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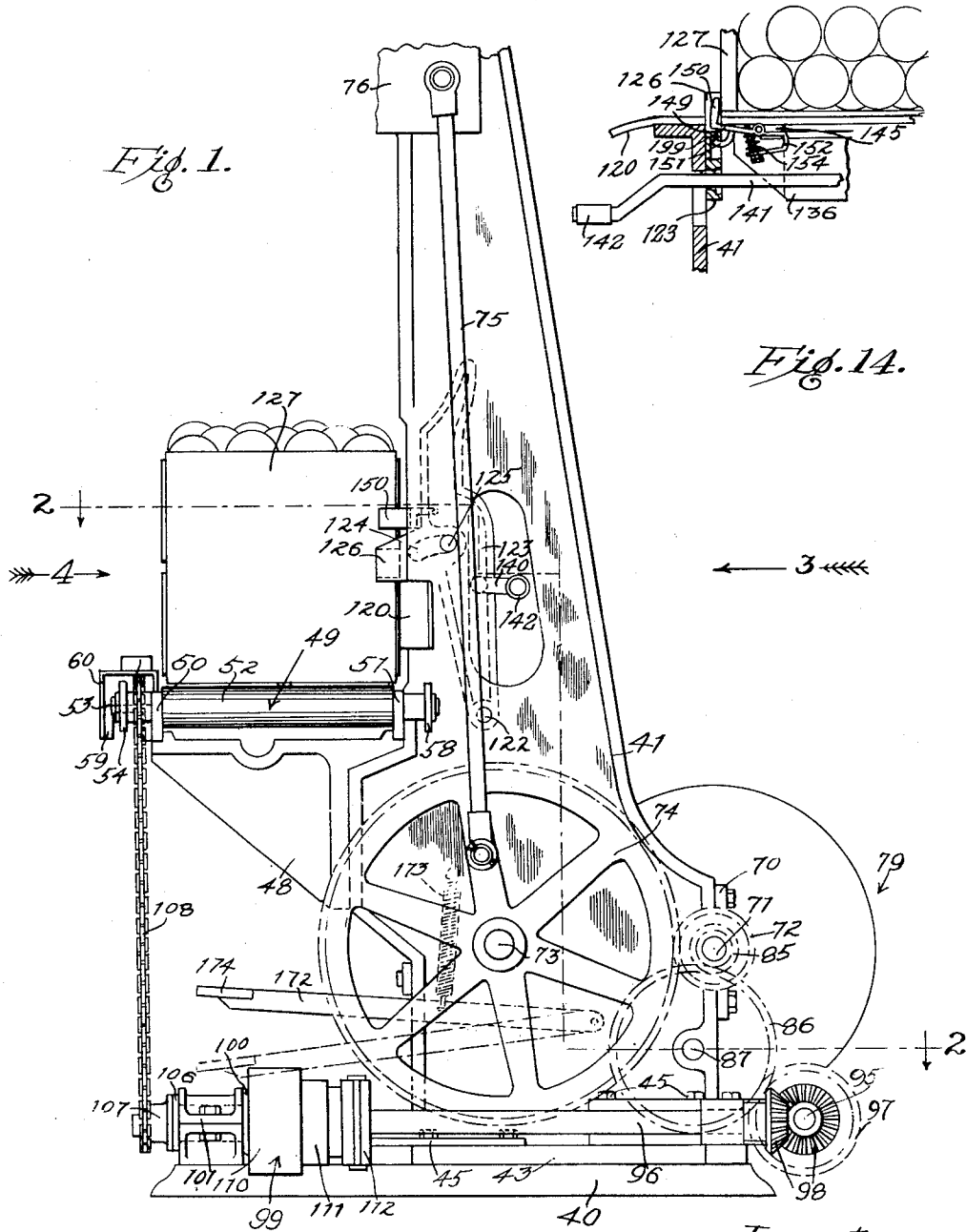
D. E. KEECH ET AL

