

April 28, 1936.

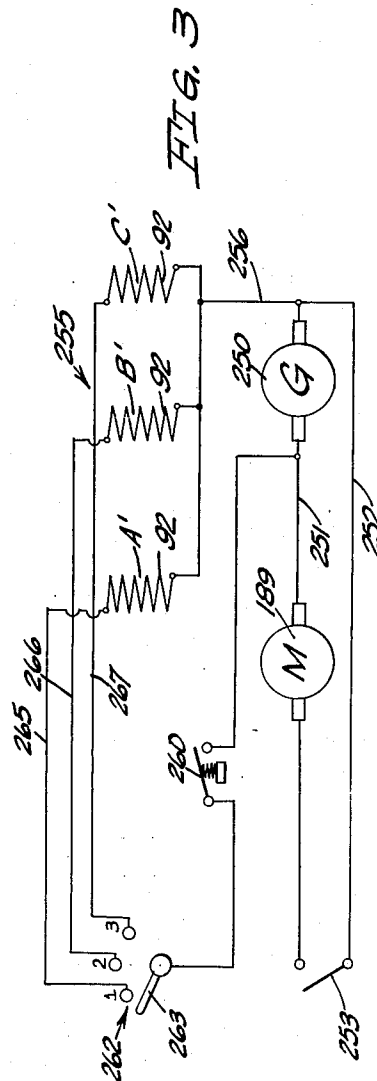
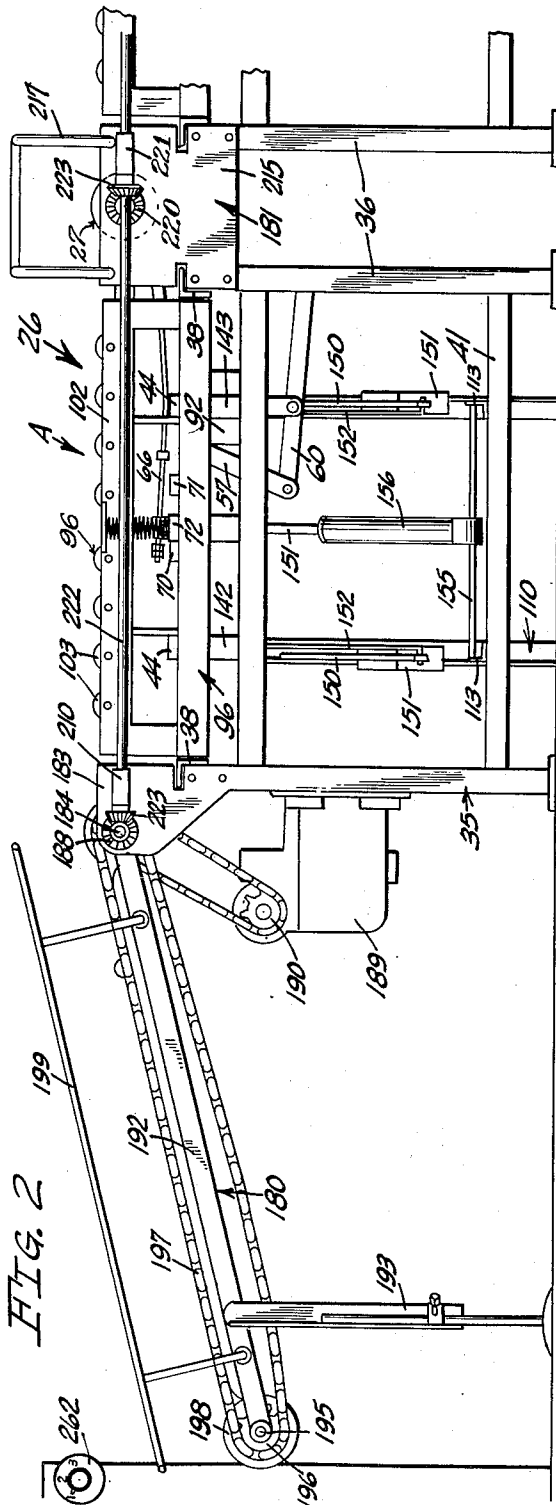
H. PAXTON

