

July 13, 1926.

H. A. HOUSE

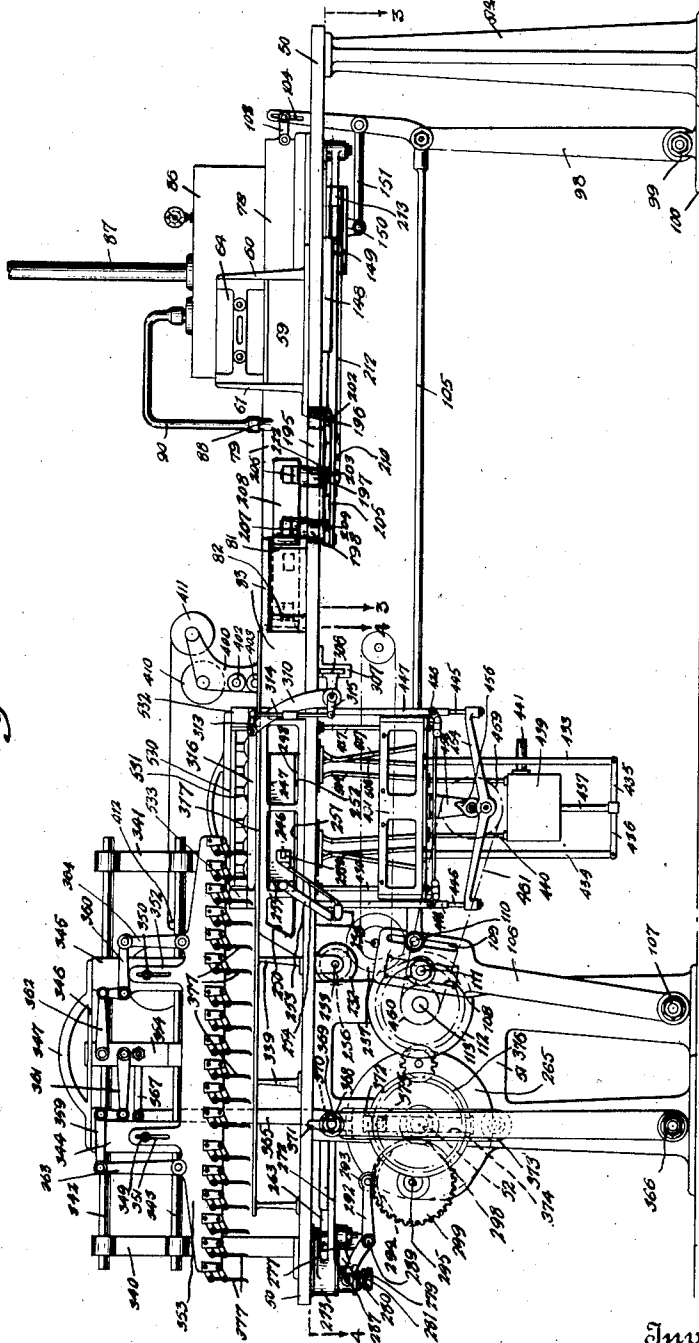
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METHOD OF PACKING AND IN PACKING MACHINE

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Fig. 1.



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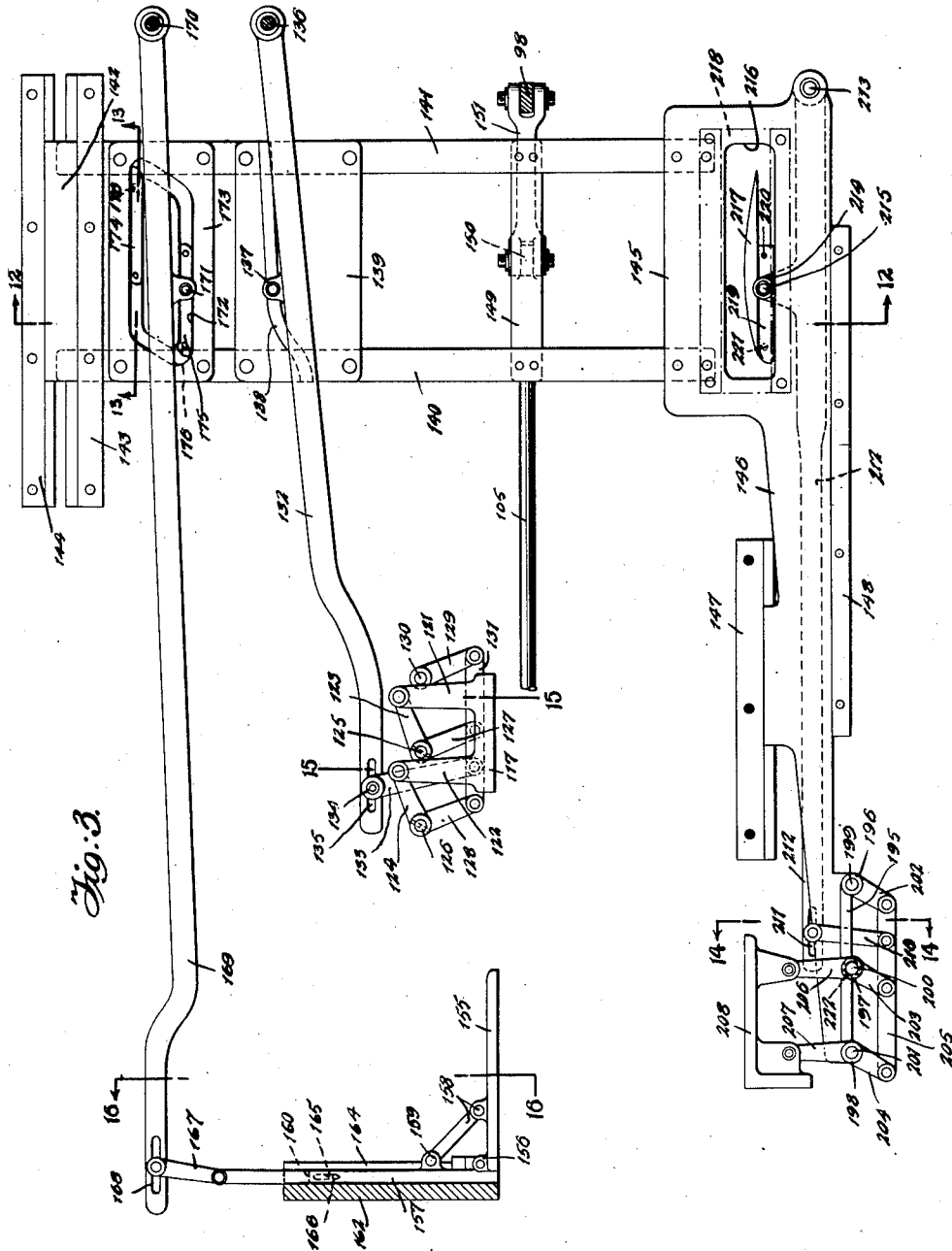


Fig. 3.

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Filed Sept. 13, 1921

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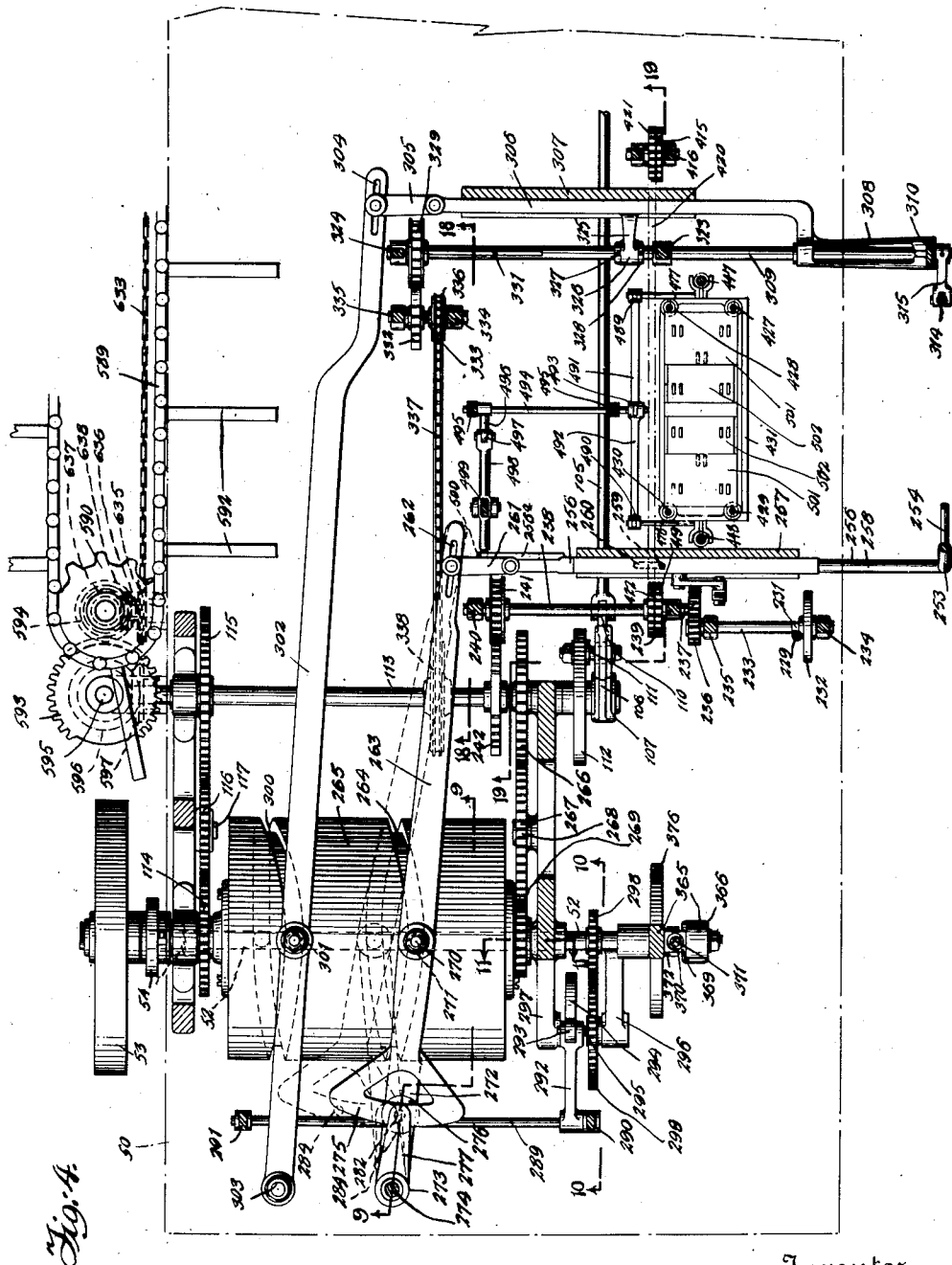


Fig. 4.

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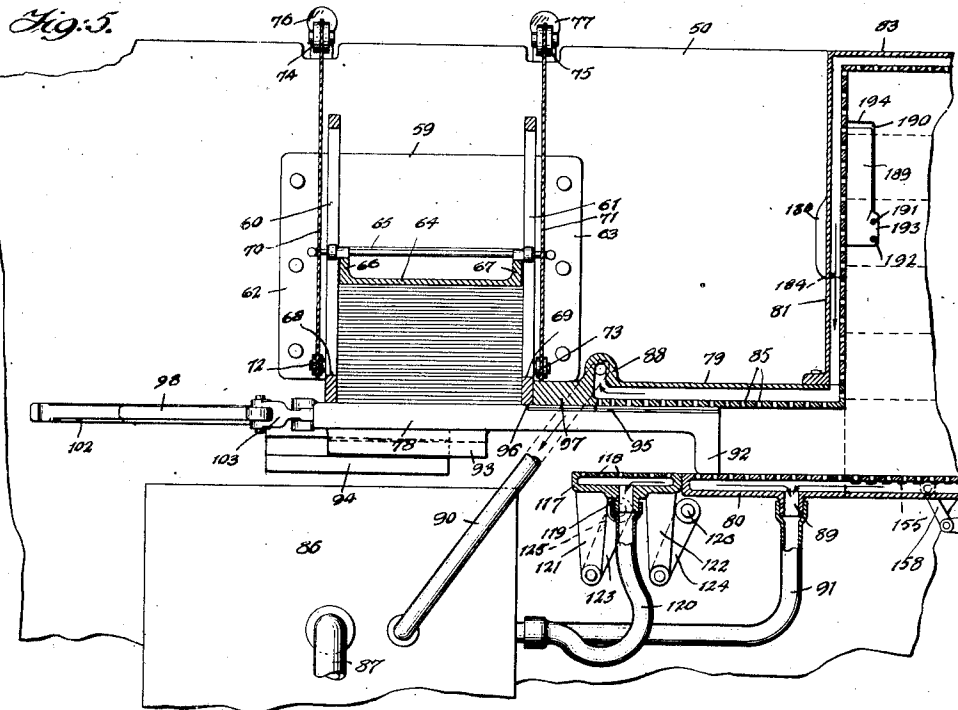
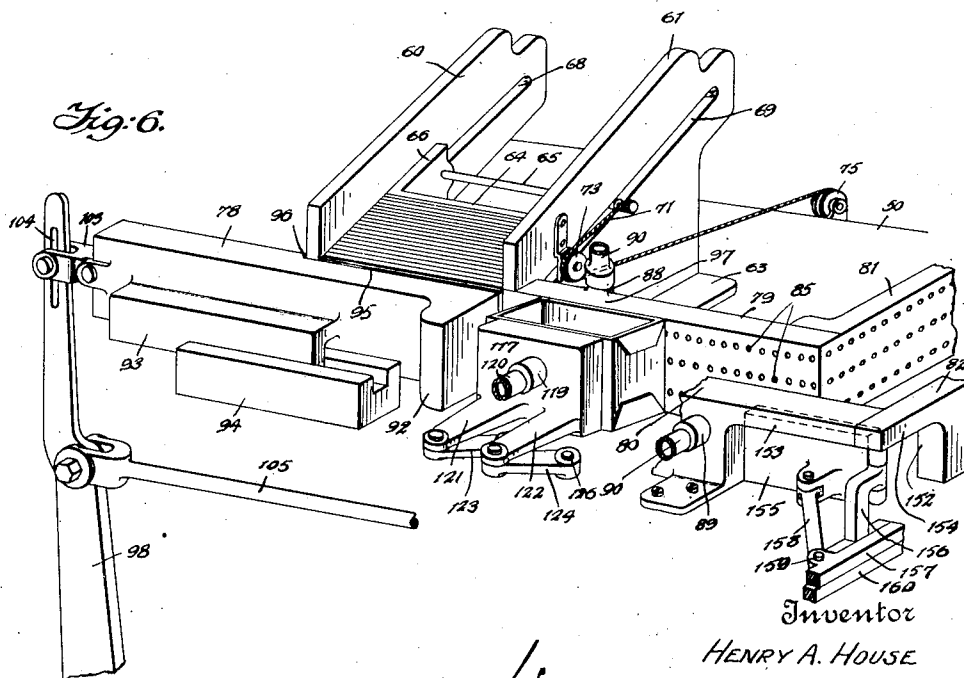
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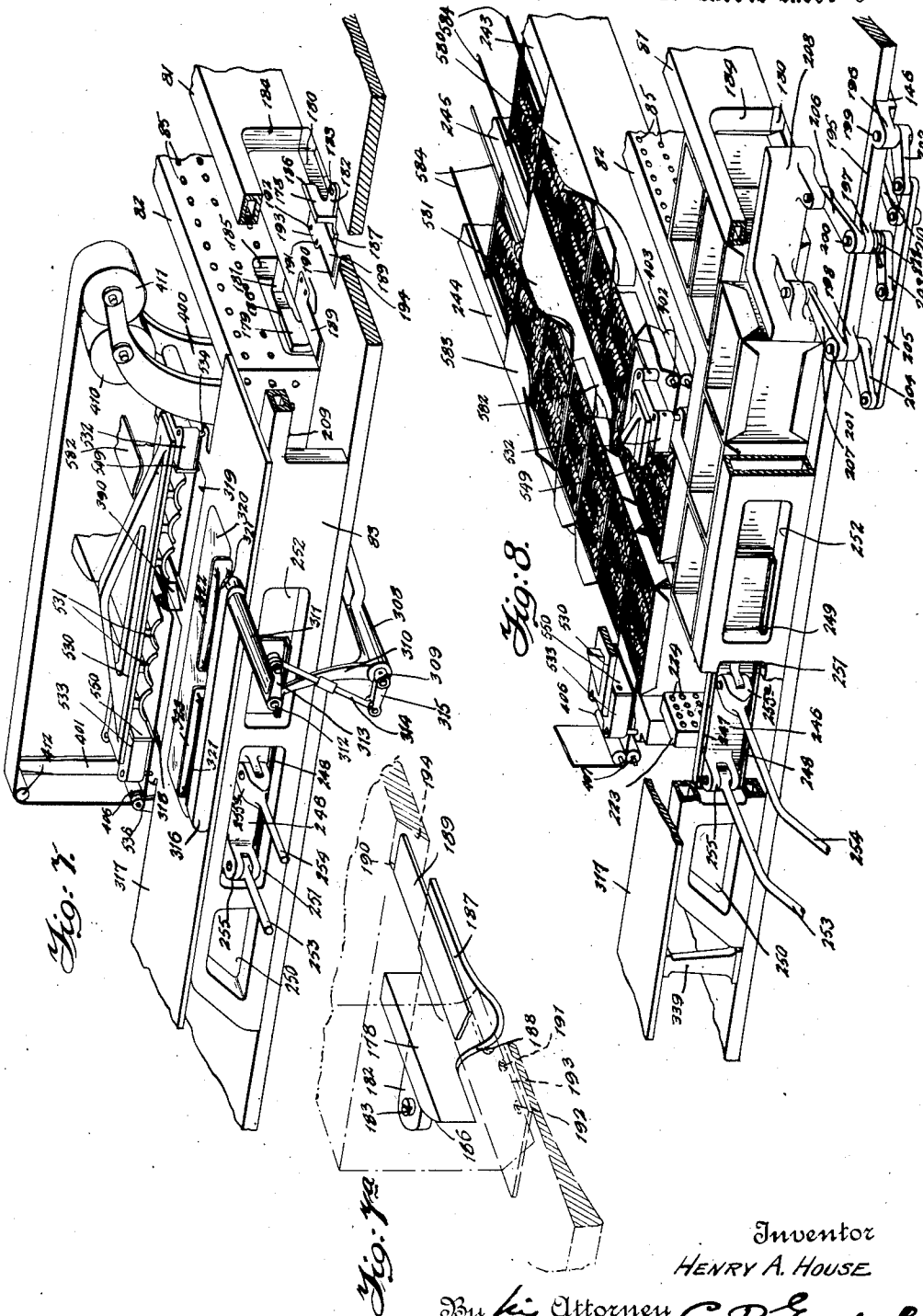
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Fig. 9.

