

April 27, 1954

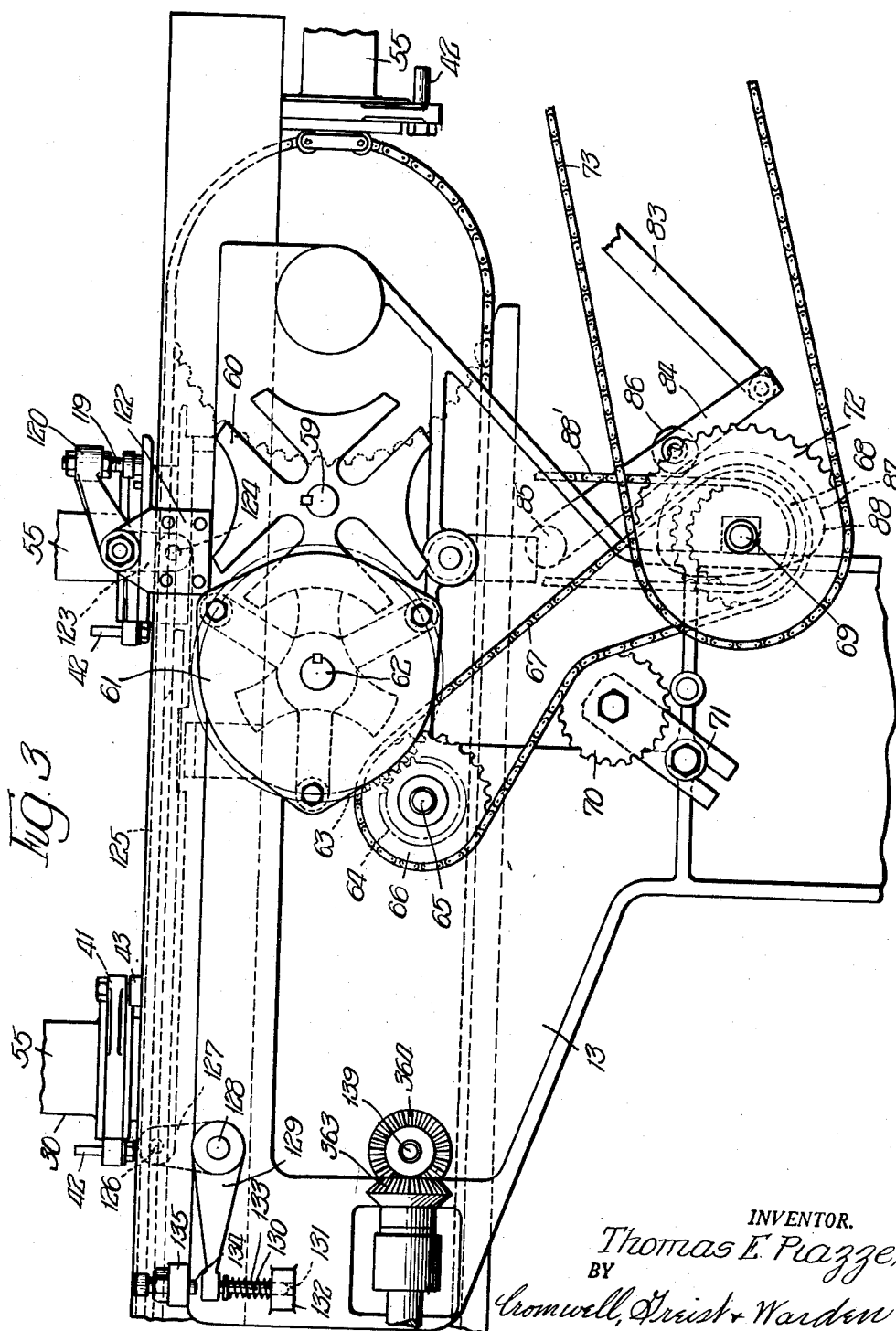
T. E. PIAZZE

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CONTAINER FILLING, CLOSING, AND SEALING MACHINE

Filed March 12, 1949