2,038,758

BOX SEGREGATOR AND STACKER

Filed June 13, 1932

7 Sheets-Sheet 2



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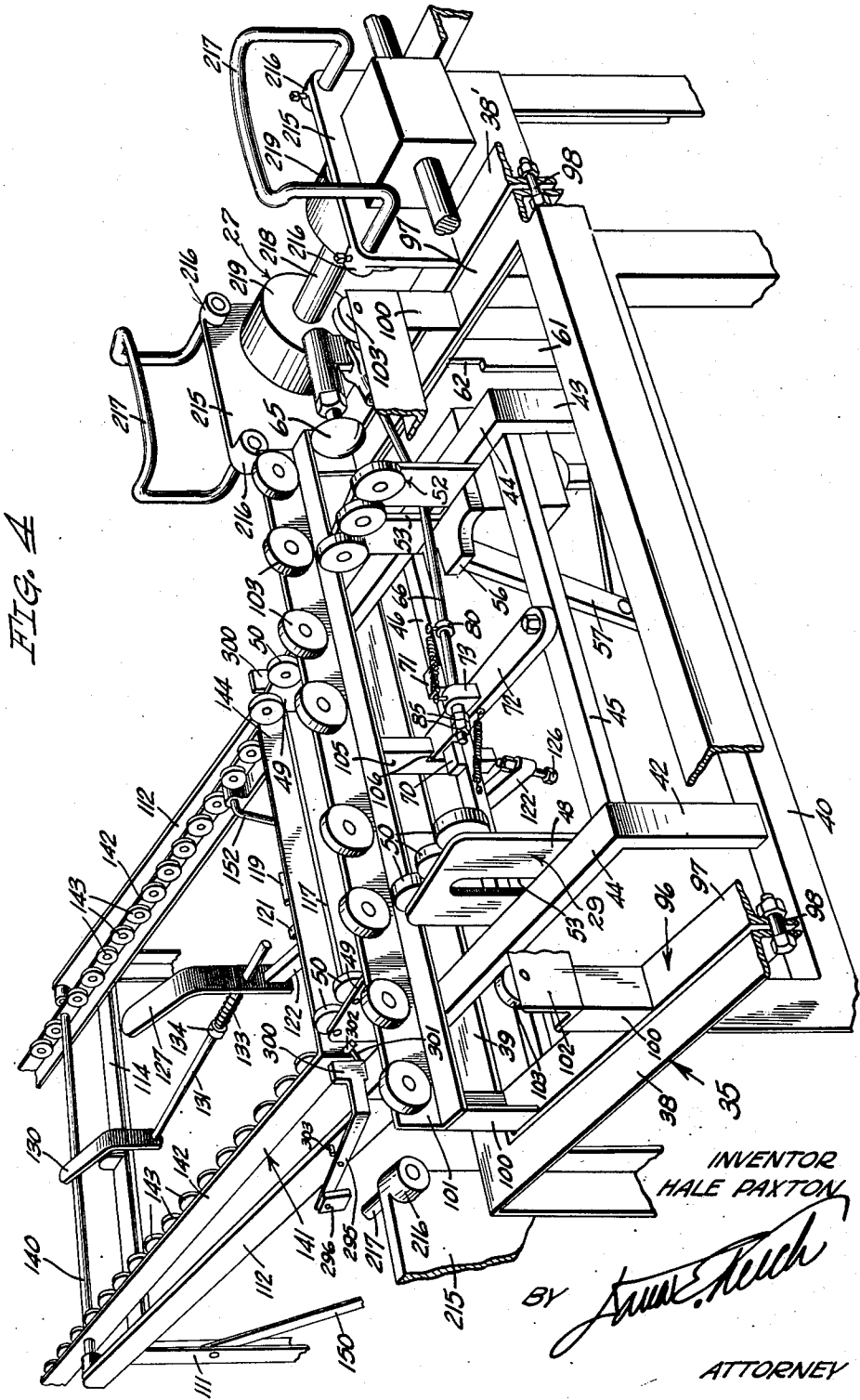
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BOX SEGREGATOR AND STACKER

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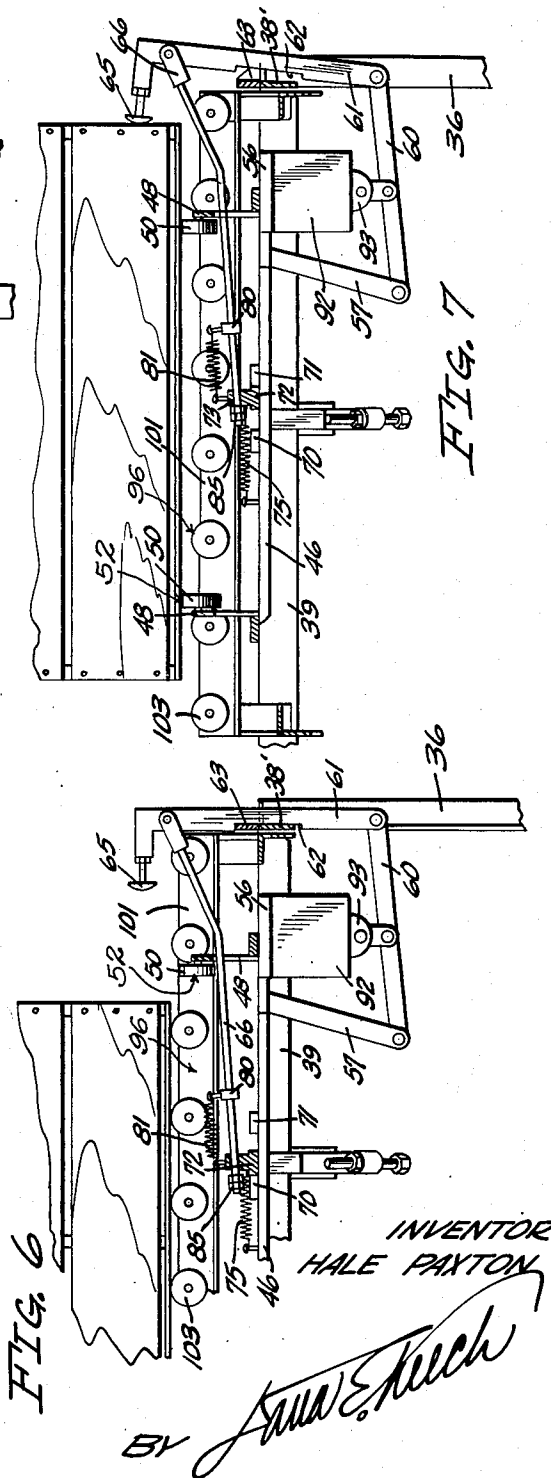
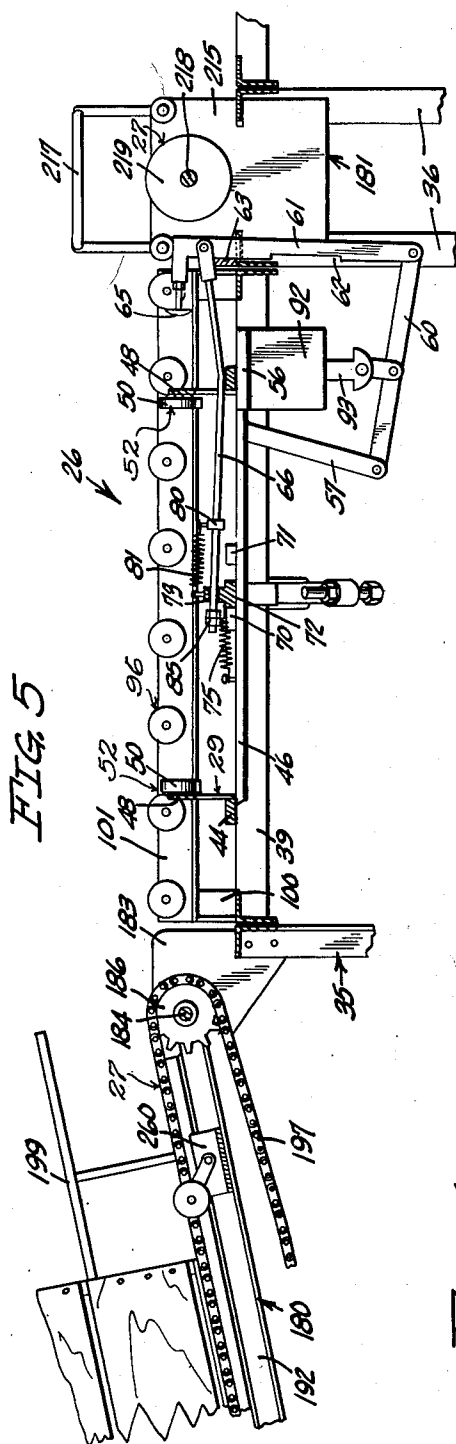
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BOX SEGREGATOR AND STACKER