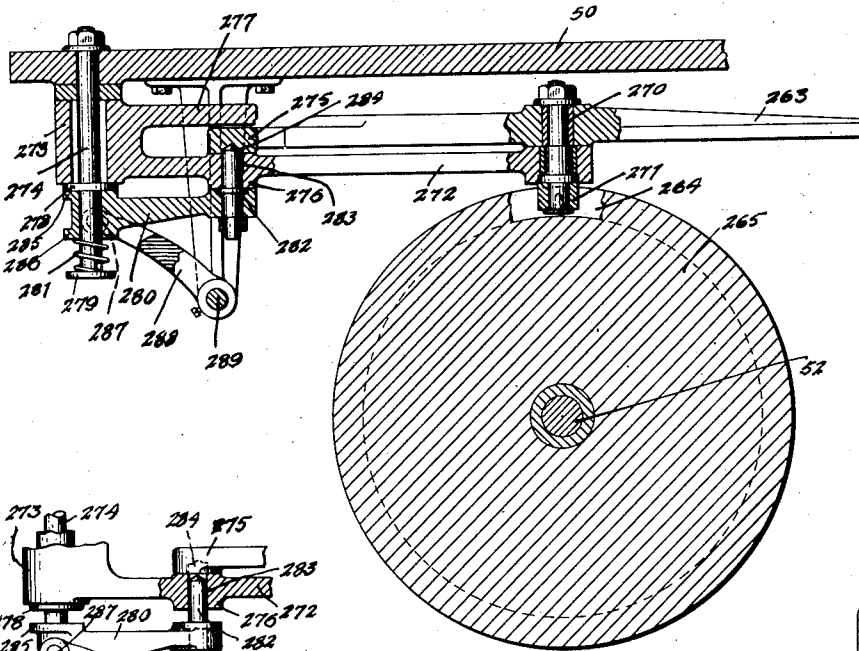
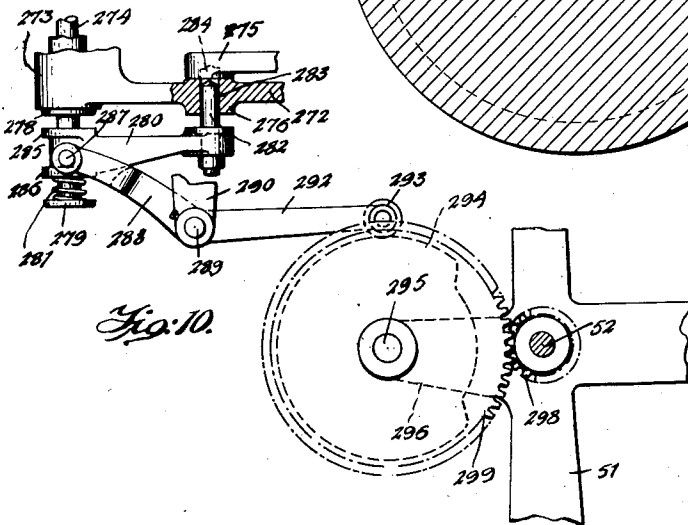
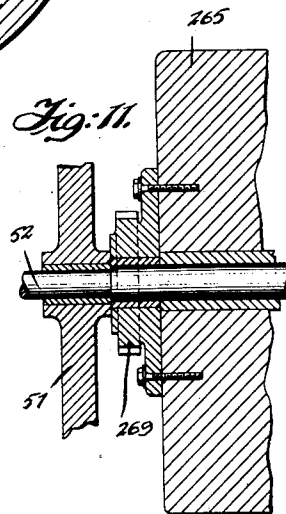


Fig. 10.

Fig. 11.



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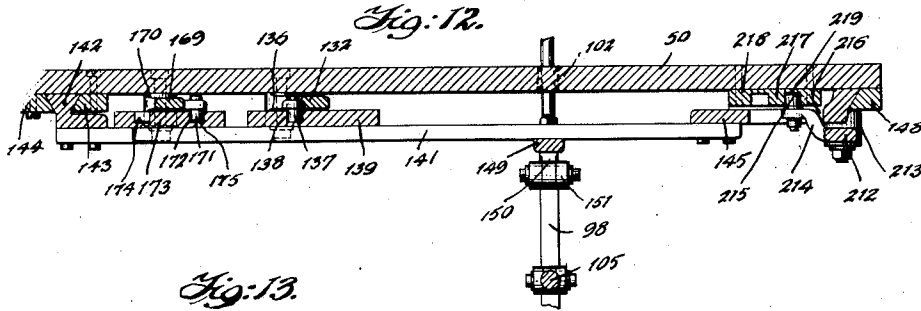
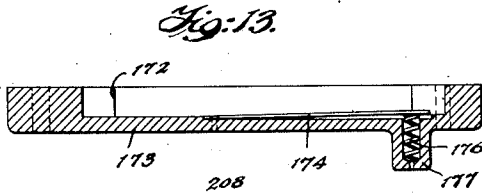
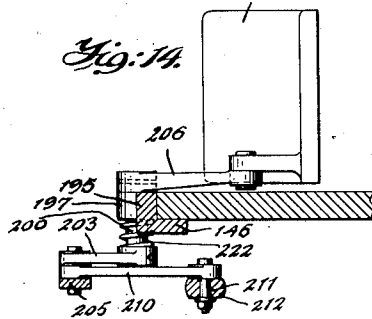
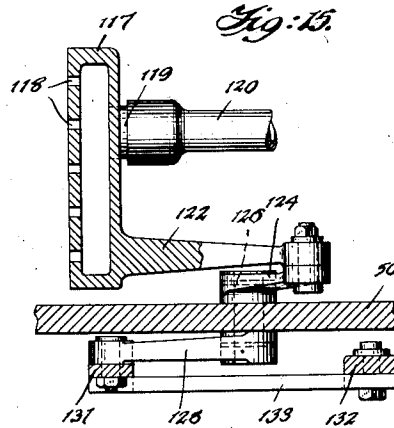
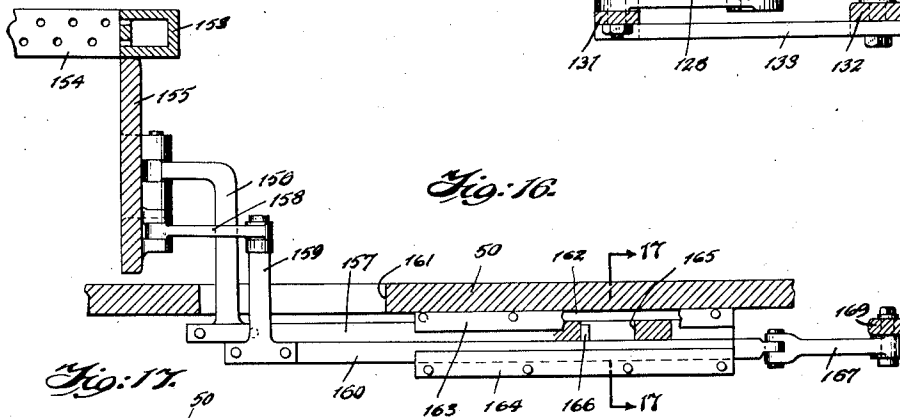
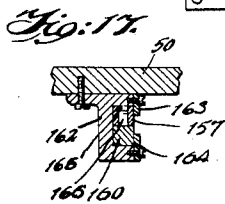
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Filed Sept. 13, 1921

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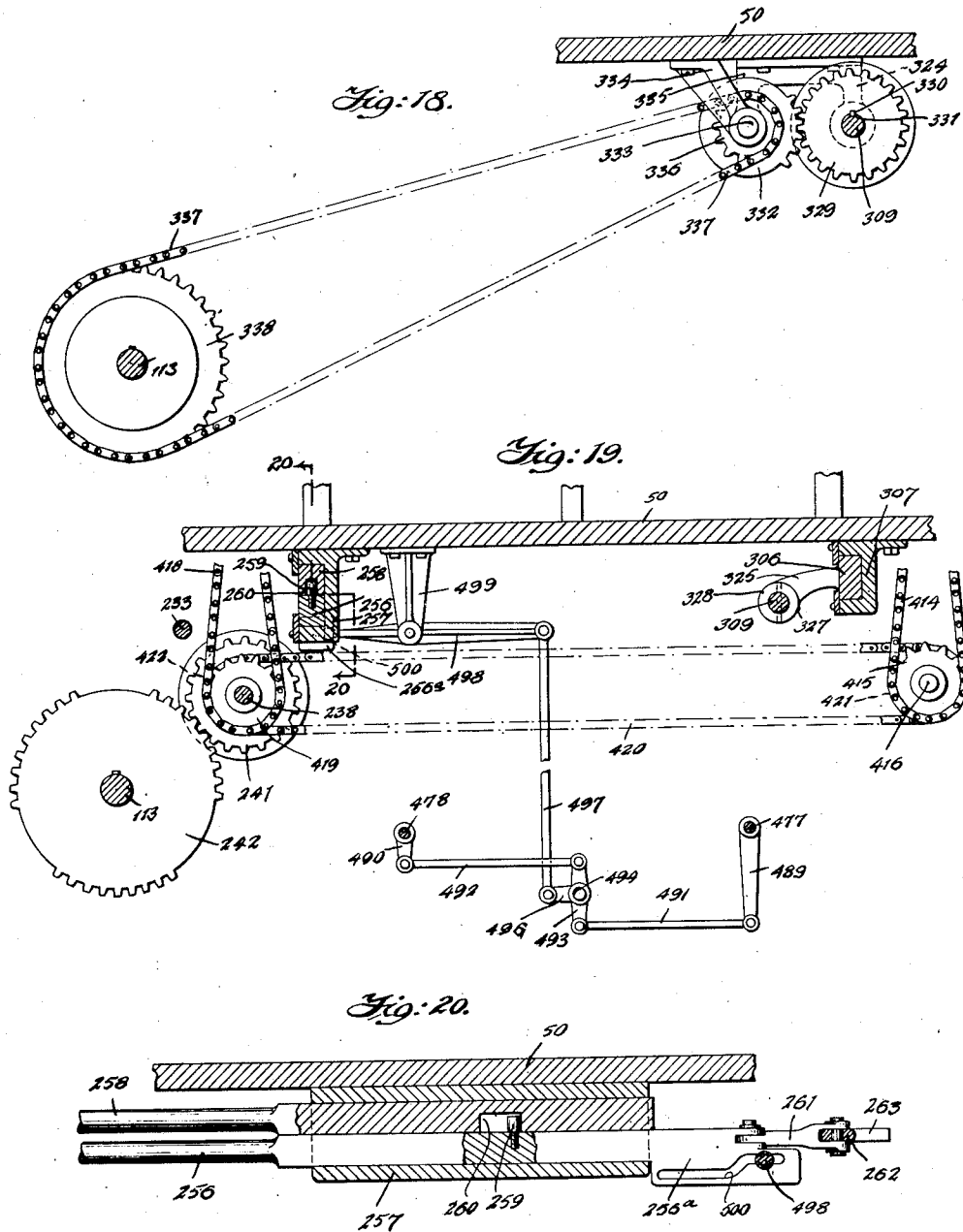
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Filed Sept. 13, 1921

15 Sheets-Sheet 9



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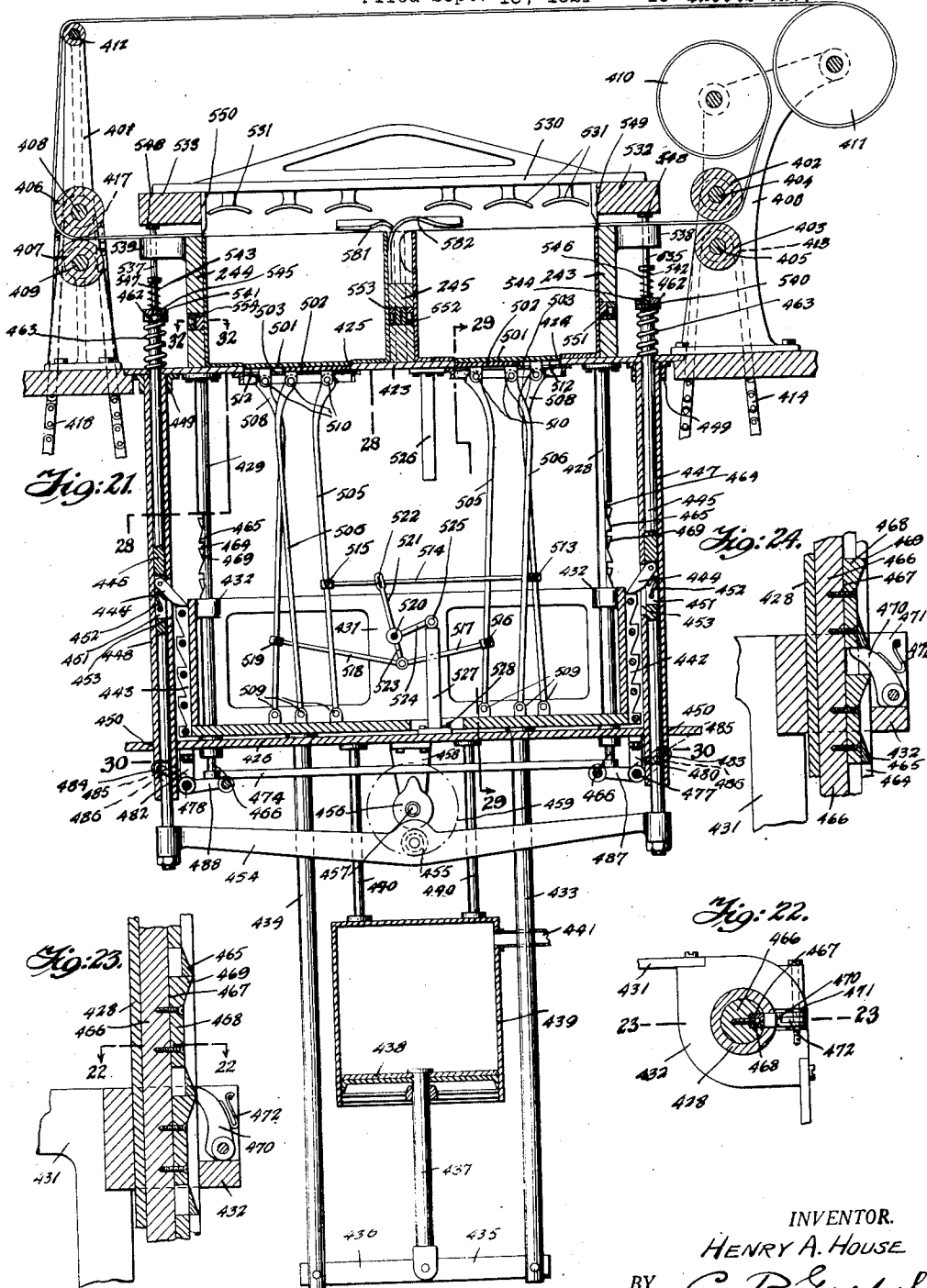
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METHOD OF PACKING AND IN PACKING MACHINE