15 Sheets-Sheet 3



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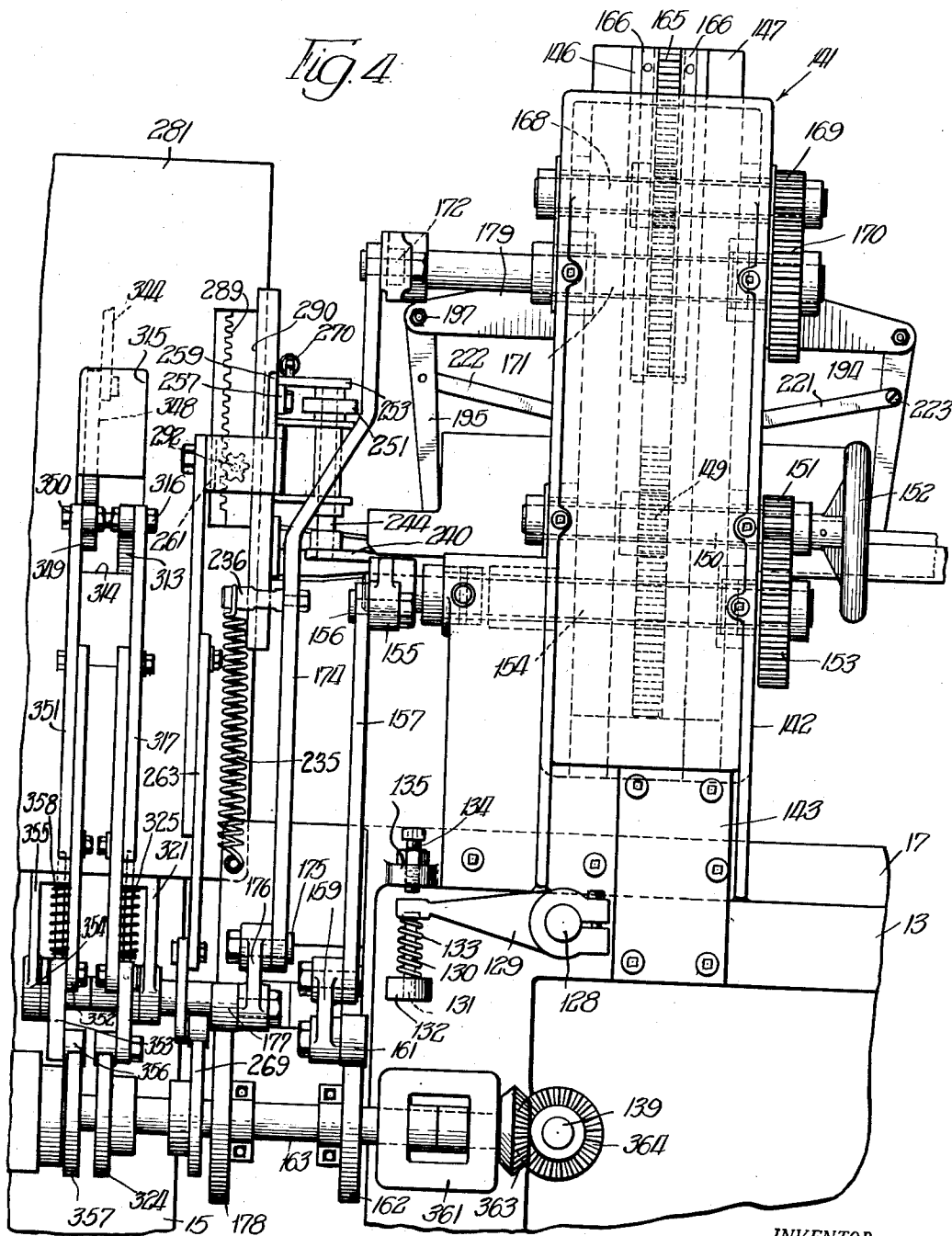
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CONTAINER FILLING, CLOSING, AND SEALING MACHINE