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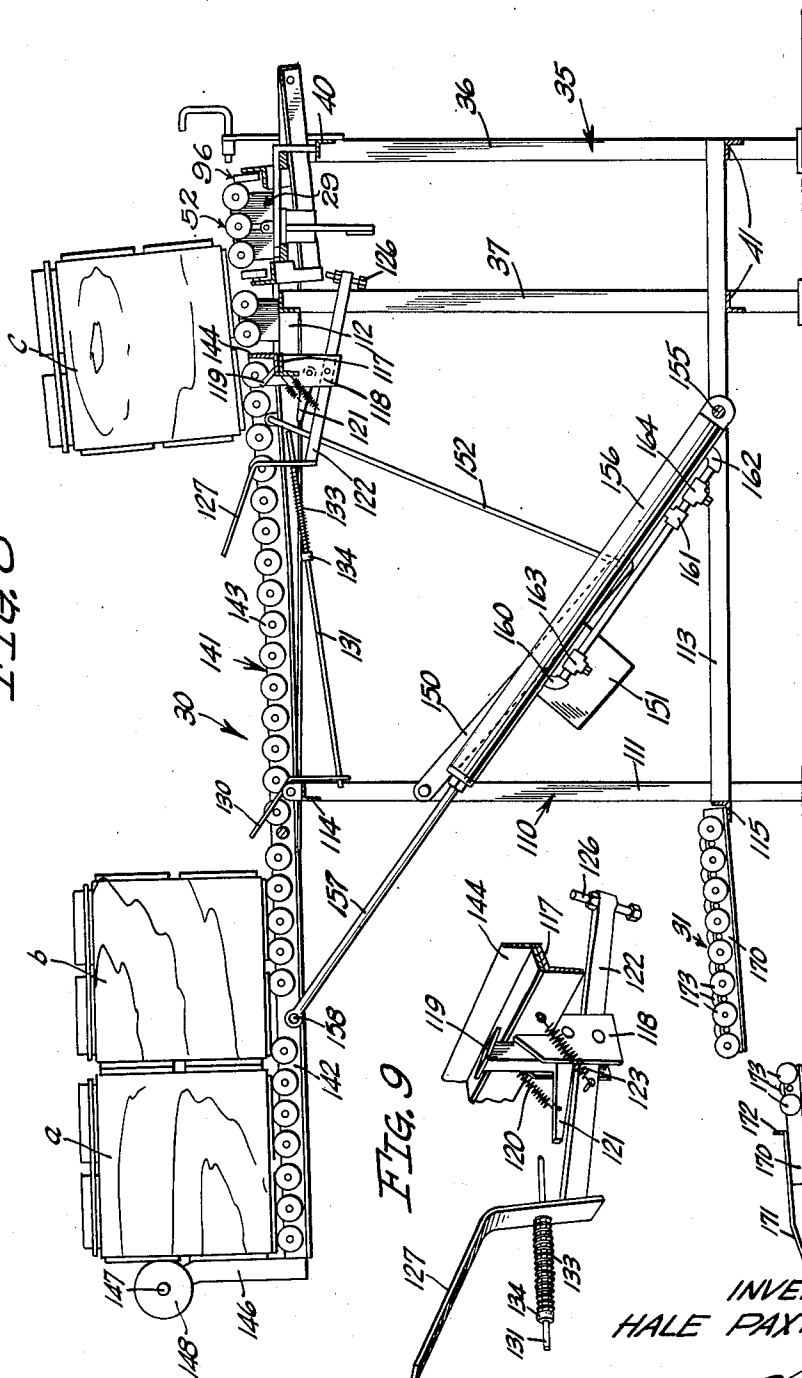
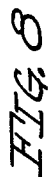
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BOX SEGREGATOR AND STACKER