Filed Sept. 13, 1921

15 Sheets-Sheet 10



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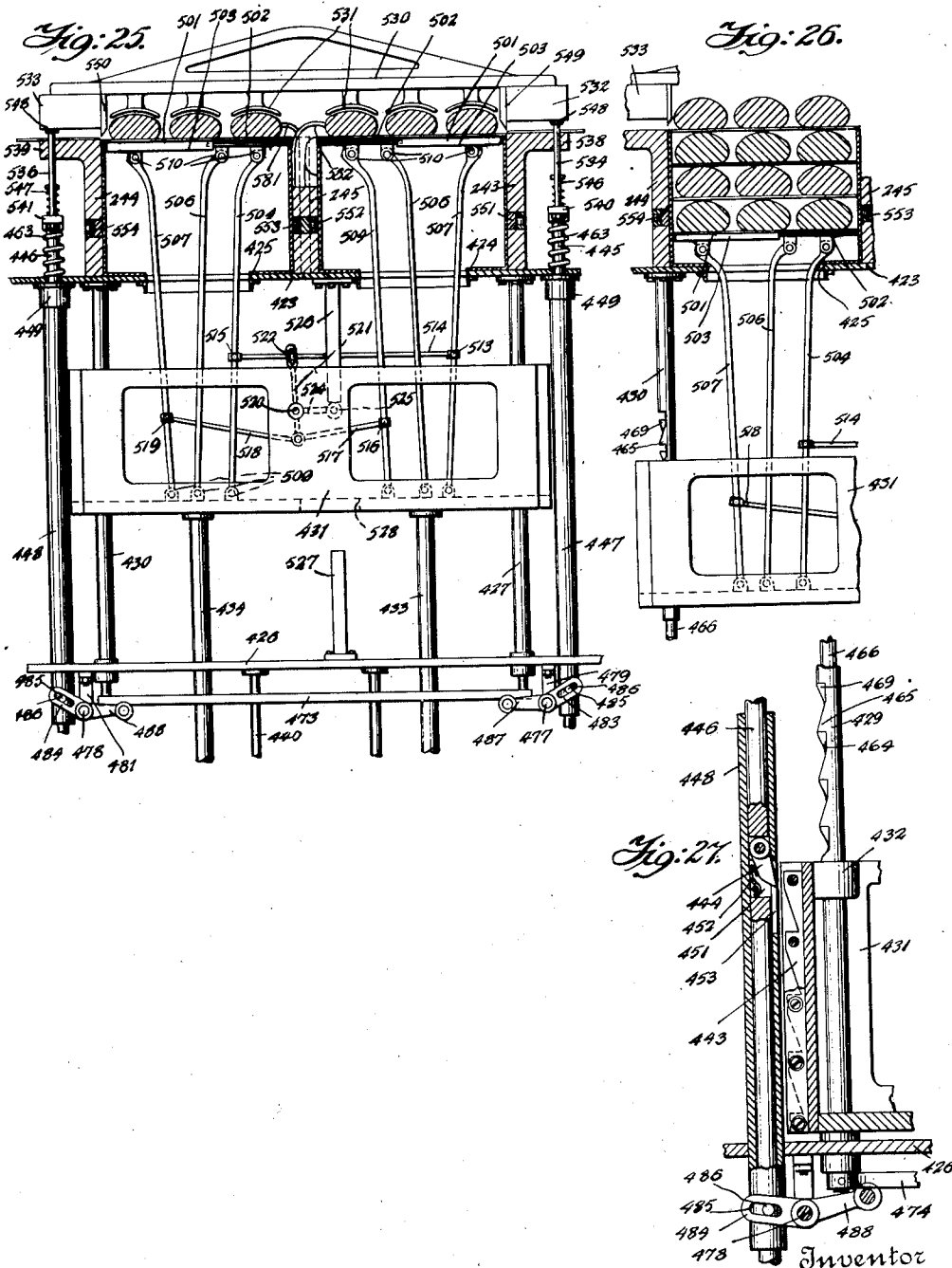
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METHOD OF PACKING AND IN PACKING MACHINE

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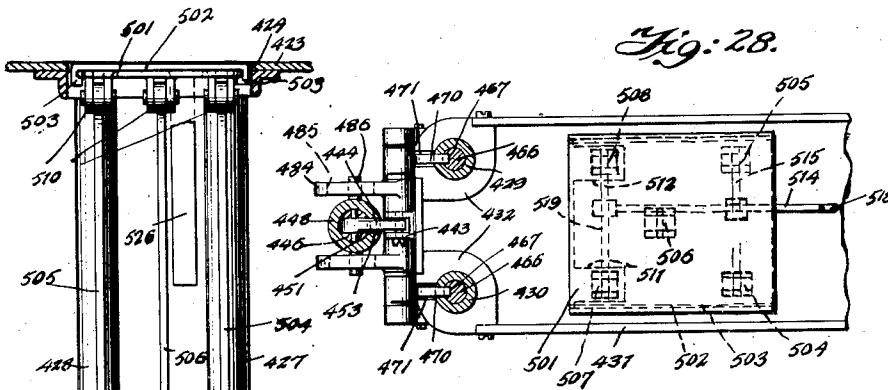
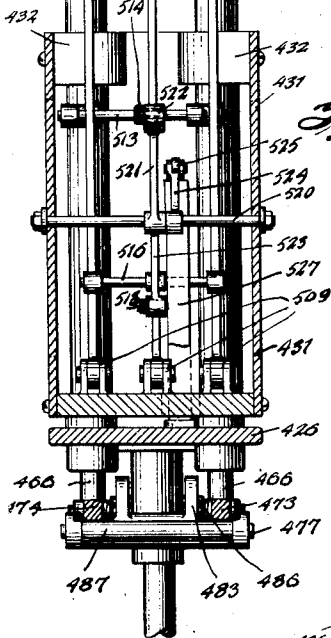


Fig. 29.

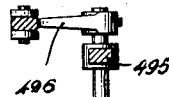
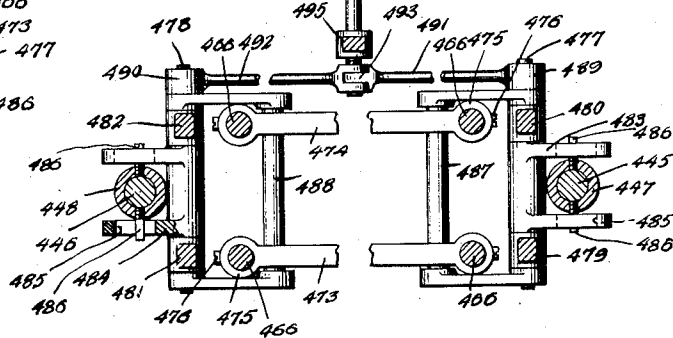


Fig. 30.



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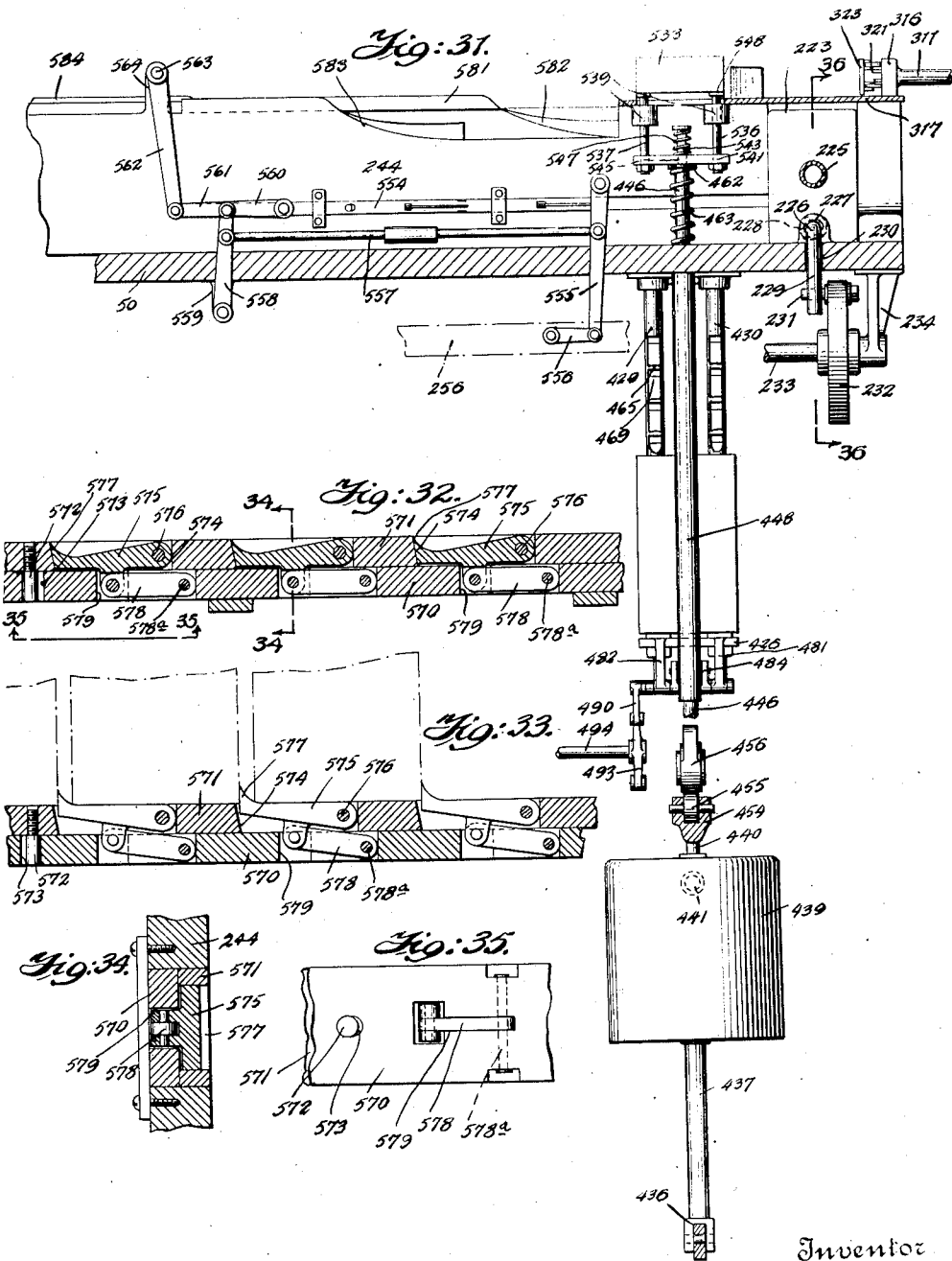
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METHOD OF PACKING AND IN PACKING MACHINE

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METHOD OF PACKING AND IN PACKING MACHINE

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Fig. 36.

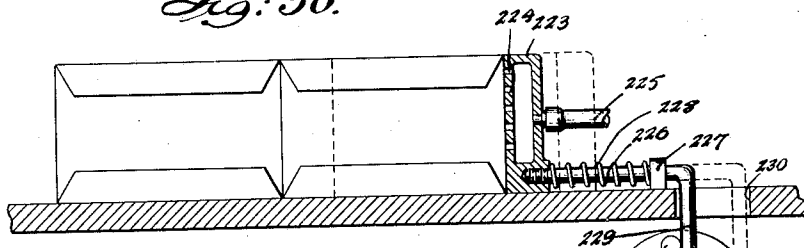


Fig. 40.

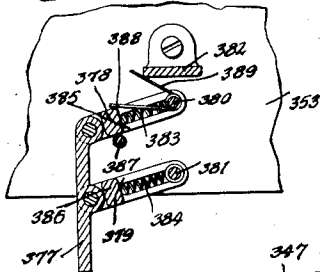


Fig. 41.

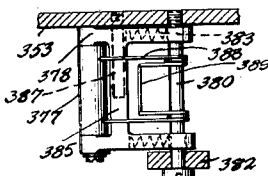
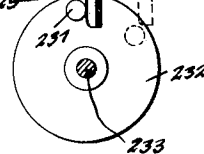
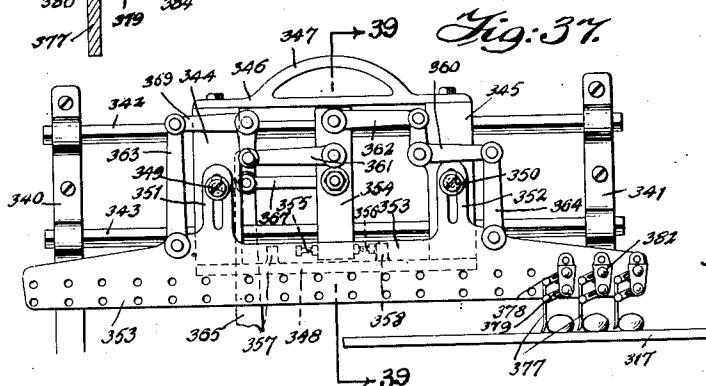


Fig. 39.

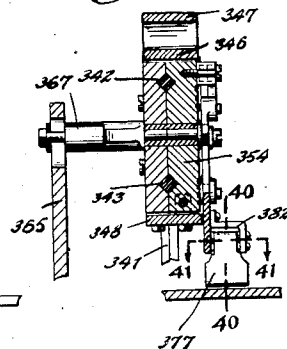
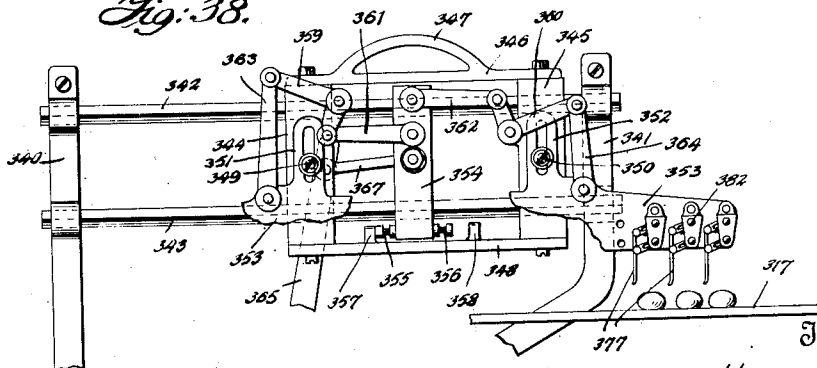


Fig. 38.



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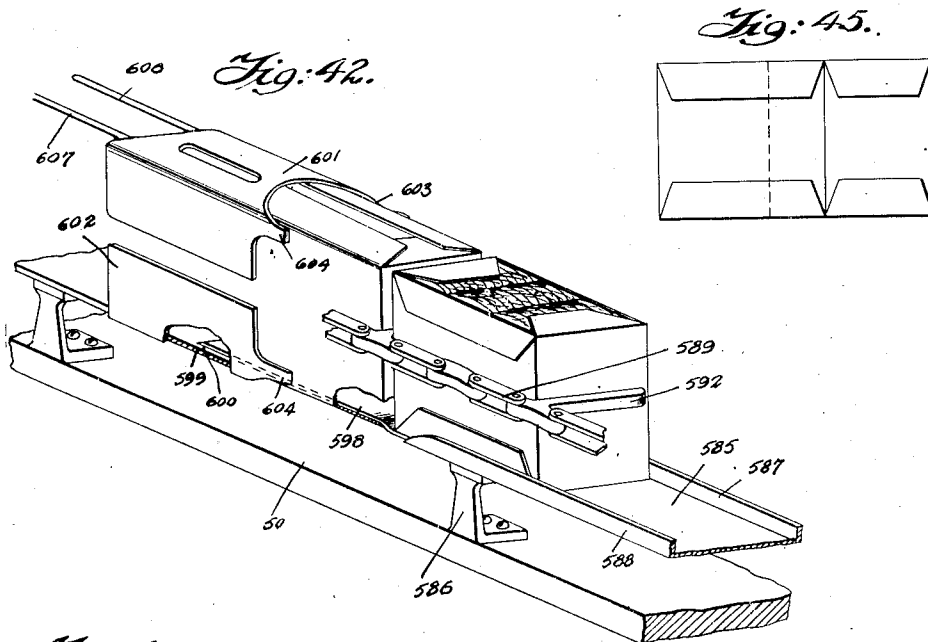
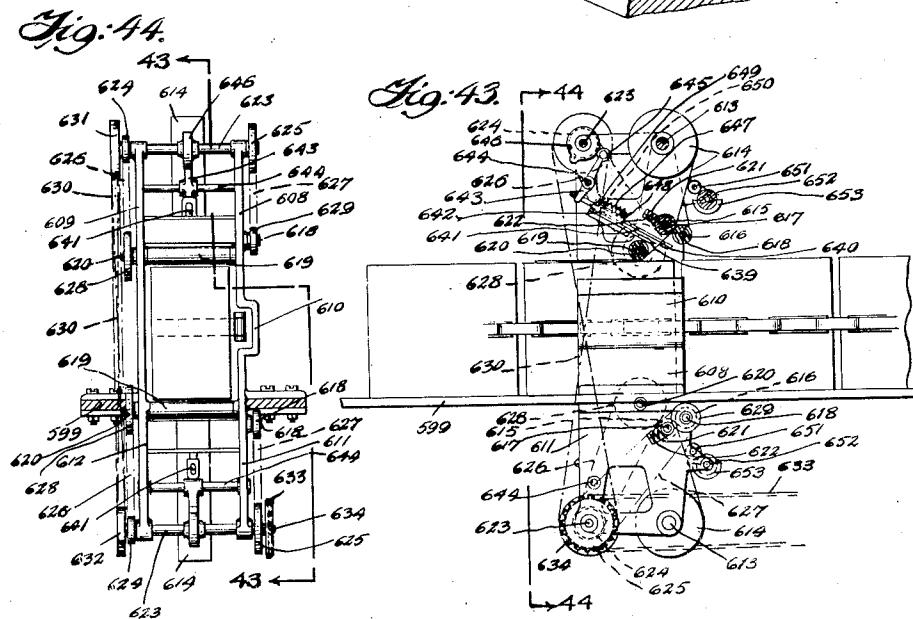
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METHOD OF PACKING AND IN PACKING MACHINE

Filed Sept. 13, 1921

15 Sheets-Sheet 15



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Patented July 13, 1926.