1,939,985

FEED MECHANISM

Filed Jan. 28, 1930

4 Sheets-Sheet 1



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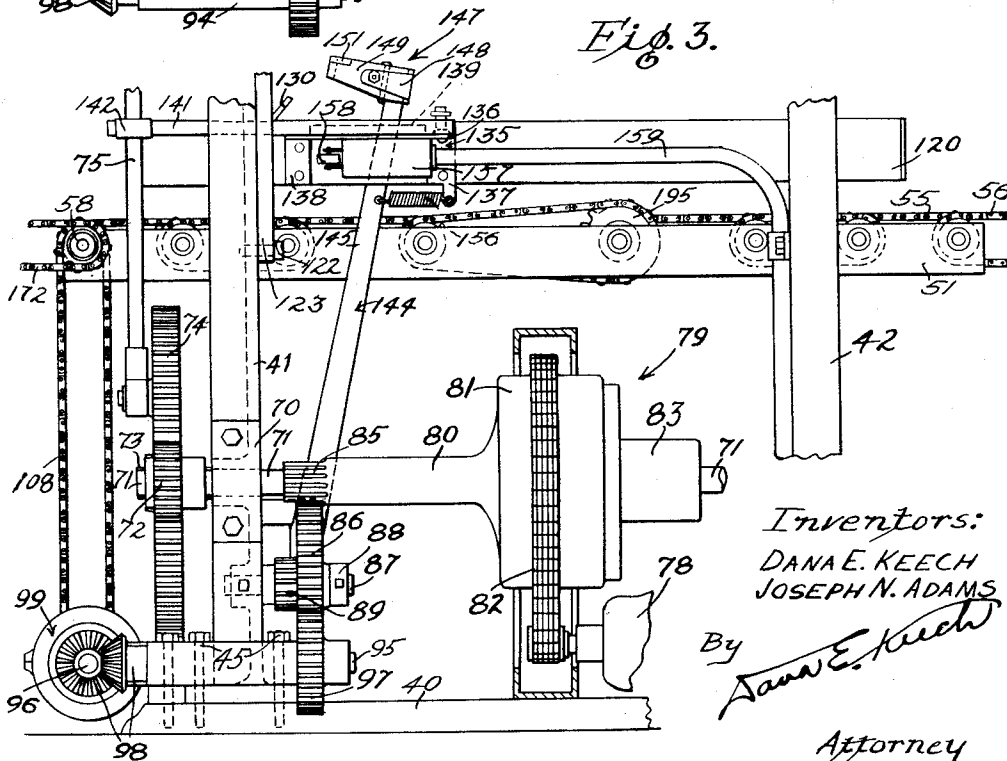
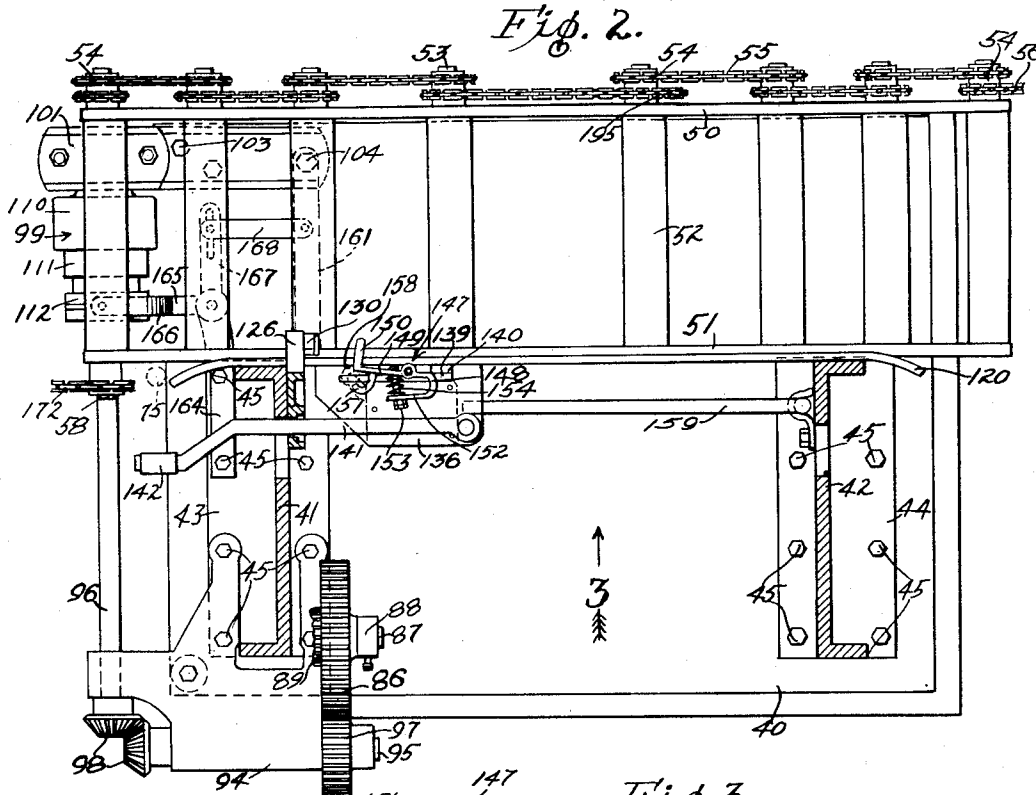
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FEED MECHANISM

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4 Sheets-Sheet 2



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4 Sheets-Sheet 4

Fig. 6.