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7 Sheets-Sheet 5



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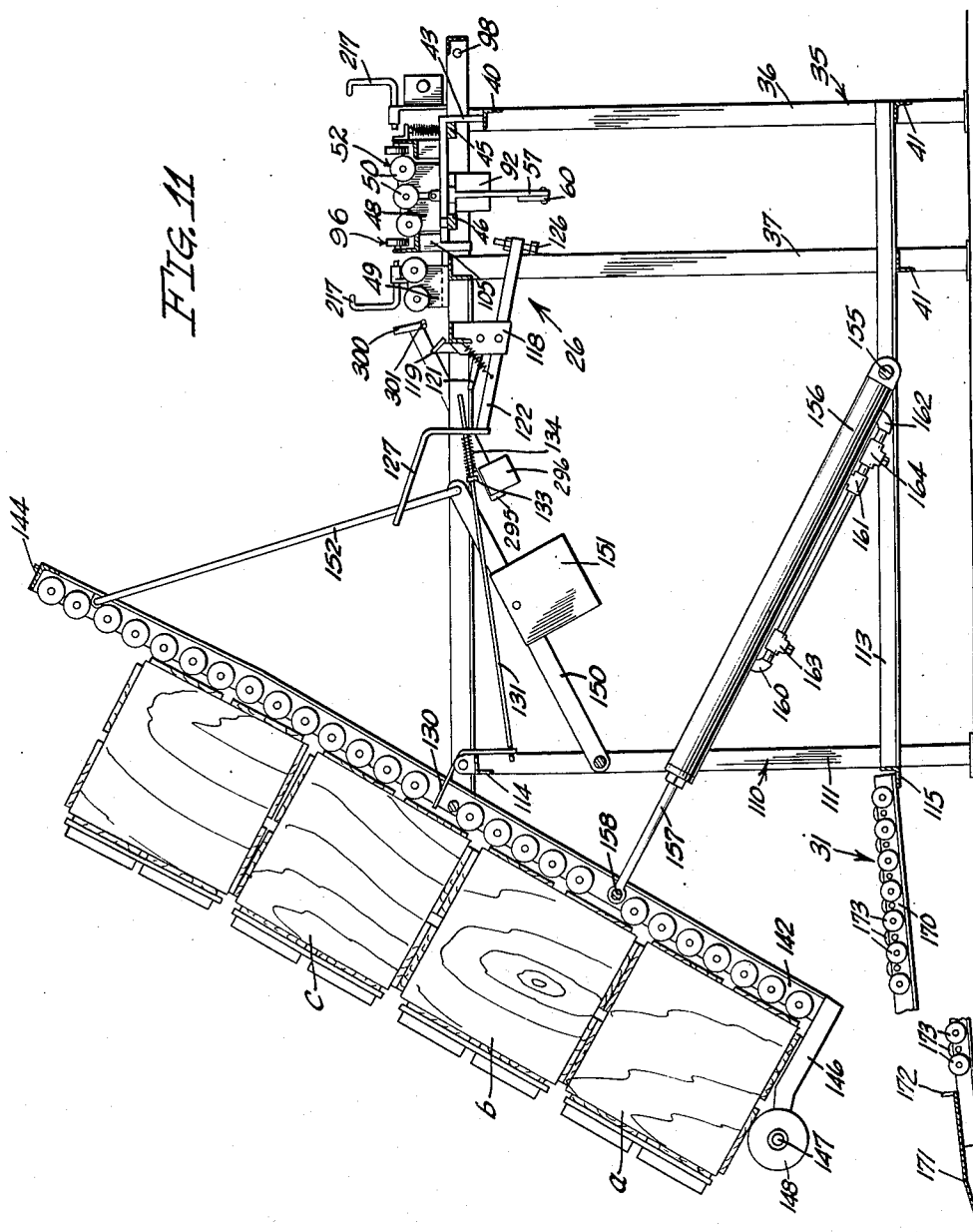
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BOX SEGREGATOR AND STACKER

Filed June 13, 1932

7 Sheets-Sheet 7



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2,038,758

BOX SEGREGATOR AND STACKER

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Application June 13, 1932, Serial No. 616,935

11 Claims. (Cl. 214—6)

My invention relates to handling packed boxes of fruit and similar packaged goods which it is desirable to segregate and form into upright stacks.

5 This invention is an improvement on the box segregating and packing device disclosed in my Patent No. 1,933,147, granted October 31, 1933. Many of the objects of the present invention are the same as those of the device shown in said patent.