1,592,767

UNITED STATES PATENT OFFICE.

HENRY A. HOUSE, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE SHREDDED WHEAT COMPANY, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF NEW YORK.

METHOD OF PACKING AND IN PACKING MACHINE.

Application filed September 13, 1921. Serial No. 500,409.

This invention relates to improvements in methods of packing, and in packing machines, and particularly, the automatic packing of biscuits, or the like, in collapsible paste-board boxes, or the like. The present embodiment of the invention contemplates the opening of the paste-board boxes from a collapsed state; the feeding of these into relation with the biscuit-feeding mechanism; the successive feeding of the layers into the boxes in superimposed relation, with separation paper strips between them; the folding in of the flaps of the boxes during their progress through the machine; and finally, the sealing of the flaps.

An object is to provide a machine, in which these several steps are so co-ordinated and arranged that the packing of the biscuits in the boxes may be carried on continuously and automatically, and in a manner as to preclude manual handling of the biscuits or boxes.

A further object is to provide means for feeding and handling the biscuits, which are of a very fragile nature, and which will be positive in action, thus assuring properly timed feeding and placement of the biscuits, but which will, at the same time, engage them with such light and yielding contact as to not break or damage them.

An important feature of the invention is the manner of feeding the layers of biscuits successively into the box, the layers being first fed above the upper ends of the box into which a platform is projected from below, the first and lowermost layer resting on this platform. The platform is intermittently lowered as each layer is fed into place, until the requisite number of layers are within the box to fill it; whereupon, the filled box is progressed through the machine, and an empty one is fed into place. In the present embodiment, the lower end flaps of the boxes are folded in before the filling operation, and co-operate with the paper strip provided beneath each layer, to retain the biscuits in the boxes and to protect them from damage as the filled boxes are fed from the filling mechanism.

Another feature is the provision of suction means for opening the collapsed boxes, and suction guide walls for retaining them in open position as they are fed to the filling mechanism.

A further object is to provide means for disassociating the biscuit-feeding mechanism from the box-feeding and the filling mechanism, at will, so that in the event that any of the biscuits, being fed to the machine from the oven, are spoiled, they may be automatically removed, without entirely stopping the operation of the machine. This machine is so adapted that pans of biscuits, as they come from the baking apparatus, will be placed directly into the packing machine, without the necessity for intermediate handling. To this end, the baking pans are elongated and adapted to contain a single row of twelve biscuits, and are disclosed in my application Ser. No. 180,106, filed July 12, 1917.

While the machine is particularly adapted to the packing of biscuits, especially those of the type known as "Shredded Wheat Biscuits," the principles disclosed herein are also adapted to the packing of other articles; so that while the following description will refer, for convenience, to the packing of biscuits, it will be understood that the invention is not so limited.

With the above and other objects in view, an embodiment for carrying out my invention is disclosed in the accompanying drawings, and this embodiment will be hereinafter more fully described, and finally, the invention will be pointed out in claims.

In the drawings:

Fig. 1 is a front elevation of a machine embodying my invention.

Fig. 2 is a plan view thereof.

Fig. 3 is a horizontal sectional view, showing in plan, certain reciprocating feed mechanism, including a cam frame and co-operating parts for opening and feeding the boxes, and is taken along the line 3—3 of Fig. 1.

Fig. 4 is a similar view, showing a main drive shaft and co-operating feeding mechanism for the boxes and biscuits,—taken along the line 4—4 of Fig. 1.

Fig. 5 is a detail plan view, enlarged, of the box-feeding hopper, and a portion of the feeding mechanism shown partially in horizontal section.

Fig. 6 is a perspective view of the parts shown in Fig. 5.

Fig. 7 is a perspective view of a portion of the box-feeding mechanism; also showing the co-operative relation therewith of the

biscuit-feeding mechanism and the paper strip feeding parts.

Fig. 7* is an enlarged detail perspective view of a flap-turning device adapted to turn the lower end flaps of the boxes.

Fig. 8 is a perspective view of the same section of the machine shown in Fig. 7, but showing certain additional parts, and certain parts removed, for clearness.

Fig. 9 is a vertical sectional view, showing the cam and a portion of the mechanism for feeding the biscuits,—taken along the line 9—9 of Fig. 4.

Fig. 10 is a front elevational view of certain of the parts shown in Fig. 9,—taken along the line 10—10 of Fig. 4.

Fig. 11 is a vertical sectional view of the end of the cam drum,—taken along line 11—11 of Fig. 4.

Fig. 12 is a vertical sectional view through the bed plate and cam frame,—taken along the line 12—12 of Fig. 3.

Fig. 13 is a detail sectional view, taken along the line 13—13 of Fig. 3.

Fig. 14 is a detail sectional view of one of the box-feeding devices,—taken along the line 14—14 of Fig. 3.

Fig. 15 is a detail vertical sectional view of the box-opening mechanism,—taken along the line 15—15 of Fig. 3.

Fig. 16 is a detail vertical sectional view of one of the box-feeding devices,—taken along the line 16—16 of Fig. 3.

Fig. 17 is a vertical sectional view,—taken along the line 17—17 of Fig. 16.

Fig. 18 is a vertical sectional view of certain drive mechanism,—taken along the line 18—18 of Fig. 4.

Fig. 19 is a vertical sectional view of certain driven mechanism,—taken along the line 19—19 of Fig. 4.

Fig. 20 is a vertical sectional view,—taken along the line 20—20 of Fig. 19.

Fig. 21 is a vertical sectional view of the box-filling mechanism,—taken along the line 21—21 of Fig. 2, and showing the parts in their lowered position.

Fig. 22 is a horizontal detail sectional view of one corner of the lowering mechanism,—taken along the line 22—22 of Fig. 23.

Fig. 23 is a vertical sectional view of the ratchet and pawl mechanism,—taken along the line 23—23 of Fig. 22, and showing the parts in operative position.

Fig. 24 is a similar view, showing the parts in inoperative position.

Fig. 25 is a vertical sectional view, partly in elevation, of the box-filling mechanism, and showing the parts in their raised position.

Fig. 26 is a similar view, with the parts broken away, and showing the parts of the machine in their partially lowered position.

Fig. 27 is a vertical sectional view of

one end of the box-filling mechanism, showing the parts in such position as to release the biscuit-lowering crib preparatory to its being automatically raised.

Fig. 28 is a horizontal sectional view,—taken along the line 28—28 of Fig. 21.

Fig. 29 is a vertical sectional view,—taken along the line 29—29 of Fig. 21.

Fig. 30 is a horizontal sectional view,—taken along the line 30—30 of Fig. 21.

Fig. 31 is a side view of the box-feeding and filling parts of the machine,—taken along the line 31—31 of Fig. 2.

Fig. 32 is a horizontal sectional view,—taken along the line 32—32 of Fig. 21, showing the feeding mechanism for the filled boxes in inoperative position.

Fig. 33 is a similar view, showing these parts in operative position to feed the boxes.

Fig. 34 is a vertical sectional detail view,—taken along the line 34—34 of Fig. 32.

Fig. 35 is a detail elevational view,—taken along the line 35—35 of Fig. 32.

Fig. 36 is a vertical sectional view of the box-separating mechanism adapted to separate a pair of boxes preparatory to their being filled,—taken along the line 36—36 of Fig. 31.

Fig. 37 is a front elevational view of the biscuit-feeding mechanism,—taken along the line 37—37 of Fig. 2,—and showing the parts in position to feed the biscuits.

Fig. 38 is a similar view with parts broken away, and showing the parts in non-feeding position.

Fig. 39 is a vertical sectional view,—taken along the line 39—39 of Fig. 37.

Fig. 40 is a detail sectional view,—taken along the line 40—40 of Fig. 39.

Fig. 41 is a detail sectional view,—taken along the line 41—41 of Fig. 39.

Fig. 42 is a perspective view of the conveying mechanism for the filled boxes, and showing the devices for turning the upper and lower side flaps.

Fig. 43 is a view, partially in elevation, and partly in vertical section, of the strip-pasting mechanism,—taken along the line 43—43 of Fig. 44.

Fig. 44 is a transverse vertical sectional view,—taken along the line 44—44 of Fig. 43.

Fig. 45 is a detail view, showing one of the collapsed boxes to be filled with biscuits, and in the state in which it is supplied to the machine.

Similar reference characters indicate corresponding parts throughout the several figures of the drawings.

Referring to the drawings, and more particularly to Figures 1 and 2 thereof, the machine comprises a bed plate 50 supported upon suitable standards 51 and 51^a, and having journaled beneath it, and near one end, a main drive shaft 52 adapted to be driven from a motor, or other source of power, by

a belt-pulley 53. The shaft 52 is adapted to directly drive the biscuit-feeding mechanism, and to indirectly drive, through a system of gearing the box-feeding and filling mechanisms, and to the end of disassociating these respective mechanisms, a clutch mechanism is provided adapted to be operated to connect or disconnect the gearing from the shaft, so that when connected, the biscuit-feeding and box-feeding and filling mechanisms will operate together; but when disconnected, only the biscuit-feeding mechanism will operate. This clutch mechanism comprises a clutch 54 adapted to be actuated by a lever 55 pivoted at 56 to the bed plate, and controlled from the front of the machine by a rod 57 sliding in a bearing 58, and provided at its forward end with a suitable handle which may be conveniently manipulated by the operator of the machine.

The boxes to be filled are supplied to the machine in flattened condition, as shown in Fig. 45, and are stacked vertically in a hopper comprising an inclined base 59 (Figs. 5 and 6) supported between side plates 60 and 61 secured at their flanged bases 62 and 63 to the bed plate. A weighted follower 64 is disposed in the hopper to force the boxes to the lower end thereof, being guided by a rod 65 mounted in the sides 66 and 67 of the follower, and projecting through slots 68 and 69 in the side plates. To the ends of the rod, there are connected weight cords 70 and 71 extending over guide rolls 72 and 73 and 74 and 75, and provided at their ends with weights 76 and 77 adapted to draw the follower against the stacked boxes.

The lowermost box engages, and is supported against a slide feed member 78, which will be presently more fully described. Extending away from the hopper, at one side, and longitudinally of the bed plate, there is provided a guide-way for the opened boxes, formed by a hollow wall 79 at one side, its inner surface being substantially flush with the lower end of the hopper, and being bounded at its other side by a hollow wall 80; the guide space between these walls being equal to the width of an opened box. This longitudinally extending guide-way communicates, at its end, with a guide-way extending forwardly thereof, at right angles thereto, and of a width corresponding to the length of an opened box, being bounded at its sides by hollow walls 81 and 82. This guide-way, in turn, communicates, at its end, with another guide-way extending at right angles thereto, and parallel to the first guide-way, and is bounded by hollow walls 83 and 84. These several hollow walls are suitably bolted together, their joints being packed to render them air-tight, and the spaces within the respective contiguous walls 79, 81 and 83, and 80, 82 and 84 are communicating. The inner surfaces of the

walls are perforated, as at 85, and suction is created therein by means of a suction chamber 86 connected to a suitable air-exhaust by a pipe 87, and connected to flanged outlets 88 and 89 of the walls 79 and 80 by pipes 90 and 91. In this manner, the sides of the empty boxes being fed through the guide-ways, will cling to the side walls, and will thereby be maintained in their open position.

The reciprocating slide feed member 78 is adapted to move back and forth in front of the hopper, being provided at its forward end with a pusher-head 92 guided in its movement by means of an angle flange 93 projecting at one side, and engaging a slotted guide block 94 fixed to the bed plate. The inner face of the slide feed member is provided with a recess 95 adapted, as it registers with the lower end of the hopper, to receive a single flattened box, the shoulder 96, at the end of the recess, feeding the box longitudinally and into engagement with the inner surface of the wall 79, as the slide reciprocates forwardly. The flattened boxes, it will be understood, are of a length corresponding to the combined length of a side and one end, the top flaps extending along the upper and lower edges of the sides and ends, being folded flat against the outer surface of the sides and ends.

The portion 97 of the wall 79, adjacent the hopper, is solid, and unperforated for a distance corresponding substantially to the width of the end of the box, so that when the box is fed forwardly by the slide feed member, its side will be gripped by the suction action; while its end will be free to be swung away from the wall 79 to open the collapsed boxes, as will be hereinafter more fully described.

The slide feed member is reciprocated by means of a lever 98 pivotally mounted at 99 upon an extension 100 of the base of the standard 51^a extending upwardly through a slot 102 in the bed plate, and being connected to the rear end of the slide feed member by a forked link 103 adjustably secured in a slot 104 of the lever. A connecting rod 105 extends from the lever 98 to a lever 106 pivotally mounted at its lower end 107 upon the standard 51, and provided at its upper end with an enlarged head portion having parallel slots 108 and 109, the slot 108 being relatively wide, and having its axis coincident with the axis of rotation of the lever; while the relatively narrower slot 109 is offset, and has the end of the rod 105 adjustably and pivotally secured therein, as at 110. The slot 108 is slidably engaged by an eccentric crank pin 111 provided on a disc 112 mounted on the end of an auxiliary drive shaft 113 journaled in the frame, and driven from the main drive shaft 52 by gears 114 and 115, (Fig. 4), respectively provided on the

shafts 52 and 113, and an intermediate gear 116 mounted on a stud shaft 117; the gear ratio being such that the shaft 113 is rotated once for every two rotations of the shaft 52. Thus, two boxes will be fed from the hopper for every four revolutions of the main drive shaft,—the purpose of which will be presently pointed out. The gear 114 is loose upon the shaft 52, and is adapted to be connected thereto by operation of the clutch 54,—as before pointed out—so that upon occasion, the shaft may be driven, without driving the gear 114, by disconnecting the clutch.

At the end of the wall 80, and substantially diagonally disposed to the solid portion 97 of the wall 79, there is movably mounted a hollow suction-head 117, (Figs. 3, 5, and 6), adapted, as will presently appear, to open the boxes. The inner face of the head is provided with perforations 118, and at its rear side it is provided with a flanged outlet 119 connected by a flexible pipe 120 to the suction chamber 86. Near its base, the head is provided with a pair of outwardly-projecting arms 121 and 122, to which are pivotally connected the ends of crank-arms 123 and 124 mounted upon the upper ends of shafts 125 and 126 journaled in the bed plate, and having crank-arms 127 and 128 secured to their lower ends beneath the bed plate. A third crank-arm 129 is mounted upon a stud shaft 130 below the bed plate, and the ends of these three arms 127, 128, and 129 are connected by a bar 131, so that they will operate in unison.

The bar 131 (Fig. 3) is adapted to be swung to and fro transversely of the bed plate, to oscillate the crank-arms by means of a lever arm 132, to which it is connected by a link 133 adjustably and pivotally connected at one end 134 to a slot 135 in the end of the lever 132, and pivotally connected at its other end to the bar 131. The lever 132 is pivotally connected at 136 upon the under side of the bed plate, and is provided intermediate its ends with a roller 137 sliding in a cam groove 138 of a cam plate 139 mounted on a reciprocating cam-supporting frame, comprising rails 140 and 141 (Figs. 3 and 12) connected at their rear ends to a dove-tailed slide bar 142 slidably mounted in beveled guides 143 and 144 secured longitudinally of the bed plate, and connected at their forward ends to a plate 145 having a forwardly-extending arm portion 146,—the purpose of which will be hereinafter more fully pointed out—and slidably mounted in dove-tailed guides 147 and 148 secured to the under side of the bed plate. An intermediate cross-piece 149 also connects the two side rails, a lug 150 being formed on its under side which is connected to the lever 98 by a link 151, so that the oscillation of said

lever will impart reciprocatory motion to the cam frame.

The cam groove 138 of the plate 139 is so designed, that as the lever 98 and the cam frame are moved rearwardly, withdrawing the slide feed member 78, the lever 132 is swung forwardly from the position shown in Fig. 3. In this manner, the head 117 is swung from the dotted line position (Fig. 2) to the full line position, grippingly engaging, through its suction action, the side portion of the flattened box that has just been fed from the hopper. As the cam frame moves forwardly, the head is again moved to the dotted line position, swinging the box to open position, its end being free of the wall 79, as before explained.

As the slide feed member 78 moves forwardly, feeding a flattened box in its recess 95, its head 92 engages the end of the box which has just been opened, and pushes it forward in the guide-way, together with the box immediately in front of it, the box previously at the end of the guide-way having been pushed forwardly between the walls 81 and 82, as will now be explained.

