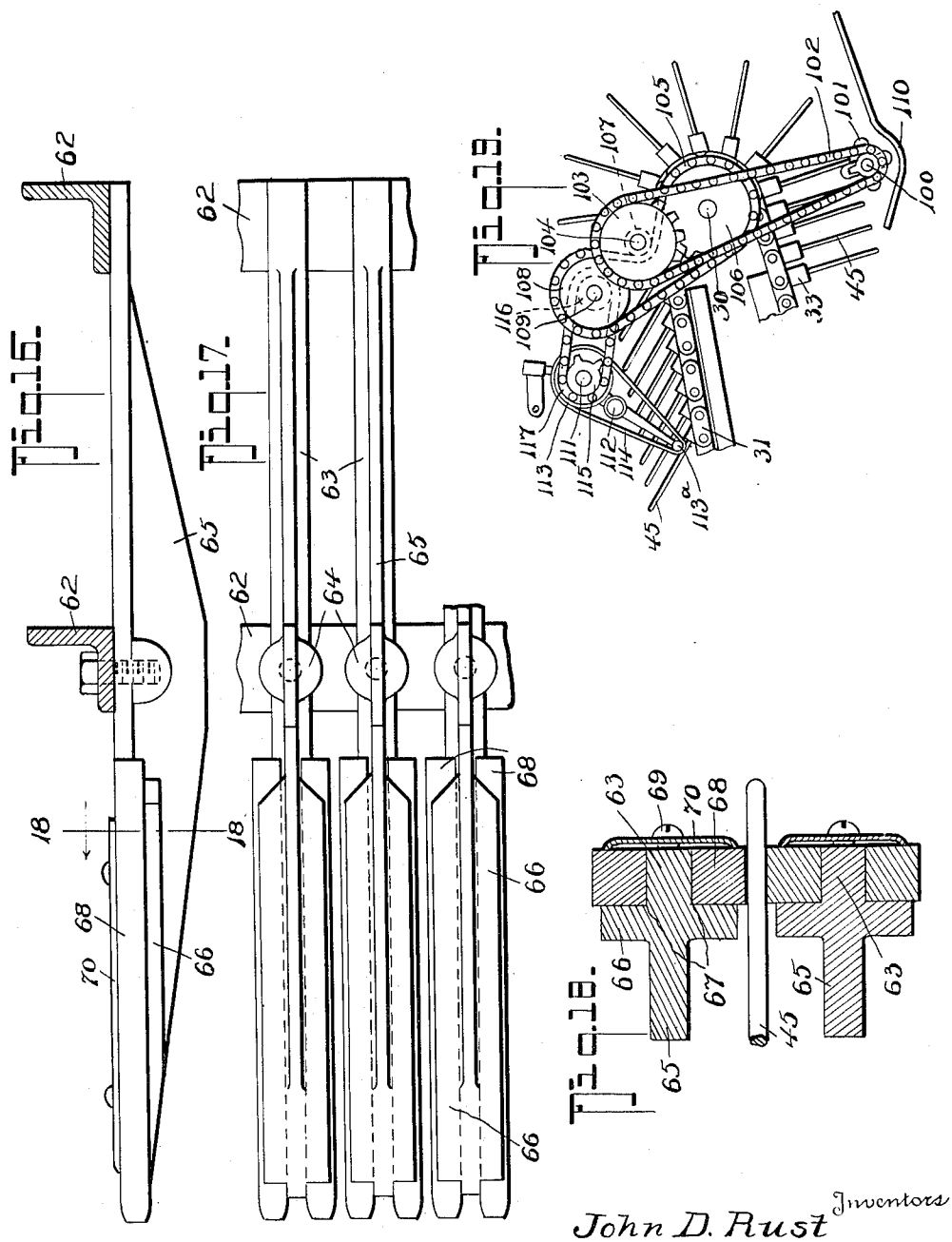
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COTTON PICKING MACHINE

Filed July 3, 1934 10 Sheets-Sheet 7



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COTTON PICKING MACHINE

Filed July 3, 1934 10 Sheets-Sheet 8

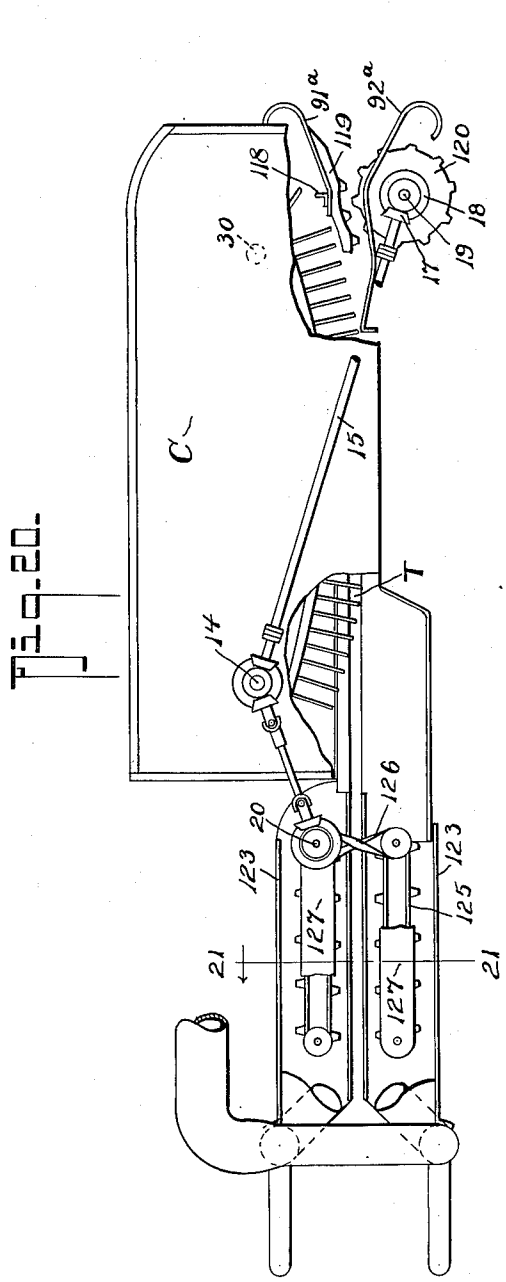


Fig. 20.

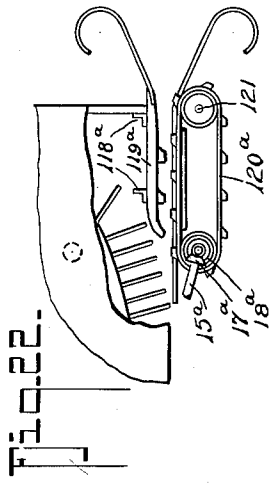


Fig. 22.

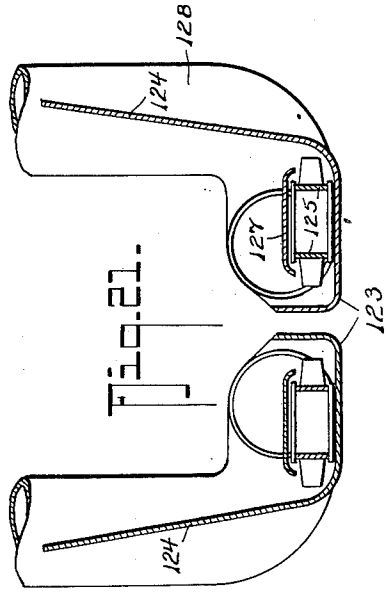


Fig. 21.

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COTTON PICKING MACHINE

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Fig. 25.

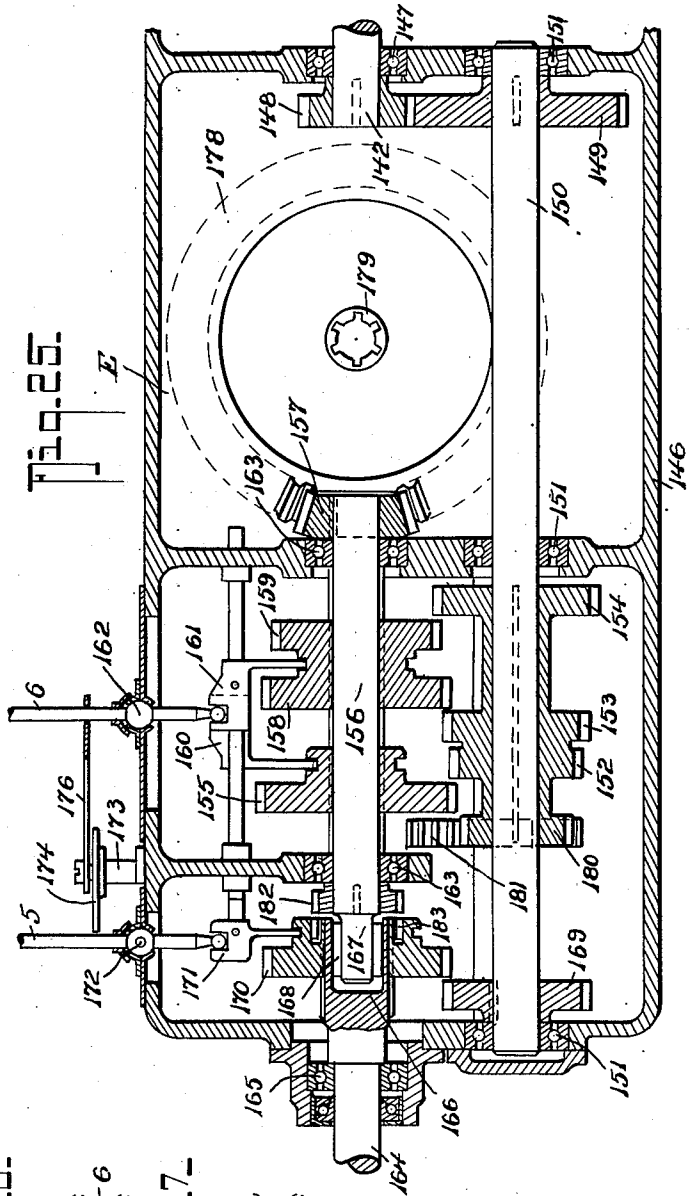


Fig. 26.