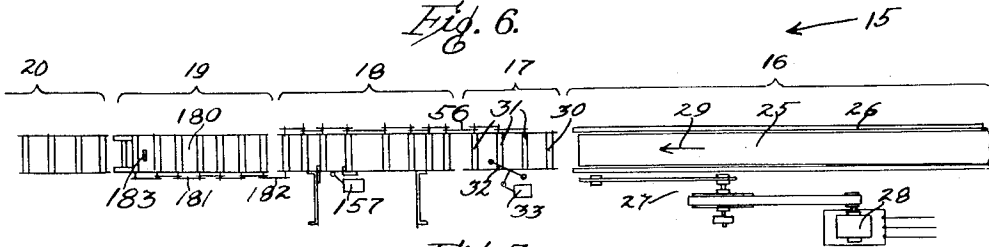


Fig. 7.

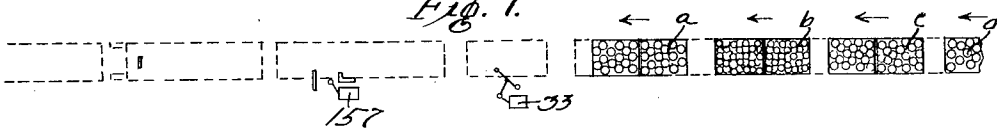


Fig. 8.

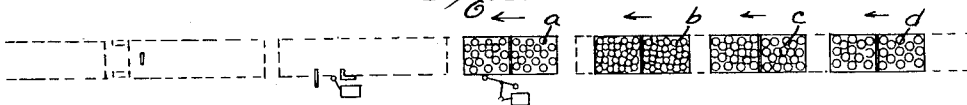


Fig. 9.

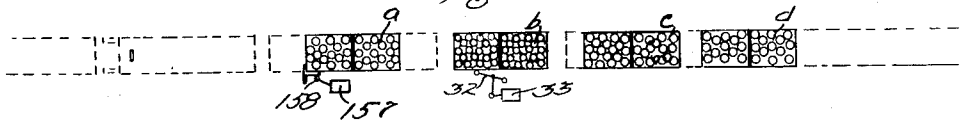


Fig. 10.

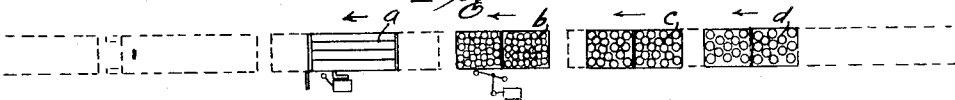


Fig. 11.

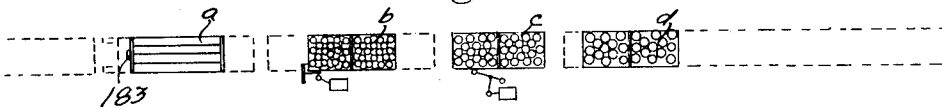


Fig. 12.

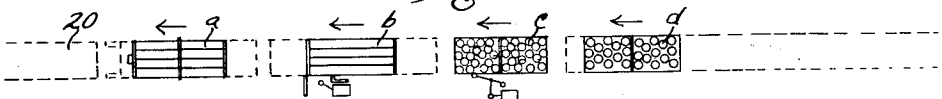
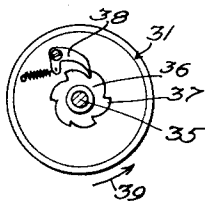


Fig. 13.



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1,939,985

FEED MECHANISM

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Application January 28, 1930. Serial No. 424,087

1 Claim. (Cl. 1—10)

Our invention relates to article handling apparatus and more particularly to mechanism for feeding boxes to a lidder or other processing device.

5 While useful with suitable modification in many industries, we will describe our invention with particular reference to its utility in the citrus industry. In citrus packing houses the fruit is packed in shipping cases by hand and the packed
10 boxes are collected on a horizontal conveyer system and delivered to a single point where they are lidded.