At the corner formed by the meeting ends of the side walls 81 and 82, there is provided an opening 152 (Fig. 6) bridged over by the reduced ends 153 and 154 of the side walls, and within which there is provided a pusher-head 155 adapted to feed the boxes as they are pushed forwardly by the member 78, into the guide-way between the walls 81 and 82. The head 155 is longitudinally mounted, at one end, upon a bracket 156 mounted upon a slide rod 157, and is connected at its rear side by a link 158 to a post 159 mounted on a slide rod 160 disposed beneath the rod 157, and adapted to have relative movement therewith. The bracket 156 and the post 159 extend upwardly through a slot 161 (Fig. 16) in the bed plate, and the slide rods are moved in a channeled guide 162 secured to the under side of the bed plate, and having retaining strips 163 and 164 projecting over the channel to hold the rods slidably therein. The rod 157 has a slot 165 formed therein, which is engaged by a pin 166, provided on the rod 160, in the rearwardly moved position of the head 155. The pin 166 engages the forward end of the slot 165, so that as the rod 160 is moved forwardly, the two rods 160 and 157 move in unison. The forward movement of the feeding mechanism is such as to feed the box beyond the corner formed by the walls 79 and 81, as shown in Fig. 5, so that the box fed between the walls 81 and 82 will be entirely free of the guide-way between the walls 80 and 79, and its flaps will, therefore, not interfere with the feeding of the box between the said walls 80 and 79. The rod 160 first moves rela-

tively to the rod 157, swinging the head 155 about its pivotal connection with the bracket 156, thereby drawing the end of the head out of the path of the boxes being fed between the walls 80 and 81, and as the rod 160 continues its rearward movement the pin 166 engaging the rearward end of the slot 165 causes the rod 157 to partake of the continued movement of the rod 160, until the outer swinging end engages the wall 80; whereupon, the final movement of the rod 160 will cause a relatively forward movement of the pin 166 in the slot 165, and the straightening out of the head 155 in line with the inner surface of the wall 80.

The rear end of the rod 160 is connected to a link 167, (Fig. 3), adjustably and pivotally connected at its end to the slotted end 168 of a lever 169 pivotally mounted at its end 170 upon the bed plate. A cam roller 171 is provided on the lever 169 and engages a cam groove 172 of a cam plate 173 mounted upon the reciprocating cam frame. The cam groove is in the form of a rhomboidal parallelogram having its ends diagonally disposed. In the longitudinal portions of the groove, there are provided leaf springs 174 and 175 having their attached ends embedded flush with the surface of the groove, as shown in Fig. 13; while their free ends, which extend to the ends of the longitudinal sides of the cam grooves, are yieldably forced upwardly by a coiled spring 176 disposed in a socket 177. As the cam frame is reciprocated rearwardly, and the roller 171 comes to the forward end of the longitudinal groove having the spring 175 therein, it engages in front of the raised end of the spring, and is, therefore, forced to move along the inclined end of the groove, upon the rearward reciprocation, thereby swinging the lever 169 to retract the rod 160, and thus draw the feed head 155 rearwardly. As the roller 171 reaches the end of the side of the groove provided with the spring 174, the spring is released and is raised in front of the roller, and upon the next rearward reciprocation of the cam frame, the roller is forced to move along the inclined rear side of the cam groove, swinging the lever 169 to feed the head 165 forwardly.

As the boxes are fed between the walls 81 and 82, they have their lower end flaps turned under by means of flap-turning devices disposed at each side of the guideway. These devices comprise shoes 178 and 179 (Figs. 7 and 7*) mounted above openings 180 and 181 provided in the bed plate, and having bracket lugs formed thereon which are secured to the bed plate by a screw 183. The shoes extend upwardly into elongated openings 184 and 185 formed in the walls 81 and 82, respectively, the opening 184 being relatively higher and extending forwardly to the end of the wall 83, to accommodate a box-feeding member, hereinafter more fully referred to. The front ends of the shoes are each provided with a beveled nose portion 186, and at the under side, there is formed a depending turning flange 187 which starts rearwardly of the nose of the shoe, its beveled edge 188 being substantially a continuation thereof, and is bent inwardly beneath a plate 189 extending over an opening 190 of the bed plate. The said plate 189 is flush with the surface of the bed plate, and secured by screws 191 and 192 engaged in a projecting portion 193, the plate 189 extending rearwardly of the end of the shoe, and its end is spaced from the beveled end 194 of the opening 190 to form an outlet slot for the turned end flap.

As the boxes are fed forwardly, the nose portions 186 of the shoes enter between the upturned end flaps, thereby turning them along the edges 188 of the flanges to their folded-in-position between the flange 187 and the plate 189, the folded end flaps moving out through the slots at the ends of the plate 189.

The boxes are now fed longitudinally of the bed plate between walls 83 and 84. At the forward end of the arm 146 of the plate 105, (Fig. 3), there is provided a flange 195 having three spaced lugs 196, 197, and 198 formed thereon, in which there are journaled the shafts 199, 200, and 201 of the crank-arms 202, 203, and 204, connected together at their outer ends by a bar 205. At the upper projecting ends of the shafts 200 and 201, there are secured lever arms 206 and 207, upon the ends of which there is pivotally mounted a right angular pusher-head 208 disposed in the opening 184 of the wall 81, and adapted to move through a communicating opening 209, (Fig. 7), provided in the wall 83. A link 210 is pivotally connected at one end to the bar 205, and is adjustably and pivotally connected at its other end to the slotted end 211 of an elongated lever 212 pivotally mounted at 213 upon the plate 145. Upon an extension 214 of the lever 212, there is provided a roller 215 disposed in an opening 216 of the plate 145, and co-operates with a cam projection 217 provided upon a stationary plate 218 secured beneath the plate 50.

The cam projection 217 is elongated, being flattened at its forward side and rounded at its rearward side, and along its forward side, there is provided a leaf spring 219 secured at one end by a screw 220, and yieldably forced upwardly at its other end adjacent the forward end of the cam projection, by a coiled spring 221 disposed beneath it; the roller 215 adapted, as the plate 145 is reciprocated, to move forwardly along the straight side of the cam, and rearwardly

along the rounded side, thereby oscillating the lever during the rearward movement. A coiled spring 222 is provided on the shaft 200 and tends to force the crank-arms in clockwise direction, and the pusher-head to its feeding position behind the boxes, as shown in Figures 3 and 8. Through the link 210, the lever 212 is also yieldably forced to one side,—that is, with the roller 215 hugging the forward side of the opening 216 during the reciprocation of the plate 145; and hugging the rounded surface of the cam 217 during its reverse reciprocation. The operation of this mechanism is as follows:

As the cam frame and plate 145 reciprocate to one side, the roller 215 riding along the straight side of the cam 217, the head 208 engages the end of the box just previously pushed into engagement with the wall 83, and pushes this box, and the two boxes now in front of it, forwardly between the walls 83 and 84, until the forward box engages a hollow suction-head 223 having a perforation 224 in its face. As the frame and plate are reciprocated in the reverse direction, the roller 215 rides along the rounded surface of the cam 217, imparting a swinging impulse to the lever 212 and through the link 210 turning the crank-arms in clockwise direction, thereby moving the pusher-head out of the guide-way, as indicated in dotted lines, (Fig. 2), so that its longitudinal face is flush with the inner surface of the wall 83, and the guide-way is free to permit another box to be fed between the walls 81 and 82 into engagement with the wall 83. As the cam frame reaches the end of its rearward movement, the lever again assumes the position shown in Fig. 3, the pusher-head swinging under the force of the spring 222, into its feeding position behind the boxes.

The head 223 has connected at its rear side a pipe 225, (Fig. 36), which leads to the suction chamber 86, and is slidably mounted upon the bed plate. A rod 226 is connected to the lower portion of the head 223, and projects rearwardly through an apertured guide block 227, a coiled spring 228 being provided upon the rod between the head and the block. The end of the rod is bent downwardly, at right angles—as at 229—through a slot 230 in the bed plate into the path of a pin 231 provided upon a disc 232 mounted on a shaft 233; the rotation of the shaft adapted, through the engagement of the pin with the end of the rod, to intermittently reciprocate the head from the full line position, (Fig. 36), to the dotted line position, thereby separating the box contiguous to the head and held thereto by the suction from the adjacent box, as indicated in dotted lines, preparatory to the boxes being fed from this position to the po-

sition in which they are filled with the biscuits.

The shaft 233 is journaled in bearings 234 and 235 upon the under side of the bed plate, and is provided, at its inner end, with a gear 236 meshing with a gear 237 provided upon the end of a shaft 238 journaled in bearings 239 and 240, and intermittently driven from the shaft 113 by gears 241 and 242, respectively mounted upon the shafts, the gear 242 being of the intermittent type, provided with three spaced toothed sections, as shown in Fig. 19. The ratio of the gears is such, that the shaft 233 is turned once for every two revolutions of the shaft 113.

The two foremost boxes between the walls 83 and 84—one having been separated from the other, as above pointed out, by reciprocation of the suction-head 223—are adapted to be pushed forwardly between the guide walls 243 and 244, and between a central guide wall 245, and at this position, they are filled with the biscuits, as hereinafter will be more fully described.

A pusher-plate 246 flanged at its upper and lower edges—as at 247 and 248—is provided at the inner side of the wall 83, being normally disposed within recesses 249 of the wall, so that in its normal retracted position, it lies substantially flush with the inner surfaces of the wall, to permit of the forward feeding of the boxes between the walls 83 and 84. The wall 83, at this point, is of skeleton form, having a series of three openings 250, 251, and 252.

A pair of feeding arms 253 and 254 for the pusher-plate 246 project through the opening 251, the arm 253 being hingedly connected at 255 to the end of the plate, and the arm 254 being hingedly connected at 255^a intermediate the ends. The arm 254 is mounted at its lower end upon the end of a slide bar 256, (Figs. 4 and 20) mounted to reciprocate in a guide 257; and upon the upper side of the bar 256, there is slidably mounted a bar 258 being connected, for relative movement therewith, by a pin 259 of the bar 256 engaging a slot 260 of the bar 258. The arm 253 is connected to the outer end of the bar 258. Upon reciprocation of the bar 256 to the right (Fig. 20), the bar 258 is moved therewith through the pin and slot connection, and the arms 253 and 254 moving inwardly together, feed the plate 246 and the two boxes in front of it inwardly between the walls 243, 244, and 245. Upon reverse movement of the bar 256, it first moves independently of the bar 258 for a distance limited by the length of the slot 260, and the plate is swung from its central connection to the arm 254 about the hinge 255, so that the free end of the plate is retracted in advance of the hinged end, thereby allowing the boxes to be fed forwardly before the plate is entirely retracted, the

plate being straightened out to its normal parallel position, as the bar 256 completes its movement.

The end of the bar 256 is flexibly connected by a link 261 to the slotted end 262 of a lever 263 adapted to co-operate, as will presently more fully appear, with a cam groove 264 of the barrel cam 265, this lever being provided with latch mechanism adapted, as will presently more fully appear, to render the lever 263 inoperative to reciprocate the feed bars during three revolutions of the cam 265, and to render it operative during one revolution.

The barrel cam is loosely mounted to rotate about the main drive shaft 52, and is indirectly driven therefrom by the counter-shaft 113 through a gear 266 secured to the shaft 113, an intermediate gear 267 journaled upon a stud shaft 268, and a gear 269 secured to the end of the cam,—as shown in Fig. 11. This arrangement is such, that by disconnecting the gear 114 from the driving shaft 52 through the clutch 54, those parts of the machine which are not permanently connected to the shaft 52 may be stopped.

The lever 263 is pivotally mounted upon a stud shaft 270, (Figs. 4 and 9), having a rotatable bushing 271 at its lower end, engaging the cam groove 264, and between the bushing and the lever, there is pivotally mounted the end of a lock lever 272 having its hub-end 273 pivotally journaled upon a vertical shaft 274 suspended from the bed plate. An arcuate head 275 is formed upon the end of the lever 263, and slidably engages an enlargement 276 of the lever 272 below a projecting retaining-arm 277 of the hub portion 273. Upon the lower end of the shaft 274, and between the bearing flange or collar 278 and a head 279 upon the extremity of the shaft, there is yieldably and pivotally mounted a lever 280 normally held in its uppermost position against the flange 278 by a coiled spring 281, and provided at its end with an upwardly-extending locking pin 282 slidably engaging a passage 283 through the enlargement 276 of the lever 272, and adapted, in the upper position, (Fig. 9), to project into a socket 284 provided centrally of the arcuate head 275, thereby locking the lever 262 rigidly to the lever 272.

The hub of the lever 280 is provided with upper and lower flanges 285 and 286 which are engaged by trunnion pins 287 in the forked end of a lever-arm 288 secured upon a horizontal rock shaft 289 rotatably supported in bracket bearings 290 and 291. A rock lever 292 is secured upon the shaft adjacent the bearing 290, and is provided, at its end, with a roller 293 riding upon the surface of a cam 294 journaled upon a shaft 295 rotatably supported by the bracket bear-

ings 296 and 297, and driven from the shaft 52 by gears 298 and 299 having a ratio of 4 to 1, so that for every four revolutions of the shaft 52, the cam 294 is rotated once. The cam 294 has a rise equal to three-fourths of its circumference, so that during a three-quarter turn of the cam 294, corresponding to three revolutions of the barrel cam 265, the shaft 292 is rocked to depress the lever 280, and through disengagement of the pin 283 from the socket 284, unlocks the levers 263 and 272. When so unlocked, the action of the cam will be to oscillate the lever 263 about its pivotal connection to the bar 256, without moving the bar 256, and to oscillate the lever 272 about the shaft 274. During the remaining one-quarter turn of the cam 294, the rock shaft is turned to allow the lever 280 to rise under the action of its spring 281, thereby locking the shafts together; whereupon, the action of the cam is to move the lever 263 about the pivot formed by the shaft 274, thereby reciprocating the bar 256, and through the feeding action of the head 246 moving the boxes into position to be filled with the biscuits.

The machine is such—as will hereinafter more fully appear—that four layers of biscuits are fed to the boxes, the first layer being moved into position during the feeding movement of the boxes, the boxes moving sufficiently in advance to allow them to come into place to receive the biscuits. The feeding mechanism for the biscuits is also actuated through the barrel cam 265 which, for this purpose, is provided with a cam groove 300 engaged by a roller bushing 301 of a lever-arm 302 pivotally mounted upon the bed plate at 303, and adjustably connected at its slotted end 304 by a link 305 to a slide bar 306 mounted to reciprocate in a slide-way 307, (Figs. 4 and 19), secured to the under side of the bed plate. At its forward end, the bar 306 is provided with an inwardly offset portion 308, (Figs. 4 and 7), in which there is rotatably journaled an elongated shaft 309, and also provided with an upstanding arm 310 having, at its upper end, a sleeve 311, in which is housed a shaft 312 provided at its outer end with a rock lever 313 connected by a rod 314 to a rock lever 315 upon the forward end of the shaft 309. Upon the inner end of the shaft 312, there is secured the end of a feed bar 316 resting upon a plate 317 upon which the biscuits are adapted to be fed, in increments of six, by mechanism—which will hereinafter be more fully described—in front of the bar 316, to be then fed forwardly thereby into openings 318 and 319 above the boxes to be filled; four successive layers of the biscuits being thus fed forwardly into position, and then downwardly into the boxes. A glass insert 320 is provided in the plate 317, so

that the position of the boxes beneath the plate may be readily observed.

Upon the front face of the bar 316, there are mounted yieldable springs 321 supporting a pair of plates 322 and 323 adapted to engage the biscuits so as not to crush them.

The shaft 309 is slidable in the bearing brackets 323 and 324 depending from the bed plate, and is connected to the bar 306 to reciprocate therewith by means of an arm 325 bent downwardly from the bar 306, and having its hub portion 326 engaged between retaining-collars 327 and 328 secured to the shaft 309. At its inner end, the shaft 15 is provided with a longitudinally fixed gear 329 having a spline 330 slidably engaging an elongated slot 331 of the shaft 309, so that during the reciprocatory movement of the shaft, rotation of the gear will impart 20 rotary movement thereto. The gear 329 is adapted to be intermittently rotated during the outward reciprocation of the bar by a segmental gear 332 carried upon a shaft 333 journaled in bearings 334 and 335, and 25 adapted to be continuously rotated by means of a sprocket gear 336 and a sprocket chain 337 from a sprocket gear 338 mounted upon the shaft 113, (Figs. 4 and 18).

As the biscuit-feeding bar 316 reaches the 30 end of its forward movement, the gear 335 meshes with the gear 329, turning it through a partial revolution, thereby rotating the shaft 309, and through the rock arms 313 and 315 and the connecting rod 314 rotating 35 the shaft 312, thereby swinging the feed-bar upwardly, holding it raised during the rearward reciprocation, the disengagement of the segmental gear 332 from the gear 329 40 allowing the arm to again drop back into place upon the plate 317 as it reaches its outer position. This provides a free space upon the plate 317, to allow the next increment of biscuits to be fed into place immediately after the previous increment has 45 been fed into packing relation with the boxes, and before the feeding-bar returns to its outer position. Thus, the feeding-bar moves to and fro, without any intervening pause, the biscuits being fed into place during the rearward reciprocation, to be immediately fed forwardly to packing relation 50 with the boxes during the forward reciprocation.

The plate 317 extends as an elongated 55 platform to the left-hand end of the bed plate, being supported upon posts 339, (Fig. 1), and above this elongated portion of the platform, there is provided the mechanism for feeding the biscuits upon the plate 317 60 in front of the feeding-bar 316.

Upon upright supports 340 and 341, 65 (Figs. 1, and 37 to 41), there are mounted a pair of spaced parallel slide-supporting bars 342 and 343 of square cross-section and turned edgewise to resist bending strains,

and upon which there is slidably mounted a slide frame consisting of uprights 344 and 345 having passages therein engaging the bars 342 and 343, being connected at their upper ends by a cross-piece 346 having an 70 arched handle portion 347, and connected at their lower ends by a cross-piece 348.