10 There are a number of other objects, however, sought to be attained by the present invention, a few of these objects being as follows:

To provide such a device in which the stacking mechanisms automatically operate by gravity; to provide such a device which may be controlled electrically from a remote station; to provide such a device which can be placed on top of a packing house floor but which will permit the stacks formed by the device to be readily grabbed by a grab truck and transferred onto the floor of the packing house; and to provide such a device which will be relatively simple in construction, inexpensive to build, and economical to operate.

25 The manner of accomplishing the foregoing objects, as well as further objects and advantages, will be made manifest in the following description taken in connection with the accompanying drawings, in which:

30 Fig. 1 is a plan view of a preferred embodiment of my invention.

Fig. 2 is an enlarged side elevational view of a foremost stacker unit of my invention.

35 Fig. 3 is a diagram of the wiring in an electrical control apparatus embodied in my invention.

Fig. 4 is an enlarged perspective view of the operating mechanism of one of the stacker units of my invention.

40 Figs. 5, 6, and 7 are similar longitudinal sectional views taken on the line 5—5 of Fig. 1 and illustrating the operation of the foremost stacker unit of my invention.

45 Fig. 8 is a vertical sectional view taken on the line 8—8 of Fig. 1 and illustrates the formation of a stack of boxes on the stack collector of one of the stacker units of my invention.

50 Fig. 9 is a fragmentary perspective view of the stack collector tripping mechanism of one of the stacker units of my invention.

Figs. 10 and 11 are views similar to Fig. 8 and illustrate the second step in the formation of a stack of boxes and the automatic swinging of this into upright position.

55 Referring specifically to the drawings, and particularly to Fig. 1, the preferred embodiment of my invention illustrated herein comprises a box segregating and stacking device 25 which includes a plurality of identical stacker units 26 (separately identified as units A, B, and C), a skeleton power conveyor 27, and an electrical control apparatus 28.

The stacker units 26

Each stacker unit 26 includes a conveyor section 29, a stack collector 30, and a stack storage track 31.

A conveyor section 29

Each conveyor section 29, as shown particularly in Figs. 1, 2, 5, and 8, includes a frame 35 having legs 36 and 37, these being connected transversely by upper frame members 38 and longitudinally by upper frame members 39 and 40 and lower frame members 41. Extending upwardly from the member 40, as shown in Fig. 4, are frame members 42 and 43, these having right angle bends so that upper portions 44 of these members extend horizontally across and are secured to the frame members 39. The members 42 and 43 are connected by longitudinal bars 45 and 46. Welded upon inner edges of the portions 44 of the members 42 and 43 so as to extend upwardly therefrom are plates 48 and 49 having rollers 50 formed thereon, these rollers having a downwardly sloped alignment so as to form a laterally diverting gravity conveyor 52. The plates 48 have vertical slots 53, for a reason which will become apparent hereinafter.

Removably secured to the lower plates of the horizontal portion 44 of the frame member 43 is a heavy solenoid base 56 from which an arm 57 extends downwardly. Pivotaly secured to the lower end of the arm 57 is a lever 60, the opposite end of which is pivotaly secured to the lower end of a box stop arm 61 having a notch 62 formed therein and extending upwardly through a bracket 63 which is mounted upon the upper surface of the frame member 38', this member having a notch in the upper flange thereof through which the arm 61 is adapted to slide, as shown in Fig. 5. Extending forwardly from the upper end of the arm 61 is an adjustable stop 65. Pivotaly connected to the arm 61 just below this stop is a link 66.

Pivotaly mounted on the longitudinal bar 45 and slidable on the bar 46 between stops 70 and 71, rigidly secured thereon, is a latch bar 72 having a lug 73 formed upward thereon. The latch 72 is connected by a spring 75 to the longitudinal

bar 46 so as to continually urge this bar against the lug 70, as shown in Fig. 4. The link 66 extends through one of the slots 53, as shown in Fig. 4, and then through a suitable aperture in the lug 73. Rigidly secured on the link 66 is a collar 80 which is connected by a spring 81 to the lug 73 so that the tension of the spring 75 is transmitted to the link 66 tending to pull the arm 61 into contact with the bracket 63, as shown in Fig. 5.

Provided upon the ends of the link 66 are nuts 85 which form an adjustable collar and are adapted to engage the lug 73 when the arm 61 is moved away from the bracket 63, the bar 72 thus being slid over the bar 46 until it engages the stop 71.

Secured to the lower face of the solenoid base 56 is a solenoid 92, the armature 93 of which is connected by a suitable link to a mid-point in the lever 60.

Disposed between the transverse frame members 38 and 38' is a tilting frame 96 which includes transverse members 97 which are disposed just within the frame members 38 and 38' and are pivotally secured thereto by bolts 98. Extending upwardly from the members 97 are short posts 100, upon the upper ends of which are fixed longitudinal rails 101 and 102, these rails having rollers 103 mounted thereon so as to be freely rotatable. Fixed on the longitudinal member 101 of the frame 96 so as to extend downwardly therefrom is a leg 105 having a shoulder 106 which is adapted to be disposed above the movable end of the bars 72 when this is positioned as shown in Fig. 4 so as to support the tilting frame 96 with the uppermost points in the rollers 103 in a horizontal plane. Whenever the bar 72 is moved out from beneath the shoulder 106 the frame 96 swings downwardly about the axis of the bolts 98 so that the longitudinal member 101 of this frame rests upon the upper portion 44 of the bars 42 and 43. This movement brings the rollers 103 below the plane passing through the upper extremities of the rollers 50.