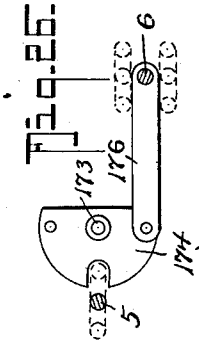
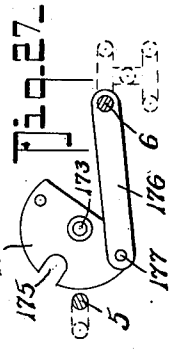


Fig. 27.

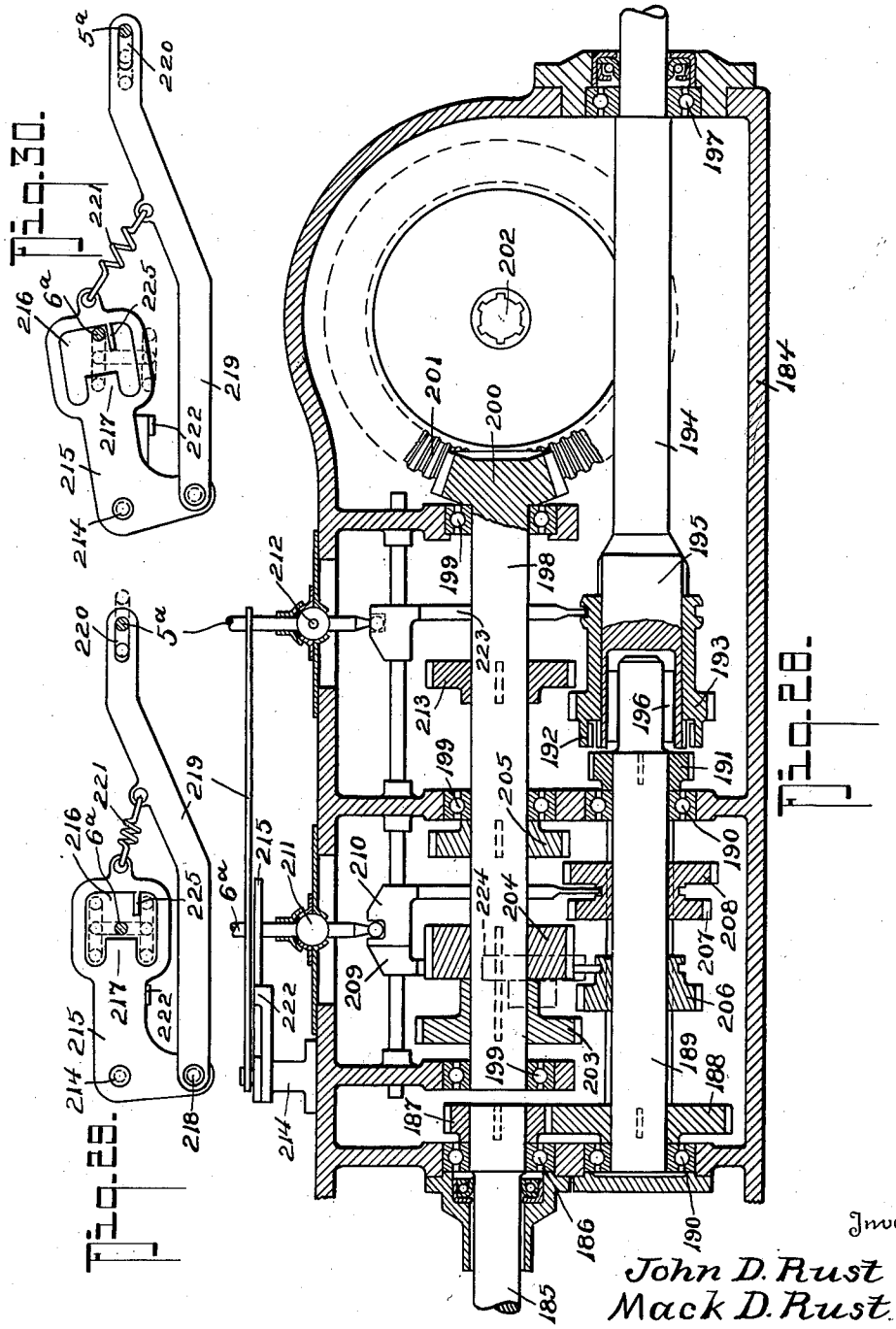


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COTTON PICKING MACHINE

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Patented Oct. 27, 1936 2,058,514

UNITED STATES PATENT OFFICE

2,058,514

COTTON PICKING MACHINE

John D. Rust and Mack D. Rust, Memphis, Tenn.

Application July 3, 1934, Serial No. 733,687

60 Claims. (Cl. 56—14)

The present invention relates to cotton pickers of the general type of our Patent #1,894,198 issued January 10, 1933, the present invention being directed to certain new and useful improvements over those disclosed in our application filed July 1, 1933, Serial No. 678,670.

An object of the invention is to provide a picking unit which, while reserving the advantageous features of our previous inventions is of a narrower width than heretofore so as to enable the use of the machine in narrow rows of cotton plants.

Further it is an object to provide improved means for directing the stalks into contact with the spindles and for ensuring their proper passage through the picking space or channel of the machine; a further object being to construct said means so as to eliminate clogging of same with consequent obstruction to proper operation of the machine.

Another object is to provide shock absorbing means at those places in the path of the traveling spindle carrier or conveyor where acceleration or deceleration forces occur.

Further it is an object to provide means for holding the spindles in their proper positions in plain slat bearings as the spindles enter the auxiliary doffer.

A further object is to provide stripping means of such construction and so positioned as to avoid clogging by the cotton during the strip-off operation, a means which is especially useful when the cotton is wet and/or when foreign matter (limbs, vines, etc.) is present with the cotton on the spindles.

Again it is an object of our invention to provide means to cause the spindles to take the proper position during the strip-off.

Further it is an object to provide stripping members having reversible and adjustable working surfaces in virtue of which these members have a longer life than heretofore and maintenance costs are proportionately reduced.

Further it is an object to provide efficient means for driving the spindles in a manner which will compensate for variations in spindles or spindle bearings, whether due to wear or to manufacturing inaccuracies; in other words, it is an object to provide what might be called a "full-floating" drive for the spindles.

Again, an object is to provide a spindle carrying slat so constructed that the spindle bearing material for all the spindles of a given slat may be made in the form of one or more replaceable and reversible strips thus providing inexpensive, quickly replaceable bearing parts for the picking spindles, which are so numerous as to make an expensive individual spindle bearing prohibitive for practical use; a further object being to provide in conjunction with the foregoing, suitable means for excluding dust and dirt from the entrance to the spindle bearings.

Further it is an object to provide salvage devices to work in conjunction with the picking mechanism for the purpose of preparing any unopened or partially opened cotton bolls for picking action by the picking mechanism; and further to provide other salvage devices to work in conjunction with the picking mechanism to collect any cotton, which drops from the picking mechanism.

Another object of our present invention is to provide means for driving the picking mechanism from the power of the tractor so that the most effective speed of travel may be selected without affecting the proper relative speed of the picking mechanism, and so that the cotton conveying means shall at all times be operated at the optimum speed; the selections of speed to be entirely under control by the operator of the machine by use of manual controls which give immediately any of the speeds for which the tractor may be designed to travel; a further object being, at the same time, to provide the driving means with mechanism by which power for operating the picking mechanism may be had with the tractor standing at rest whenever desirable.

A further object of the invention is to provide, in conjunction with the driving means, safety interlocking means cooperating with the manual speed control means to make it reasonably impossible for the operator to place the control means in undesirable operating positions.

A further object is to improve the means for moistening the auxiliary doffer.

Other objects will in part be obvious and in part be pointed out hereinafter.