Upon the front faces of the uprights 344 and 355, there are provided stud-bolts 349 and 350 respectively, upon which are engaged the vertically-disposed slotted extensions 351 and 352 of an elongated plate 353 75 adapted to have longitudinal reciprocatory movement with the frame, and vertical reciprocatory movement relatively thereto. 80

Within the frame, there is slidably mounted upon the bars 342 and 343 a side-piece 354, preferably formed in two pieces bolted together, as shown in Fig. 39, and provided at its lower end and at each side 85 with adjustably-mounted bolt-screws 355 and 356 adapted to respectively engage stop lugs 357 and 358 provided upon the cross-piece 348, as the slide-piece 354 is moved to the left or to the right. 90

Upon the upright portions 344 and 345, there are respectively mounted bell-crank levers 359 and 360, the lever 360 being inverted with respect to the lever 359, their short arms being connected to the slide-block 354 by links 361 and 362, while their long 95 arms are connected by links 363 and 364 with the plate 353; so that as the slide-block is moved to the right relatively to the slide-frame, the bell-cranks are turned to lower 100 the plate 353, while relative movement to the left causes the bell-cranks to raise the plate 353.

A long-stroke lever 365 (Figs. 1 and 4) is pivotally mounted upon the base at 366, 105 and is connected at its upper end to the slide-block 354 by a link 367. This lever is jointed at 368 for adjustment, and is provided with a turn-block 369 having a passage 370 therethrough, in which is slidably engaged the cylindrical shaft extension 371 110 of a lever 372 pivoted to the standard 51 at 373. The lever 372 is provided with a slot 374 engaged by a slide-block 375 mounted eccentrically upon a disc 376 provided upon 115 the end of the main drive shaft 52. The oscillation of the disc imparts a compounded long swing to the lever 365. In operation, the initial swing to the right slides the block 364 relatively to the frame, lowering the 120 plate 353 through rotation of the bell-crank levers 359 and 360, whereupon, the bolt-screw 356 engages the lug 358, and the continued moving imparts sliding movement to the frame. Upon reverse movement, the 125 block 354 first moves to the left, as indicated in Fig. 38, lifting the plate 353, and upon engagement of the bolt-screw 355 with the lug 357, the frame is slidably moved to the left. Upon the plate 353, there are 130

mounted a series of fingers or pusher-plates—eighteen in the present embodiment—adapted to engage behind the biscuits to feed them forwardly. The biscuits are supplied to the machine from the oven in elongated pans which are placed upon the platform 317, twelve at a time, so that as the plate 353 is at the left and is lowered, the twelve pusher-plates engage behind them, and each forward movement of the biscuit-feeding mechanism feeds six biscuits in front of the feed-bar 316, to be fed into packing relation with the boxes. As soon as they are fed forwardly, the plate 353 is lifted, disengaging the fingers from between the biscuits, and during the return movement of the plate, the fingers move above the biscuits.

The fingers 377 are flexibly mounted upon a pair of pivotal frames 378 and 379 supported upon shafts 380 and 381 mounted in brackets 382 secured to the outer side of the plate 353. The side portions of the frames 378 and 379 are slotted to slidably engage the shafts 380 and 381 and coiled springs 383 and 384 are disposed between the shafts and the forward cross-pieces 385 and 386 of the frames, so that pressure, in either direction, upon the ends of the pusher-plates, will move either the upper or the lower frame relatively to the shafts 380 and 381, compressing the springs 383 and 384, and upon release of the pressure, the pusher-plates will assume their normal position. A stop-pin 387 engaging the under side of the frame 378 limits the downward movement of the pusher-plates, the frame being yieldably held against the pin by a spring 388 coiled about the shaft 380 and tensioned through engagement of its end-portion 389 engaging the upper portion of the bracket 382.

This construction is such, that the pusher-plate will yield upwardly, or forwardly and rearwardly, so that if, during the downward movement of the pusher-plate, a displaced biscuit is in its path, it will either yield upwardly, or to one side, without damaging the biscuit.

As the biscuits are fed along the platform 317 in front of the feed-bar 316, they are equally spaced apart, and in order to separate them into groups of three, disposed at each side of the central guide wall 245, a V-shaped deflector 390 is mounted upon the platform 317, the yieldably-mounted plates 322 and 323 provided upon the bar 316 adapted to engage at each side thereof, as the bar 316 is reciprocated inwardly. The deflector is adapted, through co-operation with these plates, to shift the biscuits laterally at each side, so that they come into place above the boxes in groups of three, and in contacting relation with each other. The deflector plate is of such depth that it will

enter between the plates 322 and 323, but will not interfere with the movement of the bar 316.

Four layers of biscuits are successively fed into place above the boxes, being then fed downwardly into the boxes to fill them, the filled boxes being then progressed through the machine, and empty boxes fed into place.

The mechanism for feeding the layers downwardly will be presently fully described.

Separation strips of paper are adapted to be fed beneath each layer of biscuits, the proper length being cut off as each layer is fed downwardly. Upon supporting standards 400 and 401 at the sides of the walls 243 and 244, (Figs. 7 and 21), there are provided guide rollers 402 and 403 mounted on shafts 404 and 405 and rollers 406 and 407 mounted on shafts 408 and 409, and between which the paper strips are fed inwardly toward each other through rotation of the rollers, the strip fed between the rollers 402 and 403 being supplied from a paper roll 410 mounted on the standard 400; while the strip fed between the rollers 406 and 407 is supplied from a paper roll 411, also mounted on the standard 400, being guided over a roller 412 provided at the upper end of the standard 401.

The rollers 403 and 407 are intermittently rotated to feed proper lengths of the strips by sprocket connections with the intermittently rotated shaft 238 (Fig. 19), and consisting of a sprocket pinion 413 provided on the shaft 405, connected by a sprocket chain 414 to a sprocket gear 415 provided upon a shaft 416 mounted below the bed plate, and a sprocket pinion 417 provided upon the shaft 408, connected by a chain 418 to a sprocket gear 419 mounted on the shaft 238. The shaft 416 is driven correspondingly to the shaft 238 by means of a sprocket chain 420 extending over sprocket gears 421 and 422 provided on the respective shafts.

The boxes fed forwardly between the walls 243, 244, and 245 by means of the pusher-plate 246, move on a floor plate 423, (Figs. 21 and 25), having openings 424 and 425 therein, extending between the ends of the folded-in end flaps of the boxes, and through which collapsible lowering platforms, for supporting and lowering the biscuits, are inserted into the boxes, and are adapted to be lowered step by step as the successive layers of biscuits are fed into place.

A shelf 426 is supported in spaced relation below the bed plate 423, the shelf 426 being suspended by four perpendicularly-disposed tubular posts 427, 428, 429, and 430. A crib 431 is mounted thereon for vertical movement, being provided with apertured corner-pieces 432 secured at its upper four corners, and which slidably engage the posts. Upon the under side of the crib there

are secured a pair of downwardly-extending posts 433 and 434 connected at their lower ends to arms 435 and 436 of a piston rod 437 provided at its upper end with a piston head 438 slidable in a perpendicularly-disposed suction cylinder 439 supported from the shelf 426 by hanger rods 440, and connected to the vacuum or suction-reducing apparatus by pipe 441. When the crib is free to move vertically, the suction action forces it to its raised position.

At the ends of the crib there are provided ratchet bars 442 and 443, respectively, having a series of four teeth adapted to be respectively engaged by the pawls 444 carried by vertically reciprocating shafts 445 and 446 mounted in sleeves 447 and 448 also mounted for vertical reciprocatory movement relatively to the shaft, guide collars 449 secured to the plate 423 supporting the upper ends of the sleeves, while their lower ends are slidable in apertures 450 of the shelf 426. The pawl 444 is pivotally mounted in an opening 451 of the shaft, a leaf spring 452 normally forcing it outwardly through a slot 453 of the sleeve, to engage the ratchet.

The lower ends of the shafts 445 and 446 project below the lower extremities of the sleeves and are connected to the ends of a cross-beam 454 provided centrally with a roller 455 engaged by a cam 456 mounted on the shaft 457 journaled in suitable bearing brackets 458, and driven from the shaft 113, (Fig. 1), by means of sprocket gears 459 and 460 provided respectively on the shafts and a sprocket chain 461.

The upper ends of the shafts extend above the plate 423, and are provided with shoulders 462, between which and the plate there are mounted helical expansion springs 463 adapted to exert a lifting force upon the shafts and to retain the roller 455 in engagement with the cam 456. As the cam is revolved, the shaft 446 is intermittently raised and lowered, and the pawls 444 being successively engaged with the ratchet 443, forces the crib intermittently from its raised to its lowered position.

The tubular posts 427, 428, 429, and 430 are provided longitudinally at their outer sides with a series of openings 464 so cut therein as to form ratchet teeth 465, and within each of the posts there is slidably arranged a bar 466 having a groove 467, in which are secured spaced blocks 468 provided at their upper ends with projecting tooth portions 469 oppositely inclined to the toothed portions 465. The bar 466 is adapted, as will be presently more fully described, to be moved upwardly relatively to the posts (Fig. 23), in which position, the teeth 469 meet the teeth 465, and a substantially unbroken outer surface is provided upon the posts. When lowered, the teeth separate,

as shown in Fig. 22, forming a series of recesses spaced equally to the spacing of the ratchet teeth 442 and 443, and adapted to be engaged by a pawl 470 provided in a slot 471 formed in each of the corner blocks 432, the pawl being yieldably held in engagement with the posts by a leaf spring 472.

The ends of the rods 466 extend below the shelf 426, and are connected in pairs by bars 473 and 474 having their apertured end-portions 475 secured to the rods by set-screws 476 (Fig. 30). Rock shafts 477 and 478 are mounted in outwardly spaced relation to the rods 466 in bearings 479, 480, 481, and 482, respectively, and upon the rock shafts there are respectively mounted within the bearings, yoke members 483 and 484 embracing the sleeves 447 and 448, and having slots 485 provided in their arms, which respectively engage trunnion pins 486 provided on the ends of the sleeves.

At the outer sides of the bearings, the rock shafts have mounted therein yoke members 487 and 488, each comprising side arms, and a connecting bar, which latter engages beneath the bars 473 and 474, as shown in Figs. 21 and 30.

Upon the inner ends of the rock shafts there are provided lever arms 489 and 490 connected by links 491 and 492 to the upwardly and downwardly projecting arms of a rock lever 493 provided on the end of the shaft 494 journaled in bearings 495. A lever 496 is provided at the end of the shaft 494, and is connected by a link 497 to one end of a lever 498 pivotally mounted in a bracket 499 supported from the under side of the bed plate. The end of the lever 498 slidably engages a cam slot 500 provided in the enlarged shouldered end 256^a of the slide bar 256 (Figs. 4, 19, 20, and 30).

The operation of this mechanism for raising and lowering the crib, is as follows—it being understood that the crib is lowered in four equal steps, and is thereupon raised in one movement to its upper position. Fig. 25 indicates the raised position of the crib, the pawls 444 being engaged with the lowermost teeth the ratchet arms 442 and 443. As the cam 456 rotates, the shafts 445 and 446 are intermittently reciprocated, thereby lowering the crib step by step. During this movement, the crib is prevented from returning to its upper position by engagement of the pawls 470 with the tooth portions 469 of the blocks 468.

As the crib reaches its lowermost position, the boxes having then been filled with the four layers of biscuits, the feed-bar 256 is reciprocated inwardly to feed the boxes into position to be filled, and to remove the filled boxes, as will hereinafter be more fully pointed out. And during this movement, the cam slot 500 swings the lever 498, and through the links 497 turns the rock

lever 493, which, through the links 491 and 492, rotate the lever arms 489 and 490, and thereby rotate the rock shafts 477 and 478, the rotation of the shafts 477 and 478 swinging the yoke members 487 and 488 upwardly, raising the cross-bars 473 and 474 and the shaft 466, and thereby raising the toothed blocks 468 from the position shown in Fig. 24 to that shown in Fig. 25, forcing the pawl 470 from engagement therewith. At the same time, the yoke members 483 and 484 swing downwardly and draw the tubular posts 447 and 448 downwardly, so that the upper end of the slot 453 forces the pawl 444 into the opening 451 against the force of the spring 452, thereby releasing the crib see Fig. 27. Thereupon, the crib is forced to its upper position by the suction action within the cylinder 439 against the piston head 438.

The crib 431 supports a pair of elevated collapsible platforms adapted in the lowermost position of the crib to collapse within the openings 424 and 425 of the plate 423, and in the raised and successive biscuit-lowering position, to be expanded within the boxes.

The two platforms are of similar construction but oppositely disposed, and each comprises telescopic plates 501 and 502, the plate 501 having side flanges 503 embracing the side edges of the plate 502. The plates are each supported, in elevated relation to the crib, upon five arms 504, 505, 506, 507, and 508 pivotally connected at their lower ends to brackets 509 provided upon the base of the crib, and pivotally connected at their upper ends by brackets 510 provided upon the under sides of the plates; the arms 504 and 505 being connected at the outer end of the plate 502; the arm 506 being connected centrally at the other end of said plate; while the arms 507 and 508 are connected to the outer end of the plate 501. Slots 511 and 512 provided in the plate 502 are adapted to embrace the brackets to which the arms 507 and 508 are connected in the collapsed position of the plates, as shown in Fig. 28. The arms 507 and 508 of the right-hand platform (Fig. 21) are connected by a cross-rod 513, to which is connected one end of a link 514 connected at its other end to a cross-bar 515 connecting the arms 504 and 505 of the left-hand platform. The arms 504 and 505 of the right-hand platform are connected by a cross-bar 516, to which is connected one end of a link 517, the other end of which is connected to one end of a link 518, and the other end of which is connected to a cross-bar 519 connecting the arms 507 and 508 of the left-hand platform.

Upon a transverse shaft 520, (Figs. 21 and 29), mounted in the crib, there is provided a T-shaped bell-crank lever having

three arms,—the arm 521 having slotted connection with the link 514 at 522; the arm 523 being connected to the pivotal connection between the links 517 and 518; while the arm 524 is provided with a roller 525 disposed between the opposed ends of vertically disposed stop posts 526 and 527, respectively, provided on the plate 423 and the platform 426, the post 527 projecting through an opening 528 in the base of the crib in the lowered position thereof.

As the crib is projected to its raised position, the roller 525 abuts against the post 526, as shown in Fig. 25, and the lever being rocked in clockwise direction, forces the bar 514 to the right, and the arms 507 and 508 of the right-hand platform and the arms 504 and 505 of the left-hand platform, to open position. At the same time, the links 517 and 518 are moved to the left, swinging the right-hand arms 504 and 505 and the left-hand arms 507 and 508 to their open position, thereby expanding the platform sections 501 and 502 to span the interior of the boxes at their upper open ends, forming a support for the first layer of biscuits.

As the crib is lowered step by step, and the successive layers of biscuits fed into the boxes, the roller 525 finally engages the post 527, turning the bell-crank lever in counter-clockwise direction, thereby collapsing the platforms so that they engage within the openings 424 and 425 of the plate 423, as shown in Fig. 21. As soon as the platform reaches this position, the boxes being filled, the box-feeding mechanism is operated to remove the filled boxes and bring empty boxes into place; whereupon, the action of the cam 500, provided upon the portion 256 of the bar 256, releases the crib, and the suction action within the cylinder 439, acting upon the piston head 438, projects the crib to its raised position, thereby expanding the platforms in the upper ends of the empty boxes.

Above the boxes there is provided a vertically reciprocating pressure bar 530 provided with a series of curved plates 531 adapted to engage the separate biscuits through downward movement of the bar, to insure their being fed into the boxes. The bar is mounted, at its ends, upon transversely-disposed end blocks 532 and 533 mounted upon the upper ends of vertical slide rods 534 and 535, 536 and 537, respectively, which are guided through projecting portions 538 and 539 of the walls 243 and 244, respectively, and are connected beneath these portions by cross-pieces 540 and 541.

At the upper ends of the shafts 445 and 446, there are provided reduced extensions 542 and 543 projecting through openings 544 and 545 provided centrally of the cross-pieces, and provided at their upper ends

with enlargements, between which and the cross-pieces there are respectively provided helical expansion springs 546 and 547. As the shafts 445 and 446 move downwardly to lower the crib step by step, its connection with the cross-bar 530 causes it to partake of the initial downward movement, but permits the shafts to continue their downward stroke after the bar is stopped by abutment of the stops 548 against the upper surface of the walls 243 and 244.

Knife-blades 549 and 550 are secured upon the inner sides of the end blocks 532 and 533, and are adapted to co-operate with the inner edges of the walls 243 and 244 as the bar is moved downwardly to sever lengths of the paper strips after they are intermittently fed inwardly at each side, and during the downward movement of the biscuits into the boxes, the paper strips being disposed beneath each layer of the biscuits.

As the boxes are filled, they are moved forwardly between the walls 243, 244, and 245, to permit the empty boxes to be fed into the filling position, the filled boxes being individually fed by auxiliary feeding means, so that their weight will not oppose the incoming boxes. The walls 243, 244, and 245 are slotted, (Figs. 2, 31, 35), and are provided with reciprocating feed bars indicated generally as 551, 552, 553, and 554, (Fig. 21), and adapted to cooperate with the ends of the boxes to engage and feed them during rearward reciprocation, and to reciprocate forwardly free of the boxes. These bars are of similar construction, and will be presently more fully described in detail.