The stack collector 30

The stack collector 30 of each unit 26 includes a frame 110, this frame having posts 111 connected by upper angle members 112 to the upper member 39 of the conveyor section frame 35 and lower members 113 connecting these legs to the legs 36 and 37. Connecting the posts 111 are upper and lower members 114 and 115, opposite ends of the latter member extending beyond each of the posts 111.

Extending between and having its opposite ends rigidly secured to the members 112 is a frame member 117, this having a pair of plates 118 rigidly provided thereon and extending downwardly therefrom, as shown in Fig. 9. Pivotally mounted between the plates 118 is a latch 119, this latch being yieldably held in upper position, as shown in this figure, by a spring 120. Extending rearwardly from the latch 119 is a finger 121. Also pivotally mounted between the plates 118 beneath the latch 119 is a lever 122 which is yieldably held in the position in which it is shown in Fig. 9 by a contractile spring 123. Provided in the inner end of the lever 122 is an adjustable screw pin 126, while the other end of this lever 70 has a box contacting arm 127 fixed thereon.

Pivotally mounted on a suitable bracket on the cross-member 114 is an auxiliary box engaging lever 130, the lower end of this lever being loosely connected to one end of a rod 131. This rod extends through a suitable aperture in the arm 127,

the lever 130 being normally held in the position in which it is shown in Fig. 8 by pressure of the spring 133 which is coiled about the rod 131 between the arm 127 and a collar 134 provided on this rod.

Supported between the frame members 112 is a shaft 140 on which is pivotally mounted a tiltable frame 141. This frame consists of a pair of track members 142 which are provided with conveyor rollers 143 and which are connected at their inner ends by a frame member 144 and at their rear ends are provided with short uprights 146, between the upper ends of which is mounted a shaft 147 on which is mounted a pair of wheels 148. When the frame 141 is positioned as shown in Fig. 8, the cross-member 144 is latched beneath the latch 119, as shown in Fig. 9, thus locking the frame 141 in this position.

Pivotally provided on the posts 111 are counterweight arms 150 having counterweights 151 provided thereon, the lower ends of these arms being connected by links 152 to the inner end of the frame 141, as shown in Fig. 8.

Connecting the frame members 113 is a shaft 155 upon which is pivotally mounted a dashpot cylinder 156, the piston rod 157 of which is pivotally connected to a shaft 158 which extends between and is rigidly mounted upon the side members 142 of the frame 141. The cylinder 156 is provided with three port fittings 160, 161, and 162, adjacent pairs of which are connected by suitable pipes having a pressure valve 163 disposed between the fittings 160 and 161 and a pressure valve 164 disposed between the fittings 161 and 162.

Stack storage track 31

The stack storage track of each unit 26 includes a pair of rails 170, the upper ends of which are supported on opposite ends of the member 115 of the frame 110, these rails sloping downwardly and away from the stacker unit 26 so that the opposite ends of these rails rest upon the floor supporting the device. Secured to the lower ends of the rails 170 is a grab truck ramp 171 having a stack stop 172 provided thereon, this ramp being of sufficient size to permit a grab truck (not shown) to be rolled upwardly from the floor onto this ramp so that it can engage and cart away the stack of boxes resting on the storage track 31 against the stop 172. The rails 170 are provided with rollers 173 on opposite sides of a vertical flange of these rails so that the rollers on these opposite sides overlap each other, as clearly shown in Figs. 8, 10, and 11.

The skeleton power conveyor 27

This conveyor includes an initial feed section 180 and a number of connector sections 181 by which stacker units 26 are connected together.

The initial section 180 includes a pair of plates 183 which is connected to the near end of stacker unit A and upon which is journaled a shaft 184 having sprockets 186 and 187 and a bevel gear 188. Mounted on the frame 35 of the unit A beneath the shaft 184 is a power unit 189 having a sprocket 190 that is connected by a suitable chain to the sprocket 187 on the shaft 184, so that this shaft is rotated continuously while the power unit 189 is energized.

Rotatably mounted on the shaft 184 is a conveyor unit frame 192, supported on extensible legs 193, and having a shaft 195 journaled in its lower end, this shaft having sprockets 196 which are connected by chains 197 to the sprockets 186, this shaft also having rollers 198 fixed

thereon between the sprockets 196. Suitable guides 199 are mounted upon the frame 192, these guides being adjustable inwardly and outwardly relative to the space over the chains 197.

5 Provided on the plate 183 adjacent the gear 188 is a bearing 210, the purpose of which will be made manifest hereinafter.

Each of the skeleton conveyor sections 181 includes a pair of plates 215 which are shaped as shown in Fig. 2, opposite edges of these plates being bolted to adjacent legs 36 and 37 of adjacent stacker units so as to connect these units together. Provided on the plates 215 along their upper edges are bosses 216 in which are slidably mounted box guides 217 which are shaped as clearly shown in Figs. 2 and 4. Journaled in the plates 215 is a shaft 218 having rollers 219 fixed thereon. Fixed on an extending end of the shaft 218 is a miter gear 220 and on the plate 215 adjacent this gear a bearing 221 is provided.

Extending through all the bearings 210 and 221 is a shaft 222 having miter gears 223 provided thereon which mesh with the miter gears 188 and 220, so that when the shaft 184 is rotated by the drive unit 189 all of the shafts 218 of the skeleton conveyor sections 181 are rotated in unison therewith.