To the attainment of the aforesaid objects and ends the invention still further resides in the novel details of construction, combination and arrangement of parts, all of which will be first fully described in the following detailed description and then be particularly pointed out in the appended claims, reference being had to the accompanying drawings, in which:—

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

Figure 2 is a side elevation of the same, parts being broken away.

Figure 3 is a plan view of a picking unit with covers omitted and parts being removed or cut away the more clearly to show features of the present invention.

Figure 4 is a cross section taken substantially on the line 4—4 of Figure 3.

Figure 5 is an enlarged fragmentary view, looking outwardly, showing a portion of the spindle drive elements at the place where the spindle rollers engage therewith and showing one way to anchor the drive elements.

Figure 6 is a vertical section on the line 6—6 of Figure 5.

Figure 7 is a view similar to Figure 5, looking inwardly, showing a portion of the spindle drive elements at the place where the spindle rollers engage the same.

Figure 8 is a plan view of the parts shown in Figure 7.

Figure 9 is a detail view similar to Figure 6 but showing a modification of the invention.

Figures 10 and 11 are detail vertical sectional views showing further modifications of the invention.

Figure 12 is an enlarged detail cross section taken approximately on the line 12—12 of Figure 6.

Figure 13 is a view similar to Figure 12 but showing a modified structure.

Figure 14 is a detail of a pair of spindle bearing bars showing the arrangement of bearing holes for purposes of reversibility.

Figure 15 is a perspective view of a portion of a spindle carrying slat embodying the construction shown in Figure 12.

Figure 16 is an enlarged detail plan view of the stripping device.

Figure 17 is an elevation of the parts shown in Figure 16, looking outwardly.

Figure 18 is a section on the line 18—18 of Figure 17.

Figure 19 is a detail plan view of a portion of the machine showing a modification of the spindle shock absorbing device at the front of the unit and also illustrating a modified auxiliary doffer.

Figure 20 is a detail plan view (parts being broken away) of a picking unit showing the boll crusher in plan and also illustrating the dropped cotton salvaging devices.

Figure 21 is an enlarged section on the line 21—21 of Figure 20.

Figure 22 is a detail plan view of a modified form of boll crusher.

Figure 23 is a detail elevation of a portion of the invention, looking from left to right in Figure 2.

Figure 24 is a diagrammatic view of the fan drive.

Figure 25 is an enlarged vertical longitudinal section of the power transmission used with a tractor of the type illustrated in Figure 1, and embodying our improvements.

Figures 26 and 27 are detail plan views (somewhat diagrammatic) of the control-lever interlocking device employed with the transmission mechanism of Figure 25.

Figure 28 is a vertical longitudinal section of another power transmission embodying our improvements.

Figures 29 and 30 are detail plan views (somewhat diagrammatic) of the control-lever locking device employed with the transmission mechanism of Figure 28.

Figure 31 is a detail elevation of a portion of a modified spindle bearing bar.

Figure 32 is a view similar to Figure 12 showing a modification of the structure of Figure 12.

Figure 33 is a detail perspective view of a portion of the bar holding strip shown in Figure 32.

In the drawings, in which like numerals and letters of reference designate like parts in all the figures, A represents a tractor and B indicates a frame supported by the tractor. The picking units C—C are carried by the frame B in any suitable way—for instance, by cables and sheaves (not shown) as in our application aforesaid. D designates the engine and E the power transmitting mechanism, the latter containing certain improvements which enable new results to be obtained by our machine and which improvements constitute a portion of the present invention.

Referring now particularly to Figures 1 and 2, it will be observed that 3 designates the operator's seat and 4 the steering wheel for controlling the direction of travel of the vehicle. The driving wheels 1 are located at the front of the vehicle and trailing wheels 2 are located at the rear. The driving wheels 1—1 are spaced apart a distance sufficient to straddle two rows of cotton while the trailing wheels 2 pass between the said two rows, with the cotton picking units C—C located at either side of the tractor behind the front wheels 1—1. Arranged within convenient reach of the operator are the gear shifting levers 5 and 6 to which further reference will be made in a later part of this specification.

The propelling shaft 7 couples to the power take-off shaft 164 (see Figure 25) and is provided with universal joints 8. The shaft 7 also couples with the shaft that carries the driving pinion 9 which meshes with a driving gear 10 on a cross shaft 11. The shaft 11 drives the first motion shafts 14, of the picking units C—C by connecting shafts 12 having universal joints 13.

Power is transmitted also through a shaft 15, having bevel gears 16 and 17, to the shaft 19, via bevel gears 18, of the boll crusher (see Figure 20), the construction and operation of which will be described later. Power is also transmitted from shaft 14 through shafts 21, having universal joints 22 and pinions 23—24, to the driving shafts 20 of the cotton salvaging devices located at the rear of the machine, the details of which will be later fully explained.

As both picking units are of the same construction save that one is a right and the other a left, a detailed description of one will, it is believed, suffice and reference is now made for that purpose to Figures 3 to 24, inclusive. Each picking unit comprises a frame 25 in which is mounted a longitudinally extending inner frame indicated by 26 and 27. Power for driving the picking mechanism is applied to the shaft 14, as hereinbefore indicated. The shaft 14 and a shaft 30, mounted at the forward end of the unit, carry upper and lower sprockets 28—29, respectively, around which the upper and lower chains 31 pass.

Each picker unit is enclosed, save for a tunnelway through which the plants are passed, there being a floor 32 provided (see Figure 4) beneath the working parts of the unit.

The endless chain carrier for the picker spindles may be of the same construction as that disclosed in our application aforesaid, and a detailed description of the construction of the chain is thought to be unnecessary in this case, suffice it to say that the slats 33*m* which are pivotally

mounted to the chain as in our application heretofore mentioned, are of a peculiar construction in the present case, involving certain improvements over the slats disclosed in our previous patent and application. These slats 33 (see Figures 12–14, inclusive) comprise sheet metal casing halves 34 having indented portions 35 which meet and are electrically welded together or secured in any other suitable way. This forms a tubular structure that is provided with spindle passages 36 and channels 38 for the reception of the spindle bearing strips 41 and the sealing strips 44 (preferably of felt). The side walls of the sheet metal casing are indented at intervals, as at 37, to form knobs 37 which engage the bearing bars 41 in alignment with the spindle bearing passages 36 thereof. The casing 34—34 constitutes with the bearing bars 41 a rigid slat for supporting the spindles 45. The edge walls 39 of the sheet metal casing halves 34 are spaced apart as at 40 to provide passages for the spindle 45 and the hub of the spindle roller 46.

The bearing bars or strips 41 are preferably formed with two sets of spindle bearing apertures 42—43, respectively, (see Figure 14) the arrangement of these sets being such that the bars may be reversed (turn upside down) when one set of bearing holes is worn, to bring the other set into proper alignment to receive the spindles. In this way the lives of the bearing strips 41 are doubled. If desired the bearing strips 41*a* may be made of greater width (see Figures 13 and 31) and provided with four sets of spindle bearings apertures 42*a*—43*a*. As these strips are reversible in two directions, i. e., horizontally and vertically, it is obvious that they will wear four times as long as a single strip with but a single set of bearing apertures.

By reference particularly to Figures 5 to 8, inclusive the improvements which have been made to the spindle rotating mechanism will clearly appear. Extending throughout the full length of the inner frame on the picking side is a curved wall 48 which is carried by upright frame members 47. These members are located at suitable intervals apart. The upright 47 at the entrant or forward end of the picking tunnel is slotted as at 53 to receive the necks of the resilient friction rails 51 and the retaining keys 50 therefor, the latter being engaged by the heads 52 of the rails. Each rail 51 is mounted independently of the other and is held against falling by being passed between two horizontal rows of spindle rollers 46 in working engagement with the same. The rails 51 are passed through slots 49 in the wall 48 from the side at which they are anchored to the working side of the wall (see Figures 5 and 7).

Each rail 51 may be constructed as shown in Figures 5, 6, and 7, of a central live rubber core strip 54 and facing layers 55—56 of rubberized fabric or cord-belt material. The upper layer is engaged by one horizontal row of spindle rollers 46 while the lower layer is engaged by the rollers 46 of a second horizontal row. The several layers 54, 55, and 56 are vulcanized into an integral structure.

Instead of constructing the rails with flat surfaces as shown in Figure 6 they may be formed as shown in Figure 10 with V-shaped trackage 60 to cooperate with grooved rollers 59 on the spindles. Another modification of the construction of the rails is shown in Figure 9, in which a flat rail is illustrated as composed of a channeled body 57, of rubberized fabric or cord-belt material, with a pneumatic tube 58 as a core. The tube 58 is designed to be suitably inflated and when so inflated it will exert the necessary pressures against the flat surface portions 57 to ensure a working contact thereof with the spindle rollers. Instead of making the channeled body with flat working faces as shown in Figure 9 they may have V-shaped trackage 61 provided for cooperating with grooved spindle rollers 59, as shown in Figure 11.