In houses of any size, it is customary to have the packed boxes lidded and strapped by automatic machinery. Several types of machines are available for this purpose, and their construction is well known in the art. For the purpose of illustration, our invention will herein be shown as associated with a Parker automatic lidder and a
20 Parker automatic strapper.

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

25 Fig. 1 is a diagrammatic side elevational view of a Parker automatic lidder incorporated in the preferred embodiment of our invention illustrated herein.

Fig. 2 is a horizontal sectional view taken on
30 the line 2—2 of Fig. 1.

Fig. 3 is a rear elevational view taken in the direction of the arrow 3 in Figs. 1 and 2.

Fig. 4 is a front elevational view taken in the direction of the arrow 4 in Fig. 1.

35 Fig. 5 is a wiring diagram of the electric circuits of our invention.

Fig. 6 is a diagrammatic plan view of the conveyers utilized in our invention.

40 Figs. 7 to 12 inclusive are diagrammatic plan views of the conveyers shown in Fig. 6 illustrating the operation of our invention.

Fig. 13 is an assembly of a conveyer roll, and

Fig. 14 is a view showing a box in nailing position.

45 At the present time, it is customary to operate said lidder and strapper simultaneously by kicking a single foot pedal so that as each box is lidded a strap is applied to the box immediately preceding it. Movement of the boxes through
50 the lidder and strapper however is still accomplished manually.

It is an object of our invention to speed up the operation of an automatic lidder and/or any similar machine by automatically feeding boxes
55 thereto and/or therefrom.

Referring specifically to the drawings and particularly to Fig. 6, a preferred embodiment 15 of the feed mechanism of our invention includes a packed box conveyer 16, a receiving conveyer 17,
60 a Parker automatic lidder 18, a Parker automatic

strapper 19, and a discharge conveyer 20. As will become clear in the description to follow, certain drive and control mechanism is included with the above-mentioned elements to complete our invention.

The packed box conveyer 16 is preferably a horizontal conveyer having a belt 25 mounted upon a suitable frame 26 driven through a transmission 27 by a prime mover such as an electric motor 28. When the motor 28 is energized the
70 belt 25 is caused to move in the direction of the arrow 29.

The receiving conveyer 17 is a roller conveyer including an idle roller 30 and power driven rollers 31, the latter being actuated by chains in a
75 manner which will become evident later. Pivotaly mounted alongside and extending over the conveyer 17 is an arm 32 which is normally held by springs (not shown) in the position in which it is shown in Fig. 6 but which is positioned to be
80 contacted by a box moving on the conveyer 17 so that the arm 32 will actuate an electric switch 33 to which it is connected.

Referring to Fig. 13, each of the rollers 31 is power driven by a shaft 35 which are connected
85 by suitable sprockets and chains as indicated. On each shaft 35 is mounted one or more ratchet wheels 36, the teeth 37 of each of which are engaged by a spring-pressed pawl 38. Thus, rotation of the shafts 35 in the direction of the arrow
90 39 will cause a corresponding rotation of the rollers 31, whereas if the shaft 35 is dead an easy rotation of the rollers 31 in the direction of the arrow is made possible by the dog 38 riding over the teeth 37. The purpose of this mechanism will be
95 come evident further on in this description.

The Parker automatic lidder 18 is only illustrated diagrammatically in the drawings because its construction is well known in the art. It is the design in general use in the California citrus
100 industry and is very similar in construction to the embodiment illustrated in the patent to George D. Parker, 1,576,213, issued March 9, 1926.

Specifically, the Parker lidder 18 includes a base
105 40 having standards 41 and 42, the latter having foot plates 43 and 44 which are secured to the base 40, as shown, by means of cap screws 45. Supported on suitable arms extending forwardly from the standards 41 and 42 are heavy brackets 48 which support a roller conveyer section 49 having
110 side bars 50 and 51 between which are mounted a series of rotatable rollers 52. Shafts 53 on which the rollers 52 are mounted extend forwardly beyond the bar 50 and have secured thereto double sprockets 54 which are connected by suitable
115 chains 55 as shown in Figs. 2 and 4. The rightwardmost sprocket 54 is connected by a chain 56 to the receiving conveyer 17 so as to drive the rollers 31 thereof. The rollers 52 and 31 are driven by the leftwardmost sprocket 54 in a man- 120

ner to be described later. The shaft 53 upon which the leftwardmost drive sprocket is mounted extends rearwardly beyond the frame bar 51 and has secured thereon a sprocket 58 for a purpose to be described later. Secured to brackets 59 provided upon the conveyer frame bar 50 is a housing 60 which covers the sprockets 54 and the chains 55. The housing 60 is removed in Figs. 2, 3 and 4 to reveal these parts.