While the box guides 217 are usually spaced apart to permit a box to pass therethrough, a pair of these guides in the end-most skeleton conveyor section 181 is shifted inwardly so as to obstruct the passage of a box past these guides.

The electric control apparatus 28

35 This apparatus is illustrated diagrammatically in Fig. 3 and includes a generator 250 as a source of electric energy, opposite terminals of which are connected through wires 251 and 252 to the motor switch 253 for starting and stopping the motor 189.

For purposes of identification, the solenoids 92 of the stacker units A, B, and C are identified respectively as A', B', and C'. These solenoids are adapted to be selectively energized by the generator 250 through a control circuit 255. This circuit includes a wire 256 which connects one terminal of the generator with corresponding terminals of all of the solenoids 92. The other terminal of the generator 250 is connected to one terminal of a switch 260 which is normally disengaged, but which is mounted on the conveyor section 180 in a position to be contacted by a box carried upwardly on the chains 197 so that just before reaching the stacker section A this switch 260 is closed. The other terminal of this switch is connected to a selector switch 262 which is mounted upon a ladder, with which the apparatus 25 is adapted to be used, within easy reach of the operator of the ladder. The switch 262 has a swinging arm 263 which is adapted to make contact with any one of three contact points "1", "2", and "3". These contact points are connected by wires 265, 266, and 267, respectively, with the solenoids A', B', and C'.

Operation

The apparatus 25, as before mentioned, is especially adapted to be used in connection with a ladder in which packed boxes of fruit or other farm products are lidded, these boxes containing products of various grades which it is desired to segregate and stack separately. In the present instance, of course, it is assumed that only three segregations need be made of the lidded boxes delivered to the apparatus 25.

To start the apparatus the switch 253 is closed so as to energize the motor 189 and cause the continuous movement of the chains 197 and the power rollers 219 of the skeleton conveyor 27. A box is now fed onto the power rollers 198 which deliver the box onto the chains 197 so that it is carried upwardly on these chains. As this box is so delivered by the operator of the ladder he sets the arm 263 of the switch 262 to contact one of the contacts of this switch 10 which is connected to the solenoids 92 of the stacker unit to which it is desired to deliver this box. After thus setting the switch 262, the operator may give his attention to the lidding of another box, while the box delivered to the conveyor section 180 travels up and engages the switch 260, thus completing the circuit of the solenoid with which the selector switch 262 is connected, and energizing this solenoid so that the latter lifts the lever 60 of this stacker unit, 20 as shown in Fig. 6. Assuming that this was solenoid A', the energizing of the solenoid will thus lift the stop 65 into the position in which it is shown in Fig. 6, so that the box discharged from the conveyor section 180 onto the stacker unit A 25 comes into engagement with this stop, as shown in Fig. 7, and pulls on the link 66 to swing the latch 72 out from beneath the leg 105 on the tiltable conveyor section 96 so that this section tilts downward, as shown in Fig. 7, and allows 30 the box to rest on the conveyor rollers 50 which, as before pointed out, are inclined laterally so that this box is discharged by gravity from the conveyor 52 formed by these rollers onto the stack collector 30 of that unit.

Fig. 8 illustrates a situation in the operation of the apparatus 25 where the stack collector 30 of one of the units 26 has accumulated two boxes a and b, and a third box c is just being discharged onto this stack collector by gravity, as heretofore described. It will be noted in this figure that the end of the rod 131 extending through the box contacting arm 127 is not over the arm 121 of the latch 119, so that when the box contacting arm 127 is depressed the rod 131 will not 45 contact the arm 121. It is thus seen that single boxes will roll over the box contacting arm 127 and the lever 130 without actuating the catch 119. The third box to be delivered to the stack collector 30, however, comes to rest on top of the lever 130 and extends the other end of the rod 131 over the finger 121 of the latch 119. Thus, it is that when the fourth box is delivered onto the stack collector 30 so that it rides over the box contacting finger 127 to depress this, the finger 55 121 of the latch 119 is also depressed so as to throw the latch 119 out of engagement with the member 144 of the stock collector 30, thus releasing this stack collector, as shown in Fig. 10, and permitting it to rotate about the shaft 140, 60 as shown in Fig. 11.

The control valve 163 is set at a relatively low pressure so that during the initial portion of the tilting of the stack collector 30 there is relatively little resistance by the cylinder 156 to impede 65 this movement. As the stack collector 30 approaches vertical position, however, the plunger of the cylinder 156 passes the port fitting 161 and the escape of fluid from in front of the piston is then controlled by the control valve 164 70 which is set at a relatively higher pressure than the valve 163. As a result the final movement of the stack collector 30 into vertical position is greatly retarded and the stack of boxes is delivered from the collector 30 to the conveyor 31 75

in a manner to facilitate the downward movement of the stack by gravity on the conveyor 31 until it gently comes into contact with the stop 172. As soon as the stack has rolled off of the rollers 148 of the stack collector 30 the latter is returned by the counterweights 151 to its original position, as shown in Fig. 8.