At the outer side of the wall 244, there is pivotally mounted a lever arm 555 connected by a link 556 to the bar 256, and connected intermedially its ends by a tie rod 557 to a lever arm 558 pivotally mounted upon a bracket 559 supported from the bed plate.

The upper end of the lever 558 is connected to the jointed ends of links 560 and 561, the link 560 being connected to the end of the feed bar 554; while the link 561 is connected to the lower end of a lever 562, provided at the end of a rock shaft 563 journaled in bearing brackets 564 provided on the upper surfaces of the walls, and extending transversely across them. At its other end, the rock shaft is provided with a lever arm 565 connected by a link 566 to the bar 551, while intermediately, it is provided with a lever arm 567 extending downwardly in an opening 568 of the wall 245 and connected by a link 569 to the bars 552 and 553. Thus, as the bar 256 is reciprocated to and fro to feed the empty boxes into filling position, the system of leverage connected thereto, causes a corresponding to and fro reciprocation of the feed bars 551, 552, 553, and 554.

The detail construction of these bars is shown in Figs 32 to 35. They comprise a bar 570 and a bar 571, having relative limited movement therewith through a pin 572 of the bar 571 engaging a slot 573 of the bar 570, so that as the bar 570 is positively reciprocated in one or the other direction, it has a limited initial movement independently of the bar 571, but during the remainder of its movement, the bar 571 moves therewith.

A series of spaced openings or pockets 574 are provided in the bar 571, in each of which there is provided a finger plate 575 pivotally mounted at its forward end upon a pin 576, and provided at its rearward end with a projecting tooth 577, being so proportioned that it may be drawn entirely within the pocket 574, as shown in Fig. 32. The plate 575 is connected to the bar 570 by a link 578 disposed in a slot 579 of the bar 570, and pivotally mounted upon a vertically-disposed pin 578^a.

As the bar 570 is reciprocated rearwardly to feed the boxes, its initial independent movement relatively to the bar 571, forces the plate 575 outwardly from the pockets 574, as shown in Fig. 33, so that the toothed portions 577 thereof, each engage behind a box, the unitary movement of the two bars 570 and 571 then feeding the boxes rearwardly, the bar 316, at the same time, feeding the empty boxes into place, to be filled, through reciprocation of the bar 256. The reverse movement of the bar 570 first draws the plates into the pockets, and they then move forwardly free of the boxes.

As the boxes are fed between the walls 243, 244, and 245, their upper end-flaps are folded over by means of folding plates 580, 581, 582, and 583, (Figs. 2, 8, and 21), these plates being so shaped and disposed as to enter between the flaps folded down against the ends of the boxes and fold them over upon the upper sides of the boxes, whereupon, they are held in such position as the boxes are fed rearwardly, by holding-down wires 584. The intermediate plates 581 and 582, for folding in the inner flaps, are combined, as shown in Fig. 8, the plate 582 being disposed in front of the plate 581, so that the inner flaps of the right-hand boxes are folded in before the inner flaps of the left-hand boxes;—this for the purpose of preventing interference between the folding in of these inner flaps, which are so closely positioned to each other, that if they were not folded, one before the other, they would interfere.

The boxes are fed from between the walls 243, 244, and 245 upon a longitudinal platform 585, (Figs. 2 and 42), mounted upon supports 586, guide flanges 587 and 588 being provided along the longitudinal edges of

the platform, for a portion of its length, to retain the lower side flaps of the boxes folded upwardly against the sides.

An endless conveyor-chain 589 is provided upon sprocket gears 590 and 591, and is adapted to be driven intermittently as the boxes are fed into place between the spaced arms 592 supported upon the chain, the intermittent movement being equal to the length of two boxes, so that as the two boxes are intermittently moved longitudinally along the platform, the feeding arms successively move into place to receive the filled boxes fed forwardly from the feeding mechanism, the chain being intercepted in its movement for a sufficient length of time to permit these boxes to be fed into place between the arms. The chain is driven from the shaft 113 by an intermittent spur gear 593 meshing with a pinion 594 provided upon the shaft of the sprocket 590, and mounted upon a vertically-disposed shaft 595 provided with a beveled pinion 596 meshed by a beveled gear 597 provided upon the end of the shaft 113.

Beyond the flanges 587 and 588, the platform is provided with a slightly raised extension 598, (Fig. 42), which overlies the end of a longitudinal platform 599, and is slightly spaced therefrom, as at 600. As the boxes are fed along the platform 585 upon the portion 598 beyond the flanges 587 and 588, they come into relation with upper and lower flap-turning members 601 and 602 mounted on the end of the platform 599 adapted to turn the side flaps of the boxes over upon the upper and lower sides of the boxes.

At their side portions, these members are provided with projecting fingers 603 and 604 having their forward edges sharpened, and adapted to enter between the flaps and the sides of the boxes, their upper edges being formed in continuously curved relation with the forwardly and inwardly curved edges of the members 601 and 602, so that the flaps are folded over upon the upper and lower sides of the boxes,—the lower flaps being first folded beneath the extension portion 598 of the platform 585, and then passing through the space at 600 upon the platform 599.

A holding-down wire 605, (Fig. 2), extends above the platform 585 to the flap-turning member 601 substantially along its center line, and is adapted to hold the upper folded-in end-flaps down upon the upper sides of the boxes; and holding-down wires 606 and 607 extend from the member 601 above the platform 599, being disposed above the upper folded-in side flaps, and adapted to hold them flat, preparatory to the sealing of the boxes. The side flaps now have sealing strips pasted along their adjacent marginal portions across the space

between them, the ends of the strips overlying the folded-in end-flaps, the sealing being such, that while the boxes are completely closed, they are not air-tight, air being admitted between the ends of the side flaps and the upper surface of the end-flaps,—it being desirable, in the packing of biscuits, such as those for which the present machine is particularly adapted, to allow a certain amount of air to enter the boxes.

The sealing strip feeding and pasting mechanism is shown in Figs. 43 and 44. Side plates 608 and 609 are mounted upon the platform 599 at each side of the boxes being fed thereon, the plate 608 being bent outwardly, as at 610, to embrace the chain 589. These plates support, at their ends, mechanism for feeding and pasting strips for the upper sides of the boxes, and are provided with portions 611 and 612 extending downwardly beneath the platform 599 for supporting the mechanism for feeding and pasting the strips for the lower sides of the boxes. The two mechanisms are exactly alike,—one being inverted with relation to the other—so that the following description of the upper mechanism may also be considered as descriptive of the lower mechanism, and the same reference characters are, therefore, applied to the corresponding parts of the two mechanisms.

Upon a shaft 613, there is mounted a roll of pasting-tape 614 carried between feed rollers 615 and 616 mounted upon shafts 617 and 618, and thence beneath a pressure roll 619 adapted to engage the upper sides of the boxes, and mounted upon a shaft 620. The shaft 617 of the roller 615 is yieldably mounted, being movable in slots 621 of the side plates, and forced toward the roller 616 by springs 622, so as to tightly engage the paper. A driving shaft 623 is journaled in the plates, being provided with pulleys 624 and 625 connected by driving belts 626 and 627 with pulleys 628 and 629 provided upon the shafts 620 and 618 of the pressure and feed rollers respectively. The driving shaft 623 of the upper mechanism is driven from the corresponding driving shaft of the lower mechanism by a belt 630 extending over pulleys 631 and 632 provided upon the ends of the shafts, the shaft of the lower mechanism being intermittently driven from the mechanism for driving the box-feeding chain by means of a sprocket chain 633 extending over a sprocket gear 634 upon the lower driving shaft 623, and a sprocket gear 635 provided upon a shaft 636 adapted to be driven from the shaft 595 upon which the chain-driving sprocket 590 is mounted by beveled gears 637 and 638.

The strip being fed between rollers 615 and 616 and beneath the roller 619, is adapted to be periodically cut off in proper lengths, and for this purpose, a stationary

knife-blade 639 is mounted between the supporting plates, with its edge in proximity to the inner side of the paper strip; while at the outer side of the strip, there is provided a blade 640 transversely disposed and mounted upon the end of a reciprocating bar 641 slidable in a guide 642, and connected at its end to one end of a trip lever 643 mounted upon a shaft 644, and provided at its other end with a roller 645 engaging a cam 646 provided upon the shaft 623. As the shaft is revolved, the cam intermittently trips the lever 643, drawing the blade 640 inwardly so that it co-operates with the stationary blade 639, to sever proper lengths of the strip to be pasted upon the upper sides of the boxes.

A spring 647 is connected at one end to a pin 648 provided upon the guide block 642, and its other end is connected to a pin 649 mounted upon the bar 641, movable in a slot 650 of the block 642, being adapted to retain the roller 645 in engagement with the cam.

The paper strip is preferably gummed upon one side, and as it is fed, it is adapted to be moistened by a roller 651 engaging a roller 652 moving in a trough 653 in which water is placed. These rollers may be positively driven, if desired, but preferably, they are driven by frictional contact of the roller 651 with the paper strip.

As the boxes are fed from relation with the strip-pasting mechanism, they move along the platform 599, and are removed from the machine as the arms 592 pass around the sprocket gear 591, where they may be received upon a suitable conveyor.

I wish it understood that the particular machine and the different parts thereof illustrated and described are merely a typical embodiment of one form of my invention, and that the specific construction described herein is merely by way of illustration and not by way of limiting or narrowing my claims, as obviously a great many changes in construction and design can be made without departing from my invention, and without affecting the different sub-combinations thereof, and, obviously also, various of the features described can be omitted, leaving the machine still operative to usefully do certain of the work described, and such changes are contemplated by me and would not involve any departure from my invention.

Having now described the invention, what is claimed as new and for which Letters Patent of the United States is desired, is:

1. In a machine of the character described comprising means for successively feeding collapsed cartons to the machine, suction means for opening the cartons, means for alternately feeding the layer of articles and separating strips into the carton, and means

for closing the upper and lower ends of the carton after the desired number of layers have been fed thereto.

2. In a machine of the character described comprising means for successively feeding collapsed cartons thereto, horizontal movable suction means for opening the cartons, and means for feeding a layer of articles into the carton and a separating strip between the layers and means for closing the upper and lower ends of the carton.

3. In a machine of the character described comprising means for successively feeding collapsed cartons thereto, horizontal movable suction means for opening the cartons, means for feeding a plurality of layers of articles into the carton, and means for feeding separating strips between the layers from a roll and cutting them into the desired length.

4. In combination, a guide-way for opened cartons, means adapted to contain collapsed cartons, a reciprocating feed head adapted to singly remove the collapsed cartons from the carton-containing means, swinging suction means for opening the collapsed cartons within the guide-way, said reciprocating feed head adapted to feed the opened cartons upon its successive feeding stroke.

5. In combination, a guide-way for opened cartons, means adapted to contain collapsed cartons, a reciprocating feed head having a recess adapted to receive and feed the collapsed cartons, swinging suction means for opening the cartons within the guide-way, and means carried by said feed head adapted to feed the cartons within said guide-way upon its successive feeding stroke.

6. In combination, a guide-way for opened cartons, an inclined hopper adapted to contain a plurality of collapsed cartons, gravity-actuated means for feeding the cartons forwardly therein, a reciprocating feed head normally closing the end of the hopper and supporting the cartons therein, and having a recessed portion adapted to receive and feed the collapsed cartons singly from the hopper, means adapted to open the collapsed cartons upon reverse reciprocation of the feed head, and means carried by the feed head to feed the opened cartons forwardly in the guide-way upon its successive forward stroke.

7. In combination, a guide-way for opened cartons, means for containing a plurality of collapsed cartons, means for feeding the collapsed cartons singly therefrom along one wall of said guide-way, and means for opening the cartons, comprising a swinging head normally flush with the other wall, and movable in parallel relation to the walls into engagement with the carton, to open it upon return to normal position.

8. In combination, a guide-way for opened cartons, means for containing a plurality of collapsed cartons, means for feeding the collapsed cartons singly therefrom along one wall of said guide-way, and means for opening the cartons, comprising a swinging head normally disposed adjacent the other wall of the guide-way, and adapted to move transversely and diagonally across the guide-way to engage the carton to open it upon return to its normal position.

9. In combination, a guide-way for opened cartons, means for feeding collapsed cartons along one wall of said guide-way, and means for opening the cartons, comprising a hollow movable head normally disposed adjacent the other wall of the guide-way, and having perforations in its inner face, means for creating suction therein, the head adapted to move across the guide-way to engage the carton to open it upon return to its normal position.

10. In combination, a guide-way for opened cartons, means for feeding collapsed cartons along one wall of said guide-way, and means for opening the cartons, comprising a hollow swinging head normally disposed adjacent the other wall of the guide-way and having perforations in its inner face, means for creating suction therein, a flexible conduit connecting the head to said suction means, the head adapted to move across the guide-way to engage the carton to open it upon return to its normal position.

11. In combination, a guide-way for opened cartons, means for feeding collapsed cartons along one wall of said guide-way, and means for opening the cartons, comprising a head, pivoted means supporting the head adapted to be oscillated to swing the head diagonally across the guide-way to engage the carton to open it upon return to its normal position.

12. In combination, a guide-way for opened cartons, comprising suction walls, means for feeding collapsed cartons along one wall of the guide-way, a non-suction portion of said wall adapted to permit free swinging movement of the end portion of the carton away from the wall, means for opening the cartons, comprising a movable suction-head adapted to move across the guide-way into engagement with the collapsed carton, to open it by return movement to its normal position.

13. In combination, a guide-way for opened cartons, means adapted to feed cartons therethrough, a second guide-way at right angles to the first guide-way, means for feeding the cartons from the end of the first guide-way through the second guide-way, said means having a reciprocating head, a slide rod hingeably connected to one end of the head, a second slide rod pivotally con-

nected to the feed head at a point removed from the hinged connection of the first slide rod, means connecting the slide rods and permitting relative movement between them, and means for imparting reciprocatory movement to one of the slide rods, whereby the head is given swinging movement during its reciprocation in one direction.

14. In combination, a guide-way for opened cartons, means adapted to feed cartons therethrough, a second guide-way at right angles to the first guide-way, means for feeding the cartons from the end of the first guide-way through the second guide-way, said means comprising a reciprocating head, a slide rod hingeably connected at one end of the head, a second slide rod pivotally connected to the feed head at a point removed from the hinged connection of the first slide rod, a slot-and-pin connection between the slide rods permitting relative movement between them, and means for imparting reciprocatory movement to one of the slide rods, whereby the head is given swinging movement during its reciprocation in one direction.

15. In combination, a guide-way for opened cartons having flaps, means for feeding the cartons through said guide-way, a second guide-way at right angles to said first guide-way, means for feeding the cartons from the first guide-way through the second guide-way, and means disposed in relation to the second guide-way adapted to turn the bottom flaps of the cartons along the sides as the cartons are fed through said guide-way.

16. In combination, a guide-way for opened cartons having flaps, means for feeding the cartons through said guide-way, a second guide-way at right angles to said first guide-way, means for feeding the cartons from the first guide-way through the second guide-way, means disposed in relation to the second guide-way adapted to turn the flaps of the cartons along the sides as the cartons are fed through said guide-way, a third guide-way at right angles to the second guide-way, and means for feeding the cartons from the second guide-way through the third guide-way.

17. In combination, a guide-way for opened cartons having flaps, means for feeding the cartons through said guide-way, a second guide-way at right angles to said first guide-way, means for feeding the cartons from the first guide-way through the second guide-way, means disposed in relation to the second guide-way adapted to turn the flaps of the cartons along the sides as the cartons are fed through said guide-way, a third guide-way at right angles to the second guide-way, means for feeding the cartons from the second guide-way through the third guide-way, means for feeding articles to the

cartons, and means for feeding the cartons from the third guide-way into relation with said last-mentioned means.

18. In combination, a guide-way for opened cartons having flaps, means disposed in relation to the guide-way adapted to turn over the flaps along two of the lower edges of the side walls of the cartons, a second guide-way at right angles to the first guide-way, means for feeding the cartons from the first-guide-way to the second guide-way, a third guide-way at right angles to the second guide-way, means for feeding the cartons from the second guide-way through the third guide-way, and means disposed in relation to the third guide-way arranged to feed articles into the cartons.

19. In combination, a guide-way for opened cartons, means for feeding a single row of cartons therethrough, two parallel guide-ways disposed at right angles to said first guide-way, means for feeding two cartons from said first guide-way into said two parallel guide-ways, and comprising a swinging head adapted to have swinging movement upon its rearward reciprocation, to permit of the feeding of the cartons through said first guide-way before complete return of the feeding-head to its normal position.

20. In combination, a guide-way for opened cartons, means for feeding a single row of cartons therethrough, a plurality of parallel guide-ways disposed at right angles to said first guide-way, means for feeding a plurality of cartons from said first guide-way into the plurality of guide-ways, means for feeding articles into the cartons, and means movable in parallel relation to the carton-feeding means for feeding articles into filling relation with the cartons.