Journalled in bearings 70 provided upon rear portions of the standards 41 and 42 is a shaft 71 on the ends of which are mounted pinions 72. Also journalled in bearings provided on the standards 41 and 42 is a shaft 73 on the outer ends of which are mounted gears 74. Each of the gears 74 is connected by a pitman 75 to a nailing head 76 which is slidably mounted on upper ends of the standards 41 and 42, in the well known manner, so that when the gears 74 are given a single rotation the nailing head 76 is moved downwardly and upwardly to accomplish the nailing of a lid onto a box supported upon the lidder conveyer 49. Rotation of the gears 74 is accomplished by the pinions 72 which mesh with these gears. Power is transmitted to the pinions 72 from a motor 78 through a clutch 79 mounted upon the shaft 71. Rotatably disposed on the shaft 71 is a clutch drum sleeve 80 having a drum 81 the periphery of which is provided with a ring sprocket which is driven by the motor 78 through a silent chain 82. Fixed to the shaft 71 is an internal expanding clutch element 83 which is provided with suitable control mechanism whereby the clutch 79 may be engaged continuously only for such a time as will accomplish a single rotation of the gears 74.

The clutch drum 81 is rotated continuously, the hub sleeve 80 being fluted at its end to provide a pinion 85. Meshed with the pinion 85 is a gear 86 which is mounted upon a stationary stub shaft 87 provided upon the standard 41, the gear being retained in place by a collar 88. The gear 86 is provided with a pinion 89 which engages with another gear (not shown) of a gear train the purpose of which is to actuate the nail stripper in supplying nails to the nailing head 76.

Mounted upon the foot plate 43 is a block 94 which is secured in place by certain of the cap screws 45 which extend therethrough. As clearly shown in Figs. 2 and 3, the block 94 has bearings for suitably supporting two shafts 95 and 96. One end of the shaft 96 is provided with a pinion 97 which meshes with the gear 86. The other end of the shaft 95 is rotatably connected to an adjacent end of the shaft 96 by mitre gears 98. The shaft 96 extends forward and passes through a clutch 99 the drum hub 100 of which is journalled in a suitable bearing 101 which is secured by cap screws 103 and 104 to the lidder base plate 40. The hub 100 is provided with an end flange 106 to which is secured a drive sprocket 107 connected by a chain 108 to the left drum sprocket 54 of the lidder conveyer 49. The clutch drum hub 100 and a drum 110 provided thereon are rotatable upon the shaft 96 and are adapted to be connected thereto by a clutch expansion element 111 which is fixed to the shaft 96. The clutch 99 is normally engaged and may be released by moving a clutch ring 112 in a forward direction.

Secured upon the forward faces of the standards 41 and 42 just above the lidder conveyer 49 is a guide plate 120. Pivottally mounted on a cap screw 122 screwed into the inner face of the standard 41 is a box stop member 123 the outline of which is clearly shown in Fig. 1.

This member has a slot 124 through which extends a cap screw 125 which permits a limited rotation to the member 123 about the cap screw 122. The weight of the member 123 normally retains it in forward position so that a nose 126 thereof extends into the path of any box 127 which might be carried on the conveyer 49 as shown in Fig. 1. Pivottally mounted in the nose 126 is a finger 130 which by gravity normally assumes a position as shown in Figs. 2, 3 and 4. Thus when a box travelling on the conveyer 49 engages the nose 126 it forces the finger 130 into a cavity 131 provided therefor in the nose 126. When the stop member 123 is rotated about the cap screw 122 so as to withdraw the nose 126 from contact with the box 127 the finger 130 drops from the cavity 131 and thereafter when the member 123 is released it is stopped from falling into the path of the box 127 by engagement of the finger 130 with the rear side of the box. Secured in any suitable manner upon the rear face of the guide plate 120 is a control bracket 135. This bracket has a horizontal plate 136 upon which are formed vertical feet 137 and 138 which are secured to the plate 120. At the inner middle portion of the plate 136 an upturned flange 139 is formed, a clutch control arm slideway 140 being formed between the flange 139 and the guide plate 120.