By mounting the rails 51 as shown to operate between and on two rows of spindle rollers, they become independent of one another and act as full floating rails so that they may adapt themselves to any and all alterations in the alignment or positions of the various spindles without the use of balancing springs or other similar appliances.

By referring to Figures 16–18, inclusive, another of our improvements will be observed. Mounted on uprights 62, at the stripping side of the unit, is a vertical series of horizontal cantilever stripping elements consisting of elongated supporting bars 63 having drilled and tapped enlargements 64 intermediate the ends of the members for being secured to an upright 62 by cap screws or the like. Each bar 63 has a reinforcing rib 65 at one side and one end of each bar rests against a second upright 62 while the other end is provided with a rib 66 that forms with the bar proper, upper and lower seats 67. These seats are of rectangular form to receive the stripping bars 68. The bars 68 are preferably square in cross section so as to provide four operative surfaces any one of which may be used to cooperate with the spindles. The bars 68 are held in place on their respective elongated bars 63 by clamps 70 and screws 69.

As will be noted, by reference to Figure 3, at the picking side the spindle carrier is bowed outwardly, as in our application aforesaid, by the curved rails 27 of the inner frame; at the stripping side the rails 26 of the inner frame are deflected inwardly in a somewhat open V formation. This enables the unit to be designed much narrower than the units of our patent and of our application aforesaid.

In our present machine we provide a rotary doffer 71, as in the machine of our application aforesaid, but because of the more compact design of our present machine we are able to locate the rotary doffer 71 nearer the rear of the unit than before and to drive the rotary doffer by a chain and sprocket system 72 from the first motion shaft 14 of the unit.

The cotton is doffed from the spindle points within the suction chamber 73, by the rotary doffer 71 and conveyed away through the duct 131 to a suitable collection place (not shown). At the entrance to the suction chamber 73 there is located a block 74 to guide the spindle point ends after they shall have left the shock absorber 78. The shock absorber 78 comprises a drum rotating on an axis 79 and covered with rubber or other yieldable material for absorbing impact.

In order to hold the spindles inclined at the proper angle to pass successfully through the stripping unit we provide a hingedly mounted support 75 which is adjustable by a set screw 76 and to which is fitted a runner 77 that engages the slats of the spindle carrier and holds the spindles in their proper positions while being stripped.

The auxiliary doffer 80 may be of the same general construction as that disclosed in our ap-

plication aforesaid but the means for moistening the doffer has been improved. As will be seen from an inspection of Figures 1 and 4 the holder 81 has holes 83 in an edge wall; individual sponges 82 are provided within the holder, portions of which sponges protrude through the holes 83. The holes 83 line up with the spaces between the doffing wheels so that the edges of the perimeters of the doffing wheels will be brushed by the protuberances 84 of the sponges. Water is dripped onto the sponges within the holder 81 from a nozzle 85 and excess moisture is drained away through a funnel tube 86. The holder 81 is supported on the swinging supports 87.

Another of our improvements resides in providing a means for holding the spindles against backing in their bearings while they are being brought into engagement with the auxiliary doffer 80. This means consists of a plate 88 which is engaged by the spindle rollers 46 while the spindles are passing into the auxiliary doffer 80 (see Figure 1).

In order to absorb the shocks as the spindles pass around the shaft 30 at the front end of the unit, we have provided a wheel 90 mounted on a suitable support 89, the wheel engaging with the slats 33 as they come around to steady the same while the slats pass into the region of the inner frame 27.

The entrance throat of the picking tunnel T is provided with side walls 91 and 92. The outer wall 95 of the tunnel proper is curved to follow the curvature of the picking spindle carrier. At the inner side the tunnel has a vertically spaced series of longitudinal elements 97 which are mounted at 98 on uprights 99 and carry curved stalk guards 96. These elements 97 and guards 96 lie between the longitudinal rows of spindles at the picking side of the machine.

Adjacent the forward end of the tunnel, about where the wall 92 ends, is located a cylinder, preferably composed of screen wire, which is mounted freely to turn on an axis 93. The cylinder projects slightly into the path of travel of the picking spindles so that the points of the spindles may penetrate the meshes of the screen cylinder 94. The cylinder serves to push the stalks into contact with the spindles as the spindles enter the picking tunnel and thereby reduce the drag or friction on the spindle ends which would be present were an immovable wall located in place of the cylinder.

In Figure 19 we have shown a modification of the front shock absorber for the spindles. By reference to this figure it will be observed that a shaft 100 carries a rotatable member having wings 101. This member is driven at a rate of speed related definitely and cooperatively to the travel of the spindles, by a chain 102 that is driven from a sprocket 103 on an idle shaft 104. The shaft 104 has a sprocket 107 around which a chain 105 passes, the chain 105 passing around a sprocket 106 on the shaft 30 and around another sprocket 108 on a shaft 109. The inner wall of the throat is curved as at 110 where it passes adjacent the member 101.

In Figure 19 is also shown a modified construction of auxiliary doffer. This consists of a vertical series of endless belts 114 passing around pulleys 113a—113, the former being carried by suitable supporting arms 112 and the latter being mounted on a shaft 111 which is driven by sprockets 115—116 and chain 117 from the shaft 109.

Occasionally, in some localities and during certain years a percentage of the cotton bolls do not open up, and in order to get their cotton it is necessary to break open the bolls. This is accomplished by attaching to the unit a boll crusher, the preferred form of which is illustrated in Figure 20. Referring to this figure it will be seen that the inner wall 91a of the throat is provided with a casting 119 having crushing teeth. The casting 119 is secured to the wall of the housing and to upright supports 118 in any approved way. Cooperating with the rigid or relatively stationary casting 119 is a rotary member 120 that is mounted on the shaft 19, portions of the member 120 projecting through slots in the outside wall 92a of the throat so that the bolls will be compelled to pass through the restricted passage between elements 119 and 120 where the bolls will be crushed before the plants are passed into the picking tunnel.

The boll crusher may be of the modified construction shown in Figure 22. In this figure, the casting 119a is secured to uprights 118a and lies parallel to a flight of the endless belt member 120a, the latter having teeth to cooperate with those of the casting 119a. The belt 120a passes around pulley 121 and is driven by a shaft 15a and bevel gears 17a—18a, as indicated.

The mechanism for salvaging dropped cotton is shown in Figure 20. It consists of two troughs 123—123 spaced apart for passage of the plants, one trough being located at either side of the path of travel of the plants through the tunnel. The outside walls 124 of the troughs rise high enough to prevent the cotton being spilled over onto the ground.

An endless conveyor 125 is mounted lengthwise in each trough 123 and the two are connected to be driven in unison by a crossed belt and pulley connection 126. While we have provided endless conveyors 125 in the troughs it may be that they can be dispensed with in practice, the drag of the plants being relied upon to push the dropped cotton along the troughs to the zones of suction at the rear of the troughs. The conveyors 125 are protected on top by guard plates or hoods 127. At the rear the troughs 123 deliver their contents to the entrant ends of the suction ducts 128 which are connected with the suction blowers 129 that deliver into the collection boxes 130, as hereinbefore referred to.

The suction chambers of the picking units C—C are connected to blowers 132 by ducts 131. The blowers deliver the cotton to ducts 133 for conveying it to a main collection box (not shown) that may be located at any convenient place on the machine. The blowers 129—132 may be arranged in sets with their impellers on common shafts 134—135. The shafts have pulleys 136 around which a belt 139 passes. The belt 139 also passes around an idler pulley 138 on a shaft 137 and around a pulley 140 on a shaft 141, the latter being in turn driven from the engine shaft 142 by pulley 144, belt 143 and pulley 145.

Another of the improvements of our present invention resides in the provision of means whereby the picking mechanism may be driven from the power of the tractor in such manner that the most effective speed of travel may be selected and utilized without affecting the proper relative speed of the picking mechanism; also the provision of means whereby the picking mechanism may be run, while the tractor is at rest, for the purpose of cleaning out the picking units or testing the same. This means is disclosed in detail in Figures 25–27, inclusive, to

which reference is now made. The power transmitting mechanism E includes the case 146 having an anti-friction bearing 147 for the end of the engine shaft 142, the latter carrying a pinion 148 to mesh with a gear 149 on the transmission shaft 150. The shaft 150 is mounted in anti-friction bearings 151 and carries a gear member which comprises the reverse pinion 180, the low speed pinion 152, the second speed pinion 153 and the third speed pinion 154. It also carries a gear 169 to which reference will be made later. The reverse pinion 180 cooperates with the usual reverse gear 181 that in turn cooperates with the sliding gear 155 to effect a reversal of the drive of the tractor.

Bearings 163 are provided in the transmission case 146 for the spline shaft 156 on which the sliding gears 155—158—159 are mounted. The spline shaft also has fastened to it a bevel pinion 157 that drives the ring gear 178 of the usual differential mechanism (not shown) for the driving wheel shaft members 179.