21. In combination, a guide-way for opened cartons, means for feeding a single row of cartons therethrough, a plurality of parallel guide-ways disposed at right angles to said first guide-way, means for intermittently feeding a plurality of cartons from said first guide-way into the plurality of guide-ways, means for feeding successive layers of articles into the cartons, and means movable in parallel relation to the carton-feeding means for feeding a plurality of layers of articles into filling relation with the cartons following each feeding movement of the cartons.

22. In combination, a guide-way for opened cartons, means for feeding a single row of cartons therethrough, two parallel guide-ways disposed at right angles to said first guide-way, means for feeding two cartons from said first guide-way into said two parallel guide-ways, and comprising a head, a slide bar hingedly connected to one end of the head, a slide bar pivotal-

ly connected intermediate the ends of said head, said slide bars being movable with each other and having relative limited movement between them, whereby said head is adapted to have swinging movement upon its rearward reciprocation, to permit of the feeding of the cartons through said first guide-way before complete return of the feeding-head to its normal position.

23. In combination, a guide-way for cartons, reciprocating means for feeding unfilled cartons therethrough, means for feeding articles into the cartons, reciprocating means for feeding the filled cartons from said last-mentioned means, comprising a bar disposed at each side of the row of cartons, means co-operatively connecting said bars to the reciprocating means for the unfilled cartons, said bar being provided with a plurality of recesses and pivoted fingers disposed in said recesses adapted to be projected upon forward reciprocation of said bars, to enter behind the individual cartons to feed them, and to be retracted into said recesses upon rearward reciprocation.

24. In combination, a guide-way for opened cartons having flaps, means associated with the guide-way adapted to turn the lower flaps along the sides and leaving a space between the ends of the turned flaps, means for feeding articles into the cartons, means for feeding the cartons from said guide-way into filling relation with said last-mentioned means, means for feeding the articles above the upper ends of the cartons, and means for lowering the articles into the cartons, comprising a collapsible platform adapted to be inserted upwardly into the cartons through the space between said turned flaps, said platform adapted to be expanded into the cartons to support the articles as they are lowered.

25. In combination, a guide-way for opened cartons having flaps, means associated with the guide-way adapted to turn the lower flaps along the sides and leaving a space between the ends of the turned flaps, means for feeding articles into the cartons, means for feeding the cartons from said guide-way into filling relation with said last-mentioned means, means for feeding the articles above the upper ends of the cartons, means for lowering the articles into the cartons, comprising a collapsible platform adapted to be inserted upwardly into the cartons through the space between said turned flaps, said platform adapted to be expanded into the cartons to support the articles as they are lowered, and means for feeding a strip of card-board, or the like, beneath each layer of articles.

26. In combination, a guide-way for opened cartons having flaps, means associated with the guide-way adapted to turn the lower flaps along the sides and leaving

a space between the ends of the turned flaps, means for feeding articles into the cartons, means for feeding the cartons from said guide-way into filling relation with said last-mentioned means, means for feeding the articles above the upper ends of the cartons, means for lowering the articles into the cartons, comprising a collapsible platform adapted to be inserted upwardly into the cartons through the space between said turned flaps, said platform adapted to be expanded into the cartons to support the articles as they are lowered, means for feeding a strip of card-board, or the like, beneath each layer of articles, and means co-operating with the platform lowering means for severing a length of the strip.

27. In combination, a guide-way for opened cartons having flaps, means associated with the guide-way adapted to turn the lower flaps along the sides and leaving a space between the ends of the turned flaps, means for feeding articles into the cartons, means for feeding the cartons from said guide-way into filling relation with said last-mentioned means, means for feeding a plurality of successive layers of the articles above the upper ends of the cartons, and means for lowering the layers successively into the cartons, comprising a collapsible platform adapted to be inserted upwardly into the cartons through the space between said turned flaps, said platform adapted to be expanded into the cartons to support the layers as they are lowered, and to be lowered step by step as the layers are fed into place, to feed the layers into the cartons in superimposed relation.

28. In combination, a guide-way for opened cartons having flaps, means associated with the guide-way adapted to turn the lower flaps along the sides and leaving a space between the ends of the turned flaps, means for feeding articles into the cartons, means for feeding the cartons from said guide-way into filling relation with said last-mentioned means, means for feeding a plurality of successive layers of the articles above the upper ends of the cartons, means for lowering the layers successively into the cartons, comprising a collapsible platform adapted to be inserted upwardly into the cartons through the space between said turned flaps, said platform adapted to be expanded into the cartons to support the layers as they are lowered, said platform adapted to be lowered step by step as the layers are fed into place to feed the layers into the cartons in superimposed relation, and means for feeding strips of card-board, or the like, between superimposed layers.

29. In a carton filling mechanism, the combination of a support for a carton, a biscuit support adapted to work within the carton, and automatic means for lowering

the biscuit support within the carton on the carton support with a step by step movement and for returning the support in a single step to its uppermost position upon the completion of its downward movement. 70

30. In combination, a carton-filling mechanism comprising a platform, a support for the platform adapted to be raised and lowered, means normally tending to move the support to its raised position, means adapted to lower the platform step by step, ratchet means having notches, a pawl adapted to engage the notches to retain the platform in its lowering position, and means having relative movement to said ratchet adapted to close the notches to disengage the pawl from the ratchet, to permit said support to return to its raised position. 80

31. In combination, a carton-filling mechanism comprising a collapsible platform consisting of a plurality of relatively movable sections, a support for the platform adapted to be raised and lowered, means co-operating with the platform adapted to expand it as the support is raised, and to contract it as the support is moved to its lowermost position. 85

32. In combination, a guide-way for opened cartons, means for feeding the cartons through said guide-way into article-filling position, means for feeding articles into position above the opened ends of the cartons, and means for feeding the articles downwardly therein, comprising a support adapted to be raised and lowered, a collapsible platform consisting of telescoping sections, pivoted arms supporting the telescoping sections upon the support, and means co-operating with the arms, adapted to expand the platform into the cartons as the support is moved to its raised position, and to contract the platform as it is moved to its lowered position. 90

33. In combination, a guide-way for opened cartons, means disposed in relation to the guide-way for feeding successive layers of articles into the cartons, means for feeding the cartons through the guide-way into relation with said feeding means, and means for feeding a plurality of layers of the articles into feeding relation with the cartons during a single feeding movement of the cartons. 100

34. In combination, a guide-way for opened cartons, means disposed in relation to the guide-way for feeding successive layers of articles into the cartons, means for feeding the cartons through the guide-way into relation with said feeding means, means for feeding a plurality of layers of the articles into feeding relation with the cartons, during a single feeding movement of the cartons, and means cooperative with the carton-feeding means and the article-feeding means, whereby the carton-feeding 105

means operates periodically during and slightly in advance of one of a plurality of operations of the article-feeding means.

35. An improved method of filling cartons having their upper and lower ends closed by flaps consisting in feeding the cartons into filling positions with their upper and lower flaps open, inserting an article supporting means upwardly into the carton, feeding articles in layers above the carton, successively lowering the article supporting means into the carton, and folding the flaps to close the upper and lower ends of the carton.

36. In a machine of the character described, the combination of a guide-way, suction means in one wall of the guide-way, means for successively feeding collapsed cartons into the guide-way in contact with the said suction means, and a swinging suction head movable into the guide-way into cooperative relation with the suction means therein, this suction head being removed to contact with a wall of the cartons successively fed into the guide-way and to move back out of the guideway to open the said cartons.

37. In a machine of the character described, the combination of a guide-way, a hollow section in the guideway wall having perforations in its face, means for drawing air through this section, means for successively feeding collapsed cartons to the guide-way and placing them in contact with the face of the said section, and swinging suction means mounted in the opposite wall of the guide-way and movable across the latter to contact with the carton lying against the said section, this suction means being operable upon return to its original position to open the carton.

38. In a machine of the class described, the combination of a support for the biscuits adapted to work within the cartons, and means for automatically moving said support step by step vertically downward and returning the same to first position in packing successive cartons with superposed layers of biscuits.

39. In a machine of the class described, the combination of a biscuit support adapted to work within the cartons, and means for giving said support a continuous series of intermittent vertical movements in packing successive cartons with superposed layers of biscuits.

40. In a machine of the class described, the combination of a biscuit support adapted to work within the cartons, and means for automatically operating the same intermittently one full stroke upwardly and a plurality of part strokes downwardly.

41. In a machine of the class described, the combination of a carton support having a bottom opening, an expansible and con-

tractible biscuit support adapted to work within the cartons and within said bottom opening, and means for automatically moving the biscuit support step by step vertically downward and returning the same to first position, adapted to expand the biscuit support upon the upward movement thereof and to contract the same upon the last downward movement.

42. In a machine of the class described, the combination of a carton support having a bottom opening, an expansible and contractible biscuit support adapted to work within the cartons and within said bottom opening, means for automatically moving the biscuit support one full stroke upwardly and a plurality of part strokes downwardly, and means co-acting therewith to expand the biscuit support upon the upstroke thereof and to contract the same upon the last down stroke.

43. In a machine of the class described, the combination of a biscuit support adapted to work within the cartons, means for moving the same step by step vertically, insert paper supply means, and means for moving the same intermittently during the stoppages consequent upon the intermittent movement of the biscuit support.

44. In a machine of the class described, the combination of a biscuit support adapted to work within the cartons, means for moving the same step by step vertically, means for supplying insert paper, means for cutting the same transversely, and means for moving the insert paper supplying and cutting means to feed and cut said paper during the stoppages consequent upon the intermittent movement of the biscuit support.

45. In a machine of the class described, the combination of a biscuit support adapted to work within the cartons, automatic means for moving the same step by step downwardly and a full stroke upwardly, and means for preventing upward movement of the biscuit support at other than the proper times.

46. In a machine of the class described, the combination of a biscuit support adapted to work within the cartons, means for moving the same step by step vertically downward and a full stroke upwardly, and means for preventing upward movement of the biscuit support at other than the proper times, including a rack device, a pawl engaging the same, and means for releasing said pawl.

47. In a machine of the class described, the combination of a guide-way for the cartons having end flanges and a bottom opening, biscuit supporting and lowering means adapted to work within the cartons and through said bottom opening, means for intermittently operating the biscuit supporting and lowering means, and a feed platform for

biscuits on a level with the top of the carton being packed, said biscuit supporting and lowering means being expansible and contractible, and the operating means being adapted to expand and contract the same.

48. In a machine of the class described, the combination of a guide for the cartons having a bottom opening and adapted to uphold the cartons, biscuit supporting and lowering means adapted to work within the cartons and through said bottom opening and adapted for expansion and contraction, means for intermittently operating the biscuit supporting and lowering means one full stroke upwardly and a plurality of part strokes downwardly, and means co-acting with said operating means to expand the biscuit supporting and lowering means upon said full stroke thereof and for contracting the same during the last down stroke thereof.

49. In a machine of the class described, the combination of biscuit supporting and lowering means adapted to work within the cartons, and means for operating the first named means a plurality of part strokes downwardly and one full stroke upwardly, and means for preventing upward movement of the biscuit supporting and lowering means at other than the proper times including a rack device, a pawl engaging the same, and intermittently operating means for releasing said pawl.

50. In a machine of the class described, the combination of a support for a carton, a support movable into the carton from below and adapted to receive biscuits, and automatic means for raising the biscuit support to the top of the carton in a single step and lowering the support to the bottom of the carton in a succession of steps.

51. In a machine of the class described, the combination of a support for an open bottom carton, an opening in the support with which the carton is to be placed in registry, a biscuit support movable through the opening in the carton support and into the carton, this biscuit support being arranged to receive rows of biscuits, and means connected to the biscuit support through the opening in the carton support and automatically operable to move the biscuit support within the carton in a succession of step by step movements.

52. In a machine of the class described, the combination of a support for a carton having a restricted opening, a support adapted to receive biscuits to be packed in a carton and movable through the restricted carton opening, this biscuit support being collapsible and expansible, and means for moving the biscuit support into and out of the carton, the said means being operable to collapse the support as it is moved through the carton opening out of the carton and to expand

the support after it has moved into the carton through the restricted opening.

53. In a machine of the class described, the combination of supports for a pair of cartons, a biscuit support movable into each carton on the carton support, this biscuit support being arranged to receive superimposed groups of biscuits, and automatic means for raising the biscuit supports in unison to the tops of the cartons and for lowering the biscuit supports in unison to the bottoms of the cartons with a step by step movement.

54. In a machine of the class described, the combination of biscuit supporting and lowering means, means for feeding biscuits thereto, and means for feeding paper strips over biscuits previously fed to said supporting and lowering means.

55. In a machine of the class described, the combination of intermittently operating biscuit supporting and lowering means, intermittently operating means for feeding biscuits thereto, and intermittently operating means for feeding paper strips over biscuits previously fed.

56. In a machine of the class described, the combination of a horizontal platform, means for feeding cartons successively past and in register with said platform, means for delivering successive rows of biscuits to said cartons, and means for feeding successive rows of biscuits upon said platform and therefrom upon said delivery means.

57. In a machine of the class described, the combination of a horizontal platform, means for feeding cartons successively past and in register with said platform, means for delivering successive rows of biscuits to said cartons, each row as a unit to a carton, and means for feeding successive rows of biscuits upon said platform and therefrom upon said delivery means.

58. In a machine of the class described, the combination of a horizontal platform, means for feeding cartons successively past and in register with said platform, means working within the cartons for delivering successive rows of biscuits thereto, and means for feeding successive rows of biscuits from said platform upon said delivery means.

59. In a machine of the class described, the combination of a horizontal platform, means for feeding successive rows of biscuits thereon, means for feeding cartons successively past and in register with said platform, means working within the cartons for delivering successive rows of biscuits thereto, each row as a unit to a carton, and means for pushing successive rows of biscuits from said platform upon said delivery means.

60. In a machine of the class described, the combination of a horizontal platform,

means for feeding successive rows of biscuits thereon, means for feeding cartons successively past and in register with said platform, a biscuit support working within the cartons for delivering successive rows of biscuits thereto and including means for automatically operating the same intermittently one full stroke upwardly and a plurality of part strokes downwardly, and means for feeding successive rows of biscuits from said platform upon said biscuit support.

61. In a machine of the class described, the combination of means for successively feeding cartons to a filling position, and means for removing a row of biscuits in single file and as a unit from a supply and delivering the biscuits to the cartons in such position

62. In a machine of the class described, the combination of means for successively feeding cartons to filling position, and means for removing successive rows of biscuits from a supply, each row in single file and as a unit and delivering the same to the cartons in filling position, each row as a unit to a carton.

63. In a machine of the class described, the combination of means for successively feeding cartons to filling position, biscuit supporting and lowering means, and means for removing successive rows of biscuits from a supply and delivering the same to the supporting and lowering means and thereby to the cartons in filling position.

64. In a machine of the class described, the combination of means for successively feeding cartons to filling position, biscuit supporting and lowering means, a platform, means for successively removing biscuits from a supply and transferring them to the platform, and means for removing biscuits from the platform and delivering these biscuits to the biscuit supporting and lowering means and thereby to the cartons in filling position.

65. In a machine of the class described, the combination of means for feeding a succession of cartons to filling position, means for removing biscuits from a supply in successive rows in single file and delivering the biscuits to the cartons in filling position, and means for ejecting the filled cartons from the filling position.

66. In a machine of the class described, the combination of means for feeding empty cartons to a filling position, means for removing biscuits from a supply in rows in single file and delivering the biscuits to the cartons in the filling position, means for ejecting the filled cartons from filling position, and means for synchronizing the carton feeding and the carton ejecting means.

67. In a machine of the class described, the combination of means for successively

feeding flattened cartons, opening the same and feeding the opened cartons including a reciprocatory head, moving forwardly and reversely in the same path and adapted to feed both a flattened and an opened carton upon its forward movement.

68. In a machine of the class described, the combination of a receptacle for holding a quantity of cartons in flattened condition and having a discharge end, a head reciprocating along a straight line path past the discharge end of the hopper and operable to feed a carton from the hopper in its movement in one direction, and means in the path of travel of the head for opening the carton fed thereby, the said means being arranged to hold the opened carton in front of the head to be engaged and advanced thereby in the next feeding movement of the head.

69. In a machine of the class described, the combination of a receptacle for holding a quantity of cartons in flattened condition and having a discharge end, a passage-way extending past the discharge end of the hopper, a head movable along a straight line path in the passageway and operable to feed a carton from the hopper in its movement in one direction, and a member swinging into the passageway and arranged to contact with the carton and open the same, this swinging member being arranged to cooperate with the holding means to hold the opened carton in front of the head to be engaged and advanced thereby in the next feeding movement of the head.

70. In a machine of the class described, the combination of a receptacle for holding a quantity of cartons in flattened condition and having a discharge end, a passage-way extending past the discharge end of the hopper, a second passage-way extending at an angle to the first, means for feeding cartons successively from the discharge end of the hopper into the first passage-way, means for opening the cartons so fed, the feeding means being arranged to advance an opened carton each time it feeds a flattened carton, and means operable to engage the opened carton so fed and to advance it into the second passage-way.

71. In a machine of the class described, the combination of means for successively feeding flattened cartons from a supply, opening the cartons and feeding the opened cartons along a predetermined path, in single file, and means for receiving a pair of cartons so advancing and for moving these cartons to a selected point abreast.

In testimony that I claim the foregoing as my invention, I have signed my name hereunder.

HENRY A. HOUSE.