Pivoted upon the plate 136, as shown, is a rod 141 which extends through a suitable opening in the stop member 123 and is bent to bring its free end into a desirable position, this end carrying a roller 142 for a purpose to be made clear later.

Secured upon a forward face of the standard 41 beneath the conveyer 49 is a control lever support 143 upon which a clutch control lever 144 is pivottally mounted as shown in Fig. 4. The lever 144 has an upper arm 145 and a lower arm 146. The arm 145 extends upwardly through the control arm slideway 140 and has provided upon its extremity a box engaging head 147. The head 147 includes a base plate 148 which is secured as by rivets to the arm 145 and to one side of which is hinged a plate 149 having a box dog 150 extending therefrom into the path of a box 127 carried on the conveyer 49. Also provided on the plate 149 extending rearwardly therefrom is a release hook 151. The base plate 148 has a portion thereof bent to form a spring arm 152. Extending through the plate 149 and the arm 152 is a bolt 153 which limits the forward movement of the plate 149. Disposed about the bolt 153 is a compression spring 154 which yieldably maintains the plate 149 in its forward position. With its opposite ends attached to the upper lever arm 145 and to the extension of the bracket attached arm 137, is a tension spring 156 which yieldably holds the arm 145 in the retracted position in which it is shown in Figs. 2, 3 and 4.

Secured to the lower face of the plate 136 is a switch 157 having an actuating roller 158 and conductors which are lead therefrom in a conduit 159.

The roller 158 is spring-urged into the path of the lever arm 145. When this arm is moved to the extreme left end of the slideway 140, as this is shown in Figs. 2 and 3, it engages the roller 158 and opens the switch 157, the effect of which will be made evident later on.

The lower arm 146 is connected by a loose shackle 160 to the inner end of a horizontal lever

161 the opposite end of which is fixed pivotally to the bearing 101 by the cap screw 104.

Secured beneath two of the cap screws 45 as shown in Fig. 2 is a horizontal bar 164 on the front end of which is pivotally mounted a bell crank 165 having a yoke 166, which connects to the clutch ring 112, and an arm 167 which is connected by a link 168 to the lever 161. It is thus seen that when a box moving on the conveyer 49 contacts the box dog 150 the lever 144 is swung so that by the time the box engages the box stop 126 as shown in Fig. 14, the lower lever arm 146 has, through the toggle 160, moved the lever 161 so as to rotate the bell crank 165 and disengage the clutch 99.

The lower lever arm 146 is provided with a foot-operated mechanism 169 for actuating the lever 144 to give the same effect as if this lever arm had been actuated by a box 127 moving on the conveyer 149. The mechanism 169 includes a cam face 170 provided on the lever arm 146 so as to terminate at its lower end in a stop lug 171. Pivotally mounted on the inner face of the standard 41 is a foot lever 172 which is yieldably supported by a tension spring 173 and which normally rests against a lower face of the bar 143 adjacent to the upper end of the cam face 170. The front end of the lever 172 is provided with a pedal 174 by which the ladder operator may press the lever 172 against the cam face 170 and swing the lever 144 to where the lever head 147 will be disposed as shown in Fig. 14. Although other releasing means may be provided for the lever 172 this lever may be released, in the embodiment illustrated, by a slight upward pressure on the pedal 174 by the foot of the operator.

Referring again to Fig. 6, the box strapper 19 may be any box strapper through which a lidded box is conveyed for the purpose of strapping it, but is preferably a Parker strapper as illustrated by the patent to George D. Parker, 1,715,780, issued June 4, 1929. This strapper has a roller conveyer 180 on which boxes are conveyed into and from the strapper. In our invention provision is made for driving the rolls of the conveyer 180 positively by means of a chain mechanism 181 which is actuated by a chain 182 connecting this mechanism to the sprocket 58 of the ladder 18. Thus, when the clutch 99 of the ladder 18 is engaged so as to actuate the conveyer 49 thereof and the conveyer 17 preceding this conveyer, the conveyer 180 of the strapper 19 is also actuated through the chain 182. The strapper 19 is provided with a stop 183 which halts a box moving on the conveyer 180 in position for being strapped and is preferably automatically disengaged upon the strapping operation being completed.

The conveyer 20 is an automatic gravity or power conveyer adapted to receive lidded and strapped boxes from the strapper 19 and convey these to cars or to storage.