A toothed clutch member 182 is designed to cooperate with an internal toothed clutch member 183 of the sliding gear 170. The gear 170 is mounted on the splined and socketed end 166 of the power take-off shaft 164, the socket carrying the roller bearings 168 for the end 167 of the shaft 156. The shaft 164 has a bearing 165 in the wall of the case 146.

The low speed sliding gear 155 is shifted by a shifter fork 160 while the second and third speed sliding gears 158—159 are shifted by a shifter fork 161. These forks are of the usual kind employed in transmission mechanisms having a single gear-shift lever 6, ball-pivoted at 162 and moving on the well known "H-plate" principle (see Figures 26–27). The power take-off sliding gear lever 5 is pivoted at 172 on a fixedly located axis so as to move back and forth only and it engages a shifter fork 171 for the gear 170.

Between the levers 5 and 6 there is located a support 173 on which is pivoted a lock-out plate 174 having a radial notch 175 to receive the lever 5 when the lever is in its forward position and the notch is in alignment therewith. The plate is also connected to the lever 6 by a link 176, the link being pivoted to the plate at 177. By reference to Figures 26 and 27 it will be seen that only when the lever 6 is in the neutral position may the lever 5 be moved forward to engage the gears 170 and 169. When these gears are engaged the engine power is transmitted to the picking units without driving the tractor. While the lever 5 is thus in its forward position it will be impossible to operate the lever 6. When the lever 6 is in any position other than neutral it will be impossible to operate the lever 5 forwardly. Therefore it is not possible for even the most stupid operator to set the tractor into operation while the picking units are being run under test.

When, however, the lever 5 is moved rearwardly to couple the power take-off shaft 164 directly to the splined shaft 156 (clutch member 182—183 in engagement), the lever 6 may be shifted to any of its desired positions to run the machine with either of its selected gear ratios.

In Figures 28–30, inclusive, we have illustrated another form of transmission mechanism. It comprises a case 184 having bearings 186 for the engine shaft 185 on the end of which is mounted a pinion 187. The pinion 187 meshes with a gear 188 on the splined shaft 189. The splined shaft is mounted in bearings 190. The shaft 189 carries a toothed clutch member 191 to mate with a toothed clutch portion 192 of a sliding gear 193, mounted on the splined and socketed end 195 of a power take-off shaft 194. The shaft 194 is mounted in a bearing 197 in the case 184 and on a roller bearing 196 on the end of the shaft 189.

A transmission shaft 198 is mounted in bearings 199 and carries a gear 213 to cooperate with the sliding gear 193. It also carries a low speed gear 203, a second speed gear 204 and a third speed gear 205, and a pinion 200 to mesh with the ring gear 201 of the differential for driving the shaft member 202.

On shaft 189 is the low speed sliding gear 206 which is operated by a fork 209 and the lever 6*a*. The second and third speed sliding gear 207—208 is also mounted on the shaft 189 and is operated by the fork 210 and lever 6*a*. The lever 6*a* is ball-fulcrumed at 211 while the lever 5*a* is pivoted on a fixed axis 212. Pivoted at 214 on a support located on top of the case 184 is a bell crank 215, one arm of which is provided with an opening 216 for the lever 6*a*, and projections 217 and 225 are provided to stop the pivotal movement of the bell crank 215 at times, as will later more fully appear.

Pivoted to the bell crank 215, as at 218, is a bar 219 having a slot 220 for the lever 5*a*. A spring 221 tends to keep the lever 215 and bar 219 in their proper positions and tends always to bring lever 215 against a fixed stop 222.

A fork 223 cooperates with the lever 5*a* to shift the gear 193 into engagement with the gear 213 or to engage and disengage the clutch members 191–192. The lever 5*a* is mounted to be moved forwardly and backwardly in a single plane, while the lever 6*a* is mounted to be moved on the well known "H-plate" principle. When lever 5*a* is in its neutral position or is pulled back to mesh the gears 213 and 193, the bell crank 215 will remain in the position shown in Figure 29 and lever 6*a* will be free to be shifted into any of its change-speed positions.

In the embodiments of the invention illustrated in Figures 28–30, when clutch members 191—192 are engaged, the lever 6*a* can only be shifted into the second or intermediate gear position, i. e., to mesh gears 207—204, all other positions of the lever 6*a* being blocked by the bell crank 215 (see Figure 30).

It will be noticed that when gears 193 and 213 are meshed shafts 198 and 194 turn at a constant relative speed. Therefore, the speed of the tractor and that of the picking units remain at a relatively constant ratio to one another, and any speed change effected by shifting the lever 6*a* will cause a corresponding change in the operation both of the tractor and the picking units. The picking mechanism will, therefore, be driven at a speed corresponding to the speed of travel of the tractor regardless of the particular tractor speed selected by means of the change-speed gears controlled by the lever 6*a*.

It is to be further noted, that when power is supplied to the shaft 194 from shaft 189 by means of the gears 207—204, the shaft 198, and the gears 213—192, all of said gears are in action causing working loads to be applied on the bearings 199, 190, and 196, a certain amount of wear and power losses will occur in all of said parts. When, however, power is transmitted directly from shaft 189 to shaft 194 by means of positive clutch gear elements 191 and 192, the above mentioned power losses and wear are eliminated. Since in ordinary operation of the machine in

the fields, it is found that some one speed of the mechanism (in this case intermediate speed) will be suitable for most conditions of operation, the direct drive from shaft 194 may be used when operating at intermediate speed without affecting the speed ratio simply by making the size and number of teeth of the gears 213 and 193 correspond to the size and number of teeth on the intermediate speed gears 204 and 207, respectively.

When shaft 194 is driven from shaft 198, the drive is from engine shaft 185 via gears 187—188, to shaft 189 and from thence through low, second or high gears to shaft 198 and from thence through gears 213—193 to shaft 194; the strain of driving the tractor as well as that of driving the picking mechanisms falls on shaft 198; whereas when shaft 194 is driven from shaft 189 directly shaft 198 only has to bear the strain of the tractor. More power is required to run the picking units than to drive the tractor, hence the advantage in relieving shaft 198 and the gears of this additional load.

The interlocked plate 125 is therefore made with the opening so shaped as to allow the lever 6a to be shifted into the intermediate speed position while the lever 5a is shifted backward into the position of direct drive by means of the positive clutch elements 191 and 192 between the shafts 189 and 194.

By locking out all other speeds than the intermediate speed which is the one most used in the field, when clutches 191—192 are engaged the operator cannot shift the gears to change the constant operating speed ratio that must exist between shafts 198—194 to ensure the proper and safe operation of the machine. Were no provisions made to prevent the operator shifting to other speed gears than the intermediate one while shaft 194 is driven from shaft 189, the balance between tractor travel speed and picking unit speed would be upset with consequent probable damage to the spindles of the machine (bending of the spindles). It should, of course, be understood that the speed of travel of the spindle carrier, and the consequent movement of the spindles in the backward direction during contact with the plant, is approximately equal to the speed of the forward travel of the machine whereby the spindles, while in the plants, rotate in a position approximately stationary with relation to the plants.

As will be seen by reference to Figure 29, when lever 6a is in either of its positions to the rear, i. e., pulled back to either side of projection 217, it will be impossible to move the lever 5a, forwardly to the position of Figure 30 since projection 217 will engage lever 6a as a stop and hold the bell crank 215 and bar 219 to the position in which they are shown in Figure 29, thereby making it impossible for the operator to connect shafts 189—194 while lever 6a is in its high or reverse speed positions. Another projection 225 stops the lever 215 from movement should lever 6a be in low speed position.

It should be further understood that the usual reversing gear meshes 224 with gear 204 and may be engaged by sliding gear 206 but as this reversing gear would lie in a plane in front of the cutting plane of Figure 28 it would not show in that figure so this position only has been indicated with relation to gears 204—206 by dot and dash lines 223.

In order that the picking mechanism may not be operated when the tractor is in reverse gear, we provide a one-way clutch 226, (see Figure 1) of any approved construction, located preferably in the drive between shaft 7 and the shaft which carries the bevel gear 9.

From the foregoing it will be seen that by using a tractor with a driving wheel wide enough to straddle two rows of plants, the width of the tractor body can be so reduced that the picking units C—C may be located with their tunnels closer together than is possible with the arrangement shown in our application aforesaid. Consequently the cotton rows may be placed closer together and a proportionately greater yield of cotton obtained.

Operation

As the machine is driven over the rows of cotton the tractor will straddle two rows, as before pointed out, the units C—C picking the cotton of those two rows. The cotton stalks enter the picking mechanisms through the throats thereof. (When the boll crushing attachments are used they will open any closed bolls before the stalks are passed from the throats into the tunnels of the picking units.)

As the machine moves forward the cotton stalks will enter the tunnels T (see Figure 3) of the picking mechanisms where the plants will be engaged by the spindles 45, the cotton being wrapped around the spindles and removed from the bolls as the plants pass along the tunnels. The screen cylinder prevents a drag effect on the spindles at the entrance of the tunnel and presses the stalks and bolls into the group of spindles to enable them effectively to gather the cotton from the bolls. Passing further along toward the rear of the tunnel T, the spindles with their cotton wound around them are gradually withdrawn from the tunnel and from the plants, the plants being held from following the spindles by reason of the presence of the guards 96 and elements 97.