Pivotally mounted on the stack collector frame members 112 is a pair of arms 295 having counterweights 296 and stop plates 300 on opposite ends thereof. The arms 295 are normally held in the depressed position shown in Fig. 4 by pins 302 on the cross-bar 144 which contact pins 301 on the stop plates 300 as shown. When the stack collector 30 swings upwardly, as shown in Fig. 11, the arms 295 swing into contact with stop pins 303 provided on the frame members 112, and the stop plates 300 are raised to prevent the delivery of any box from the conveyor section 35 of this unit to the stack collector thereof until this stack collector returns to its proper position for receiving a box.

It is thus seen that by the time another box is ready to be delivered to the apparatus 25, the first box has passed the switch 260 and set the particular unit 26 to receive this box, which unit was designated upon the switch 262. Thus, when the next box is ready to be delivered to the apparatus 25, the operator merely sets the switch 262 to indicate the proper stacker unit to which the second box is desired to be delivered and feeds this box onto the advance conveyor section 180. A second box is then delivered to its proper unit in the same manner as hereinabove described for the first box. One of the distinct advantages of the control system 27 is that a timed interval elapses after the setting of the switch 262 and before the lifting of the stops 65, in the stacker unit designated, takes place. Thus, the preceding box has ample time to reach its particular stacker unit and be deflected therefrom prior to the setting of the stops of the stacker unit designated for the next following box.

While I have shown and described only a single embodiment of my invention, it is to be understood that various changes might be made in this without departing from the spirit of the invention or the scope of the appended claims.

What I claim is:

1. In combination: a conveyor having a section which is tiltable laterally; latch means for supporting said section in alignment with the balance of said conveyor; a stop in the path of a box as it arrives on said section, said stop disengaging said latch means, thus permitting said section to tilt laterally; means to receive said box from said section and direct it laterally; and means engaged by said box as it moves laterally to reposition said conveyor section.

2. In combination: a substantially horizontal runway for receiving a series of boxes one at a time at one end thereof; a stop at the opposite end of said runway; means for pivotally mounting said runway to permit the weight of said boxes to tilt said runway and deliver said boxes in the form of a stack; a latch for preventing the tilting of said runway during the accumulation of said row of boxes; and means in the path of said boxes travelling onto said runway and at the entrance end of said runway for releasing said runway from said latch as the last box moves into place on said runway, said releasing means being unresponsive to previous boxes travelling onto said runway to release said latch.

3. A combination as in claim 2 in which a conveyor is provided with a depressible section opposite the receiving end of said runway; a track beneath said depressible section and inclined towards said runway; means for releasing said section when a box is disposed thereon to permit said section to drop and deposit said box on said track, said box gravitating therefrom onto said runway; and means adapted to be engaged by a box travelling on said runway and actuated by said box as it thus travels off of said conveyor for restoring said section to its upward position.

4. In combination: an inclined runway for receiving a series of boxes one at a time at one end thereof; a stop at the opposite end of said runway; means for pivotally mounting said runway to permit the weight of said boxes to tilt said runway and deliver said boxes in the form of a stack; a latch for preventing the tilting of said runway during the accumulation of said row of boxes; means in the path of said boxes travelling onto said runway and at the entrance end of said runway for releasing said runway from said latch as the last box moves into place on said runway, said releasing means being unresponsive for releasing said latch to previous boxes travelling onto said runway; and means on said runway causing each of said boxes to gravitate along said runway until it comes in contact with said stop or with the box last previously delivered onto said runway.

5. A combination as in claim 4 in which a conveyor is provided with a depressible section opposite the receiving end of said runway; a track beneath said depressible section and inclined towards said runway; means for releasing said section when a box is disposed thereon to permit said section to drop and deposit said box on said track, said box gravitating therefrom onto said runway; and means adapted to be engaged by a box travelling on said runway and actuated by said box as it thus travels off of said conveyor for restoring said section to its upward position, said track and the adjacent end portion of said runway having a greater inclination from horizontal than the balance of said runway to hasten the delivery of said box from said track onto said runway.

6. A combination as in claim 2 in which a frame is provided for supporting said runway, the last mentioned means being provided on said frame.

7. A combination as in claim 2 in which a frame is provided for supporting said runway, the last mentioned means being provided on said frame, said means including a spaced pair of levers which are spaced apart a greater distance than the width of a single box.

8. In combination: a box collector having a substantially horizontal runway for receiving a horizontal series of boxes discharged onto said runway from one end thereof; a roller stop on said collector at the opposite end of said runway, said stop being positioned to engage the near side of the first box of said series; a supporting frame on which said collector is pivotally mounted to permit said collector to be rocked by the weight of said series of boxes to swing said series of boxes into a position tilted away from said collector while still in contact with said collector; means for checking the rotation of said collector, as said series approaches said position, to bring said series of boxes gradually to a stop in said position; and a gravity roller conveyor inclined slightly downwardly away from said collector, said conveyor being disposed beneath said collector at such a level that when said series of

boxes is rocked into said tilted position, the weight of said series rests directly on and is supported by said conveyor, whereupon said series of boxes, in the form of a stack, rolls by gravity down said conveyor and away from and over said stop roller.

9. A combination as in claim 8 having means for increasing the force of retardation applied to said collector just before the rotation of the latter has brought said series of boxes into the tilted position set forth in said claim.

10. A combination as in claim 8 in which said gravity roller conveyor is provided with rollers overlapping each other to substantially increase the smoothness of transfer of said series of boxes from said collector to said conveyor.

11. A combination as in claim 8 in which said stop roller engages a side face of said initial box above the center of gravity of said box when the latter is fed along said runway into contact with said stop roller.

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