Referring to Fig. 5, the motor 28 which drives the packed box conveyer 16 is seen to be fed with electricity by certain wires 190, the current through which is controlled by a magnetic switch 191. This switch is any of the usual types used for this purpose and is controlled by the making or breaking of a circuit 192 which includes a master switch 193 and the aforementioned switches 33 and 157. The switches 33 and 157 are in parallel in the circuit 192 so that with the master switch 193 closed both of the switches 33 and 157 have to be disengaged in order to

break the circuit 192 and shut off the supply of current to the motor 28 through the wires 190. Likewise, when the circuit 192 is broken by opening both of the switches 33 and 157 and the motor 28 de-energized as a result thereof, and if either one of the switches 33 and 157 is closed, this re-establishes the circuit 192 and causes current to flow to the motor 28 through the wires 190 which results in resumption of movement of the conveyer 17. The master switch 193 is for closing the circuit 192 when either of the switches 33 or 157 are closed.

Operation

Referring particularly to Figs. 6 and 12, it is noted that in commencing operations the master switch 193 is closed, thus causing movement of the packed box conveyer 16 to begin. Also the switches are actuated which start the motors of the ladder 18 and the strapper 19. When the motor 78 of the ladder 18 is running the shaft 96 is constantly rotating and, with the lever 145 in its inactive position as shown in Figs. 2, 3 and 4, the clutch 99 is engaged so that the conveyer 49 of the ladder, the receiving conveyer 17 on one end thereof, and the strapper conveyer 180 on the other end thereof, are all driven through this clutch.

It is preferable that certain rollers of these three conveyers rotate faster than the others. This is accomplished by using sprockets 54 of different diameter as shown. To begin with, the driven rolls 31 of the receiving conveyer 17 are rotated so as to propel the box thereon at a higher rate of speed than the boxes are carried on the packed box conveyer 16. The three rollers 52 nearest the right hand end of the ladder 18 are driven at the same speed as the rollers 31. The remaining rollers 51 of the ladder 18 and the rollers of the strapper 19 are driven so as to propel a box carried thereon at a still higher rate of speed.

This difference in speed of these rollers is accomplished by employing on one of the roller shafts 53 as shown in Fig. 4 a double sprocket having an inner sprocket 195 which is of greater diameter than the sprockets of the other double sprockets 54.

With the apparatus in motion as above set forth, packed boxes of fruit begin to arrive on the packed box conveyer 16. In practically all instances the packed boxes are carried around a turn in the packed box conveyer system before reaching the portion of the packed box conveyer 16 illustrated in Fig. 6. By this turn these boxes are spaced a short distance as shown in Fig. 7. Here a series of four boxes 127 are shown, these being designated as boxes *a*, *b*, *c* and *d*. In Figs. 7 to 12, arrows placed alongside these boxes will indicate that they are in motion while the absence of such arrows will indicate that the boxes are stationary. In Fig. 7 boxes *a*, *b*, *c*, and *d* are all travelling upon the packed box conveyer 16. In Fig. 8 the leading box *a* has passed on to the receiving conveyer 17 and opened the switch 33 through its actuating arm 32. The switch 157 being closed, however, the circuit 192 is unbroken and the packed box conveyer 16 continues to be driven by the motor 28. Feeding of the boxes from their positions as indicated in Fig. 8 to their positions as indicated in Fig. 9 is therefore continued. It will be seen in Fig. 8, however, that owing to the greater speed of the rollers 31 the box *a* is beginning to draw away from box *b*. As box *a* moves into the ladder 18 it contacts the

box dog 150 and swings the lever 144 so as to disengage the clutch 99 just as the box moves into engagement with the stop 126. With the disengaging of the clutch 99 the receiving conveyer 17 and the conveyers of the lidder 18 and the strapper 19 are all stopped.

As this is accomplished the upper lever arm 146 engages the switch wheel 158 and opens switch 157. At the same time box *b* has engaged the arm 32 so as to open the switch 33. Both switches 157 and 33 being thus open, the conveyer 16 is stopped. The situation at this time is illustrated in Fig. 9.

Obviously, if the box *b* has not been following the box *a* as to be already in contact with the arm 32 at the time box *a* actuated switch 157, the electrical control circuit 192 would have remained unbroken and the conveyer 16 continued in operation after the halting of the box *a* and the stopping of the receiving conveyer and the lidder and strapper conveyers, until box *b* had arrived at the position in which it is shown in Fig. 9.