The cotton ladened spindles are now carried around the sprockets 28. As the spindles swing around the rear sprockets 28 they throw loose from themselves the bulk of any trash gathered from the stalks and the trash is discharged through a suitable opening provided in the floor of the housing as in the machine of our application, Serial No. 678,670 aforesaid.

The spindles in swinging around the axis 14 encounter the shock absorber cylinder 78 as they pass into the stripping devices. The cylinder 78 also serves to aid in giving the spindles the necessary inclination to the stripping bars 68—63 as the stripping action begins. The spindles are maintained in this position while leaving the stripping bars by the runner 77 hereinbefore mentioned (see Figure 3). The doffer 71 rotates rapidly near the stripping bars and ensures the delivery of the cotton to the suction box 73.

The spindles now leave the stripping bars and are carried forwardly until the rolls 46 engage the plate 88 and the spindles begin to come under the influence of the auxiliary doffer 80 which rotates by means of its contact with the spindles and in parting with the spindles it drags off all particles or wisps of cotton which may have been left thereon by the stripping means. At the same time the moistened flexible bands of the doffer wheels 80 automatically moisten and clean the spindles which are thus kept in perfect picking condition.

The spindles now pass from the auxiliary dof-

fer 80 around sprockets 29 at the front of the machine, the accelerated travel of the spindles as they are passed around the axis 30 is retarded or absorbed by the wheel 94 before the spindles again are passed into the cotton plants. This completes the cycle of operation.

The structures disclosed in this application are the preferred ones but we wish it understood that modifications, alterations in design and proportion of parts, and slight changes in details of construction may be made by those skilled in the art without departing from the spirit of the invention.

In Figures 32 and 33 is shown a modification of the structure shown in Figures 12 and 15. In Figures 32 and 33 instead of having an indentation 35 pressed to constitute the abutments 35x (Figure 12) strips 227 may be inserted, the strips each having a bead 228 to engage the bearing strips 41, the beads being apertured as at 229 for the passage of the spindles 45.

Also the slats may be provided with plates 230 to prevent adjacent slats tangling with one another folded against one another.

From the foregoing description, taken in connection with the accompanying drawings, it is thought the construction, operation and advantages of our invention, together with the novel features thereof, will be clear to those skilled in the art.

What we claim is:

1. In a cotton picking machine having a picking side and a stripping side, an endless carrier comprising spaced-apart shafts with upper and lower sprockets, chains taking around said sprockets, spindle carrying slats mounted on said chains, a tunnel at the picking side of the machine located approximately parallel to a vertical plane containing the axes of said shafts, and spaced away from said chains, means bowing a flight of said chains outwardly toward said tunnel to cause the spindles to pass into, through and out of the tunnel, a set of stripping bars at the stripping side of the machine and located approximately parallel to the tunnel, and means to deflect a flight of the chains inwardly at the stripping side away from the stripping bars whereby the spindles will have their inner ends first brought under the influence of the stripping bars and then gradually pulled from the bars as the carrier advances.

2. In a cotton picking machine having a picking side and a stripping side, an endless carrier comprising spaced-apart shafts with upper and lower sprockets, chains taking around said sprockets, spindle carrying slats mounted on said chains, a tunnel at the picking side of the machine located approximately parallel to a vertical plane containing the axes of said shafts and spaced away from said chains, means bowing a flight of said chains outwardly toward said tunnel to cause the spindles to pass into, through and out of the tunnel, a set of stripping bars at the stripping side of the machine and located approximately parallel to the tunnel, means to deflect a flight of the chain inwardly at the stripping side away from the stripping bars whereby the spindles will have their inner ends first brought under the influence of the stripping bars and then gradually pulled from the bars as the carrier advances, and means to steady the spindles as they are drawn through the stripping bars.

3. In a cotton picking machine, an endless chain carrier taking around spaced-apart shafts having sprockets, spindle carrying slats hinged to said carrier, spindles projecting from said slats, in combination with means for absorbing the swinging shocks of the spindles as they pass around the axes of said sprockets.

4. In a cotton picking machine, an endless chain carrier taking around spaced-apart shafts having sprockets, spindle carrying slats hinged to said carrier, spindles projecting from said slats, in combination with means for absorbing the swinging shocks of the spindles as they pass around the axes of said sprockets, at least one of said absorbers comprising a rotating member having a shock absorbing surface for engagement by the spindles.

5. In a cotton picking machine, an endless chain carrier taking around spaced-apart shafts having sprockets, spindle carrying slats hinged to said carrier, spindles projecting from said slats, in combination with means for absorbing the swinging shocks of the spindles as they pass around the axes of said sprockets, one of said absorbers comprising a roller to engage and steady said slats as the spindles approach the completion of their accelerated swinging movement.

6. In a cotton picking machine, a traveling spindle carrier, a plurality of rows of spindles spaced apart horizontally and vertically and carried by said carrier, said spindles having rollers, independently flexible and resilient tracks, one for each horizontal pair of rows of rollers, and means to anchor said tracks at one end, said tracks being otherwise free to float and accommodate themselves to the spindle rollers.

7. In a cotton picking machine, a traveling spindle carrier, a plurality of rows of spindles spaced apart horizontally and vertically and carried by said carrier, said spindles having rollers, independently flexible and resilient tracks, one for each horizontal pair of rows of rollers, and means to anchor said tracks at one end, said tracks being otherwise free to float and accommodate themselves to the spindle rollers, and each of said tracks comprising a body having a resilient core.

8. In a cotton picking machine, a traveling spindle carrier, a plurality of rows of spindles spaced apart horizontally and vertically and carried by said carrier, said spindles having rollers, independently flexible and resilient tracks, one for each horizontal pair of rows of rollers, means to anchor said tracks at one end, said tracks being otherwise free to float and accommodate themselves to the spindle rollers, each of said tracks comprising a body having a resilient core and an upper and lower belt strip having roller engaging surfaces.

9. In a cotton picking machine, a traveling spindle carrier, a plurality of rows of spindles spaced apart horizontally and vertically and carried by said carrier, said spindles having rollers, independently flexible and resilient tracks, one for each horizontal pair of rows of rollers, means to anchor said tracks at one end, said tracks being otherwise free to float and accommodate themselves to the spindle rollers, each of said tracks comprising a body having a resilient core and an upper and a lower belt strip composed of rubberized textile material.

10. In a cotton picking machine, a traveling spindle carrier, a plurality of rows of spindles spaced apart horizontally and vertically and carried by said carrier, said spindles having rollers, independently flexible and resilient tracks, one for each horizontal pair of rows of rollers, means

to anchor said tracks at one end, said tracks being otherwise free to float and accommodate themselves to the spindle rollers, each of said tracks comprising a body having a resilient core and an upper and a lower belt strip composed of rubberized textile material with a live rubber face.

11. In a cotton picking machine, a traveling spindle carrier, a plurality of rows of spindles spaced apart horizontally and vertically and carried by said carrier, said spindles having rollers, independently flexible and resilient tracks, one for each horizontal pair of rows of rollers, means to anchor said tracks at one end, said tracks being otherwise free to float and accommodate themselves to the spindle rollers, each of said tracks comprising a pneumatic tube core and a channeled member of rubberized textile belting material embracing said core and having upper and lower roller-engaging surfaces.

12. In a cotton picking machine, a traveling spindle carrier, a plurality of rows of spindles spaced apart horizontally and vertically and carried by said carrier, said spindles having rollers, independently flexible and resilient tracks, one for each horizontal pair of rows of rollers, means to anchor said tracks at one end, said tracks being otherwise free to float and accommodate themselves to the spindle rollers, each of said tracks comprising a body having a resilient core, an upper and lower belt strip having roller-engaging surfaces, and said roller-engaging surfaces comprising rib-like elements and said rollers being grooved to receive the same.

13. In a cotton picking machine, a traveling spindle carrier, a plurality of rows of spindles spaced apart horizontally and vertically and carried by said carrier, said spindles having rollers, independently flexible and resilient tracks, one for each horizontal pair of rows of rollers, means to anchor said tracks at one end, said tracks being otherwise free to float and accommodate themselves to the spindle rollers, each of said tracks comprising a pneumatic tube core and a channeled member of rubberized textile belting material embracing said core and having upper and lower roller-engaging surfaces, said roller-engaging surfaces comprising rib-like elements and said rollers being grooved to receive the same.

14. In cotton picking machines wherein picking spindles are conveyed by endless slatted carriers; a slat comprising a tubular body having front and back chambers extending lengthwise of the slat, spindle bearing strips held in said chambers, said strips having bearing apertures, the apertures of the first strip aligning with those of the second strip, and spindles held in said bearing apertures.

15. In cotton picking machines wherein picking spindles are conveyed by endless slatted carriers; a slat comprising a tubular body having front and back chambers extending lengthwise of the slat, spindle bearing strips held in said chambers, said strips being reversible and each strip having at least two sets of bearing apertures and spindles held in the apertures of one set of each bearing strip.

16. In cotton picking machines wherein picking spindles are conveyed by endless slatted carriers; a slat comprising a tubular body having front and back chambers extending lengthwise of the slat, spindle bearing strips held in said chambers, said strips having bearing apertures, the apertures of the first strip aligning with those of the second strip, spindles held in said bearing apertures, and washer strips held against the outer faces of said bearing strips and penetrated by said spindles, said washer strips serving to protect said bearing apertures against entry of dirt and grit.

17. In cotton picking machines wherein picking spindles are conveyed by endless slatted carriers; a slat comprising a tubular body having front and back chambers extending lengthwise of the slat, spindle bearing strips held in said chambers, said strips being reversible and each strip having at least two sets of bearing apertures and spindles held in the apertures of one set of each bearing strip, and washer strips held against the outer faces of said bearing strips and penetrated by said spindles, said washer strips serving to protect said bearing apertures against entry of dirt and grit.

18. In cotton picking machines wherein picking spindles are conveyed by endless slatted carriers; a slat comprising two metallic channel members, means securing them together to comprise a tubular body having spindle-passing openings in its front and back walls, a pair of spaced-apart strips of suitable bearing material held in said tubular body, washer strips held in said tubular body against the outer faces of said spaced-apart strips, said strips having spindle bearing holes and spindles mounted therein and passed through said tubular body.

19. In cotton picking machines wherein picking spindles are conveyed by endless slatted carriers; a slat comprising two metallic channel members, means securing them together to comprise a tubular body having spindle-passing openings in its front and back walls, a pair of spaced-apart strips of suitable bearing material held in said tubular body, washer strips held in said tubular body against the outer faces of said spaced-apart strips, said strips having at least two offset sets of bearing holes, and spindles mounted in one set of holes of each strip and passing through said tubular body.

20. In cotton picking mechanism wherein picking spindles are conveyed by endless slatted carriers; a slat comprising a tubular body, a pair of spaced-apart bearing strips held in said body and having bearing apertures, and spindles held in said apertures and passed through said body.

21. In a cotton picking machine, a traveling carrier, picking spindles mounted thereon, means for stripping cotton from said spindles, said means comprising a set of cantilever stripping bar carrying elements, an upright on which said elements are secured, another upright against which one end of each of said elements rest, the other ends being free, said elements each having a pair of stripping bar seats and stripping bars held in said seats.

22. In a cotton picking machine, a traveling carrier, picking spindles mounted thereon, means for stripping cotton from said spindles, said means comprising a set of cantilever stripping bar carrying elements, an upright on which said elements are secured, another upright against which one end of each of said elements rest, the other ends being free, said elements each having a pair of stripping bar seats, and stripping bars reversibly held in said seats.

23. In a cotton picking machine, a traveling carrier, picking spindles mounted thereon, means for stripping cotton from said spindles, said stripping means comprising a set of cantilever stripper-bar carrying elements.

24. In a cotton picking machine, a traveling carrier, picking spindles mounted thereon, means for stripping cotton from said spindles, said strip-

ping means comprising a set of cantilever stripper-bar carrying elements, and stripping bars reversibly mounted on said elements, the bars of one element being spaced from those on adjacent elements to leave passages through which the spindles are drawn.

25. In a cotton picking machine, a traveling carrier, picking spindles mounted thereon, means for stripping cotton from said spindles, said stripping means comprising a pair of uprights, cantilever bars secured to one of said uprights with an end of each bar engaging the other upright, the other ends of said bars being free, the free portions of said bars each having a horizontal and a vertical web defining an upper and a lower seat, stripping bars reversibly located in said seats and means to hold said stripping bars to their seats.

26. In a cotton picking machine, an auxiliary doffer having a vertical series of doffing wheels between which picking spindles are drawn, a doffer moistening means located alongside the doffer in proximity to the periphery thereof, said moistening means comprising a channeled member having a series of holes in one of its walls adjacent the doffer, the holes being located in approximate alignment with the spaces between adjacent doffer wheels, a set of individual sponges in said channelled member, the sponges having portions projecting through said holes and contacting the doffer, and means to keep said sponges moist.

27. In a cotton picking machine, a tractor having a power plant and having traction wheels to straddle two rows of plants, a cotton picking unit located at each side of the tractor to operate on the respective rows of plants, each of said units comprising a traveling set of rotating picking spindles, a tunnel through which the plants are passed for action thereon by said spindles, there being a throat at the entrant end of said tunnel, a boll crusher in said throat and means to operate said spindles and said crusher.

28. In a cotton picking machine, a tractor having a power plant and having traction wheels to straddle two rows of plants, a cotton picking unit located at each side of the tractor to operate on the respective rows of plants, each of said units comprising a traveling set of rotating picking spindles, a tunnel through which the plants are passed for action thereon by said spindles, there being a throat at the entrant end of said tunnel, a boll crusher in said throat, and means to operate said spindles and said crusher from the power plant of said tractor.

29. In a cotton picking machine, a tractor having a power plant and having traction wheels to straddle two rows of plants, a cotton picking unit located at each side of the tractor to operate on the respective rows of plants, each of said units comprising a traveling set of rotating picking spindles, a tunnel through which the plants are passed for action thereon by said spindles, there being a throat at the entrant end of said tunnel, a boll crusher in said throat, means to operate said spindles and said crusher, said crusher comprising a stationary toothed plate located in said throat, and a toothed element movable in an endless path a portion of which lies in a throat whereby said toothed element will cooperate with said toothed plate.

30. In a cotton picking machine, a tractor having traction wheels to straddle two rows of plants, a cotton picking unit located at each side of the tractor to operate on the respective rows of plants, each of said units comprising a traveling set of rotating picking spindles, a tunnel through which the plants are passed for action thereon by said spindles, there being a throat at the entrant end of said tunnel, a boll crusher in said throat, means to operate said spindles and said crusher, said crusher comprising a stationary crushing plate, and a rotating crushing cylinder, and means to operate said cylinder in timed relation to the movement of said spindles into said tunnel.

31. In a cotton picking machine, a tractor having traction wheels to straddle two rows of plants, a cotton picking unit located at each side of the tractor to operate on the respective rows of plants, each of said units comprising a traveling set of rotating picking spindles, a tunnel through which the plants are passed for action thereon by said spindles, there being a throat at the entrant end of said tunnel, a boll crusher in said throat, means to operate said spindles and said crusher, said crusher comprising a stationary crushing plate and an endless belt-type crushing element, and means to operate the latter in timed relation to the travel movement of said spindles into said tunnel.

32. In a cotton picking machine, a traveling unit including a housing having a tunnel for passage of the cotton plants therethrough, means within the housing for picking cotton from the plants, and a salvaging apparatus to recover cotton dropping from the plant subsequent to the action of the picking means.

33. In a cotton picking machine, a traveling unit including a housing having a tunnel for passage of the cotton plants therethrough, means within the housing for picking cotton from the plants, salvaging apparatus to recover cotton dropping from the plant subsequent to the action of the picking means, said salvaging apparatus comprising trough members at either side of the path of travel of the plants as they leave the tunnel, and means to remove the droppings from said trough members.

34. In a cotton picking machine, a traveling unit including a housing having a tunnel for passage of the cotton plants therethrough, means within the housing for picking cotton from the plants, salvaging apparatus to recover cotton dropping from the plant subsequent to the action of the picking means, said salvaging apparatus comprising trough members at either side of the path of travel of the plants as they leave the tunnel, and suction means communicating with the rear portions of said trough members for removing the droppings therefrom.

35. In a cotton picking machine, a traveling unit including a housing having a tunnel for passage of the cotton plants therethrough, means within the housing for picking cotton from the plants, salvaging apparatus to recover cotton dropping from the plant subsequent to the action of the picking means, said salvaging apparatus comprising trough members at each side of the path of travel of the plants as they leave the tunnel, suction means communicating with the rear portions of said trough members for removing the droppings therefrom, and means in each trough member for conveying the droppings along the trough members to said suction means.

36. In a cotton picking machine, a traveling unit having a power plant and including a housing having a tunnel for passage of the cotton plants therethrough, means within the housing for picking cotton from the plants, salvaging apparatus to recover cotton dropping from the plant subsequent to the action of the picking means,

said salvaging apparatus comprising trough members at either side of the path of travel of the plants as they leave the tunnel, suction means communicating with the rear portions of said trough members for removing the droppings therefrom, suction means to receive the cotton from said picking means and convey it to a collection place, each said suction means including a separate blower, and means to operate said blowers from said power plant.