With the box *a* in its position as shown in Fig. 9, the lidder operator places a lid over the box and by the use of suitable cover pressing mechanism (not shown) this lid is forced downward into proper lidding position. A trip mechanism for the clutch 79 (not shown) is now actuated by the operator so as to nail the lid onto box *a*. As the pitman 75, shown in Figs. 1 and 3, is carried around by its gear 74 it contacts the roller 142 and swings the rod 141 about its pivoted end so as to swing the stop member 123 rearwardly, withdrawing its stop nose 126 from the path of box *a*. At the beginning of this nailing action the stop member 123 and the clutch control lever head 147 are positioned as shown in Fig. 14. The hook 151 is here seen to extend behind a border flange 199 of the stop member 123. Thus, when the stop member is withdrawn from in front of box *a* the box dog 150 is withdrawn with it, thus permitting the spring 156 to swing the lever arm 144 back to its normal position as shown in Figs. 2, 3 and 4. This movement throws in the clutch 99, closes the switch 157 and thereby starts all the conveyers into motion.

As previously mentioned, the driven rollers now directly under box *a* and all those located to the leftward in the lidder 18 and strapper 19 are driven at a higher rate than those to the right of box *a*. This is for the purpose of moving box *a* a greater distance as it progresses to the strapper 19 than the distance which the box *b* is moved in bringing it from the receiving conveyer 17 into the lidder 18. This is necessary on account of the present construction of available strappers, but is not essential to the operation of our invention, as strappers can easily be modified so that the strapping position in the strapper 19 will be located considerably closer to the lidder than is indicated in Figs. 6 to 12.

Fig. 10 illustrates the situation last described above in which the lidding of box *a* is completed and all the conveyers are again started. A movement of all the boxes into the positions in which they are shown in Fig. 11 is thus accomplished, box *a* being stopped by the stop 183 of the strapper 19 just before box *b* comes into the proper position shown for lidding, thereby stopping the receiving conveyer, the lidder and strapper conveyers and, in conjunction with box *c*, stopping the conveyer 16.

The control mechanisms of the lidder and strapper are preferably combined so that each

time a box is lidded on the lidder the strapper 19 is caused to apply a strap to the box immediately in advance of the box lidded. The completion of this double function is illustrated in Fig. 12 where the control mechanism is again actuated so as to start all the conveyers and move box *a* off the strapper onto the discharge conveyer 20 and progress the other boxes in a similar manner to that previously described.

In some circumstances it might be necessary to provide for boxes being delivered on the conveyer 16 without being spaced, in other words, abutting against each other. The layout shown would handle this condition provided the strapper were to be moved closer to the lidder so that in moving from the lidder to the strapper the box would not have to move much farther than the minimum distance separating two boxes on the lidder 18 and the receiving conveyer 17.

In the lidding and strapping of boxes it sometimes happens that the lid is broken in the process of lidding, or fruit in the box is crushed so as to require the lid to be slightly lifted and the crushed fruit replaced with good fruit. Under such circumstances it is desirable to retain the box just lidded on the lidder conveyer 49 until a new lid can be nailed onto the box or other attention given to the box to properly prepare it for shipment. The operator generally becomes aware of such a condition just as the lidding of the box is completed and, when using our invention, he thereupon depresses the lever 172 with his foot so as to throw out the clutch 99 and open the switch 157. This causes the receiving conveyer and the lidder and strapper conveyers to be halted and insures that the conveyer 16 will be stopped as soon as a box opens the switch 33. The operator is thus given complete control of the apparatus and the ability to stop it at will in case of emergency. As before mentioned, automatic operation of the entire conveyer system can be re-established by lifting the lever 172 into its upward position shown in Fig. 1.

It is thus seen that we have provided an automatic mechanism for feeding boxes into and through a lidder and strapper so that the operator's time and energy will not be consumed in drawing boxes into the lidder or in pushing these from the lidder and through the strapper. Thus, the capacity of a single lidder and strapper and operator will be greatly increased and the work made much easier on the operator.

What we claim is:

In combination: a power conveyor for delivering packed boxes to a work station disposed over said conveyor; a member disposed close to said station and adapted to be engaged by a box arriving at said station and moved in the direction of travel of said conveyor; means actuated by said member, when thus moved, to stop said conveyor substantially as said box arrives at said station; means urging said member into said path; means urging said member in the opposite direction to that of said conveyor to a position permitting said conveyor to travel; means to secure a cover to said box at said work station; and means actuated by said cover securing means to withdraw said member from said path incidental to a cover securing operation, thereby permitting said second urging means to return said member to said position.

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