37. In a cotton picking machine, a traveling unit including a housing having a tunnel for passage of the cotton plants therethrough, means within the housing for picking cotton from the plants, salvaging apparatus to recover cotton dropping from the plant subsequent to the action of the picking means, said salvaging apparatus comprising trough members at either side of the path of travel of the plants as they leave the tunnel, suction means communicating with the rear portions of said trough members for removing the droppings therefrom, and endless belt conveyors in said troughs for conveying the droppings along the same to said suction means, and conveyor guard plates cooperating with said conveyors for the purposes specified.

38. In a cotton picking machine, a cotton picking mechanism, a tractor having a power plant, means which includes a single change-speed power transmitting gear unit for driving the tractor and said mechanism by the power plant of the tractor at a constant ratio between the speed of travel of the tractor and the operation of the picking mechanism, and means included in said unit to drive the picking mechanism while the tractor is at rest.

39. In a cotton picking machine, a cotton picking mechanism, a tractor having a power plant, means which includes a single change-speed power transmitting gear unit for driving the tractor and said mechanism by the power plant of the tractor at a constant ratio between the speed of travel of the tractor and the operation of the picking mechanism, means included in said unit to drive the picking mechanism while the tractor is at rest, and manual controls for said gear unit and for said last mentioned means to drive.

40. In a cotton picking machine, a cotton picking mechanism, a tractor having a power plant, means for driving the tractor and said mechanism by the power plant of the tractor at a constant ratio between the speed of travel of the tractor and the operation of the picking mechanism, means to drive the picking mechanism while the tractor is at rest, said first mentioned driving means including a speed-changing gear set, manual controls for said gear set and for said last mentioned means to drive, and an interlocking device for said manual controls for the purposes described.

41. In a self-propelled cotton picker comprising a tractor provided with a single change-speed transmission gearing unit having a plurality of speeds of forward travel, and picking mechanism mounted on the tractor and powered thereby, means for driving the picking mechanism at a speed corresponding to the speed of travel of the tractor along the plant rows, said means including mechanism for maintaining said power relative speed in all of the different forward speeds provided in the tractor, and means for driving said picking mechanism apart from the traction wheels when it is desired to operate the picking mechanism with the tractor standing at rest.

42. In cotton picking machines, the combination with a tractor complete in itself and including a change-speed power transmitting gear set; a cotton picking machine carried as a unit on and by said tractor and including a traveling belt of rotating picker spindles; and means cooperative with said gear set for driving said picking mechanism with its traveling belt of rotating spindles to move at a constant speed ratio with respect to the traction means of the tractor; and means cooperative with said gear set for driving the picking mechanism separately while the tractor stands still.

43. A tractor powered cotton picker comprising a cotton picking machine and a tractor, said tractor being provided with a power transmission unit having selective gears and means for shifting same for various speeds forward, and a power take off shaft from which the mechanism of the cotton picker is driven, a sliding gear mounted on said power take off shaft, means for shifting said sliding gear into position which will cause the power take off shaft to rotate at a speed with a definite ratio to the speed of the motor regardless of the forward speed selected for the traction wheels, means for shifting said sliding gear into another position where the speed of said power take off shaft will be positively determined by and synchronized with the speed of the traction wheels regardless of the forward speed selected, and a neutral position for said sliding gear where the power take off shaft will not be affected by the motion of the motor or the traction wheels.

44. A tractor powered cotton picker comprising a cotton picking machine and a tractor, said tractor being provided with a power transmission unit having selective gears and means for shifting same for various speeds forward, and a power take off shaft from which the mechanism of the cotton picker is driven, a sliding gear mounted on said power take off shaft, means for shifting said sliding gear into a position which will cause the power take off shaft to rotate at a speed with a definite ratio to the speed of the motor regardless of the forward speed selected for the traction wheels, means for shifting said sliding gear into another position where the speed of said power take off shaft will be positively determined by and synchronized with the speed of the traction wheels, regardless of the forward speed selected, and a neutral position for said sliding gear where the power takeoff shaft will not be affected by the motion of the motor or the traction wheels, and means for interlocking the gear shifting mechanism in such a way that the tractor can be moved forward only when said sliding gear on power take off shaft is in the position where its speed is synchronized with the speed of the traction wheels, or with said sliding gear in neutral position.

45. In a cotton picking machine, a tunnel through which the cotton plants are passed, picking means for removing the open cotton from the plants as they pass through the said tunnel, means for crushing and breaking open the unopened bolls on the plants prior to the action of the said picking means thereon.

46. In a cotton picker, cotton picker units, traction means, and a power plant for driving said traction means and for driving said picker units at a speed corresponding to the speed of the

traction means, and for driving said picker units separately while said traction means remains stationary, said driving means having manual traction and picker control means, safety means for interlocking the said manual control means whereby the control means for the picker units is retained against being placed into "standing run" position when said traction control means is in the operative position.

47. In a cotton picking machine, a tractor having a narrow body to pass between two rows of plants and including steering-traction wheels spaced-apart to straddle two rows of plants, a cotton picking machine mounted at one side of said body to the rear of said steering-traction wheels to pick cotton from one of the rows of plants.

48. In a cotton picking machine, a tractor having a narrow body to pass between two rows of plants and including steering-traction wheels spaced apart to straddle two rows of plants, a cotton picking machine mounted on each side of said body to the rear of said steering-traction wheels to pick cotton from said two rows.

49. In a cotton picking machine, a tractor having a narrow body to pass between two rows of plants and including front traction wheels and rear trailing wheels, said traction wheels straddling two rows of plants, and a cotton picking machine mounted at one side of said body to the rear of said traction wheels.

50. In a cotton picking machine, a tractor having a narrow body to pass between two rows of plants and including front traction wheels and rear trailing wheels, said traction wheels straddling two rows of plants, and cotton picking machines mounted one at each side of said body to the rear of said traction wheels.

51. In a cotton picking machine, a tunnel through which the plants are passed, means for removing the cotton from the plants as they pass through the tunnel, there being a throat at the entrant end of said tunnel, a boll crusher in said throat and means to operate said boll crusher.

52. In a cotton picking machine, a tunnel through which the plants are passed, means for removing the cotton from the plants as they pass through the tunnel, there being a throat at the entrant end of said tunnel, a boll crusher in said throat, means to operate said boll crusher, said crusher comprising a stationary toothed plate located in said throat and a toothed element mounted in an endless path, a portion of which lies in said throat whereby said toothed element will cooperate with said toothed plate.

53. In a cotton picking machine, a tunnel through which the plants are passed, means for removing the cotton from the plants as they pass through the tunnel, there being a throat at the entrant end of said tunnel, a boll crusher in said throat, means to operate said boll crusher, said means comprising a stationary crushing plate, and a rotating crushing cylinder and means to operate said cylinder in timed relation to the movement of the machine over the row of plants.

54. In a cotton picking machine, a tunnel through which the plants are passed, means for removing the cotton from the plants as they pass through the tunnel, there being a throat at the entrant end of said tunnel, a boll crusher in said throat, means to operate said boll crusher, said crusher comprising a stationary crushing plate and an endless belt-type crushing element, and means to operate the latter in timed relation to the travel movement of the machine along the row of plants.

55. In a cotton picking machine wherein picking spindles are conveyed by endless slatted carriers; a slat comprising a tubular body, a pair of spaced-apart bearing strips held in said body and having bearing apertures, said strips held in said apertures and passed through said body, said body having means for engaging said strips along their sides and inner walls.

56. In a cotton picking machine wherein picking spindles are conveyed by endless slatted carriers; a slat comprising a tubular body, a pair of spaced-apart bearing strips held in said body and having bearing apertures, said strips held in said apertures and passed through said body, said body having means for engaging said strips along their sides and inner walls, the means for engaging the inner walls of said strips comprising ribbed plates having spindle passing apertures in the ribs thereof.

57. In a cotton picking machine wherein a tunnel is provided through which the plants are passed, picker spindles operating in and along the tunnel and means adjacent the entrance of the tunnel to direct the stalks into contact with the spindles and ensure the cotton being pressed along the spindles clear of the ends, said means comprising a rotary body into which the ends of the spindles project as the spindles and plants move relatively along past said body.

58. In a cotton picking machine wherein a tunnel is provided through which the plants are passed, picker spindles operating in and along the tunnel and means adjacent the entrance of the tunnel to direct the stalks into contact with the spindles and ensure the cotton being pressed along the spindles clear of the ends, said means comprising a rotary body into which the ends of the spindles project as the spindles and plants move relatively along past said body, said rotary body comprising a drum-like structure having a foraminous surface to receive the spindle ends.

59. In a cotton picking machine, a traveling unit including a housing having a tunnel for passage of the cotton plants therethrough, means within the housing for picking cotton from the plants and a salvaging apparatus to recover cotton dropping from the plants subsequent to the action of the picking means on said plants, said salvaging apparatus comprising means for catching the dropping cotton before it reaches the ground.

60. In a cotton picking machine, an endless traveling carrier including a plurality of hingedly mounted slats, smooth surfaced picking spindles journaled in the slats, means for stripping cotton from said spindles, said means comprising a set of cantilever stripping members, an upright on which said members are secured, another upright against which one end of said members rests, the other ends being free.

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