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15 Sheets-Sheet 4



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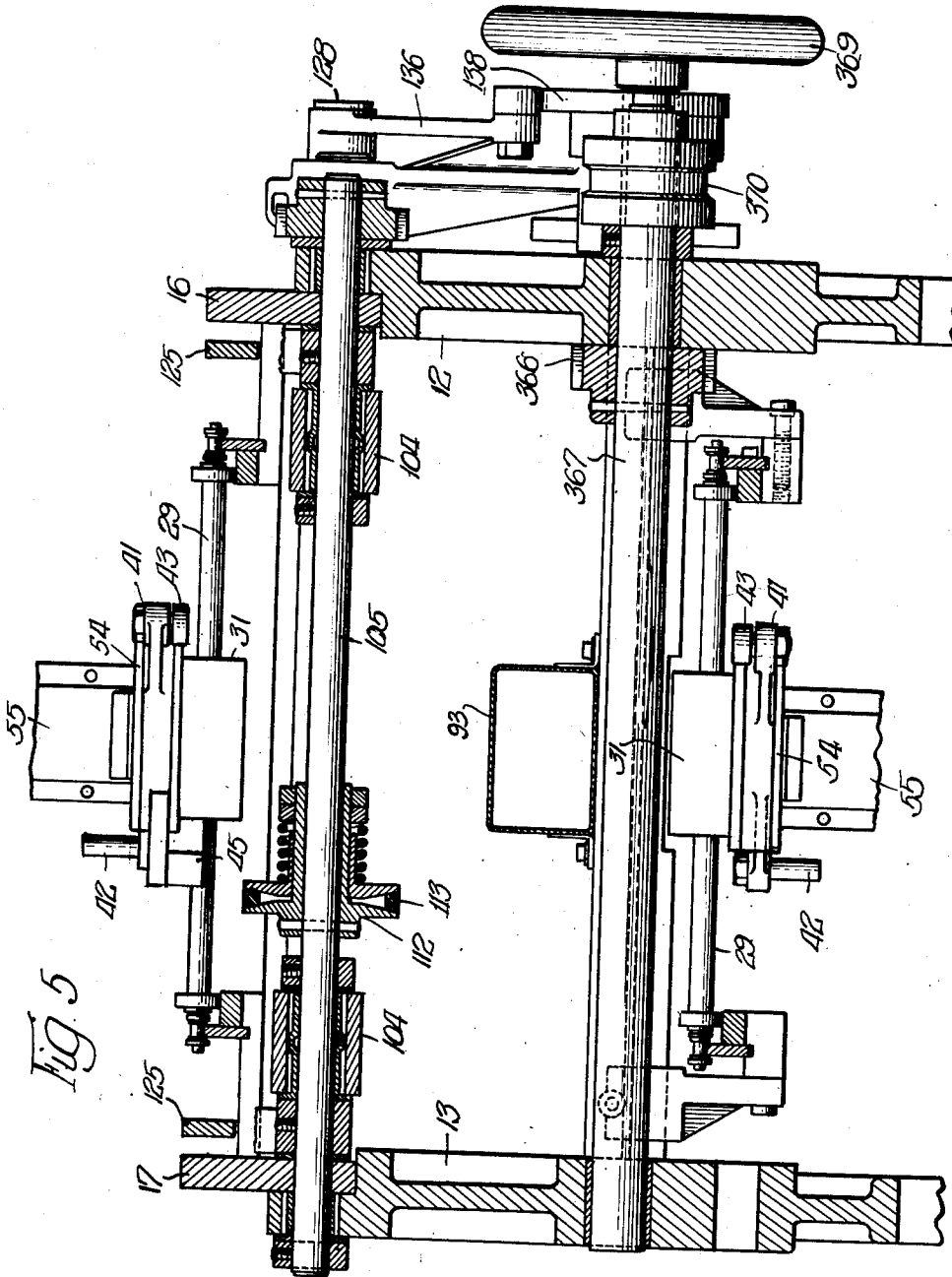
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CONTAINER FILLING, CLOSING, AND SEALING MACHINE

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15 Sheets-Sheet 5



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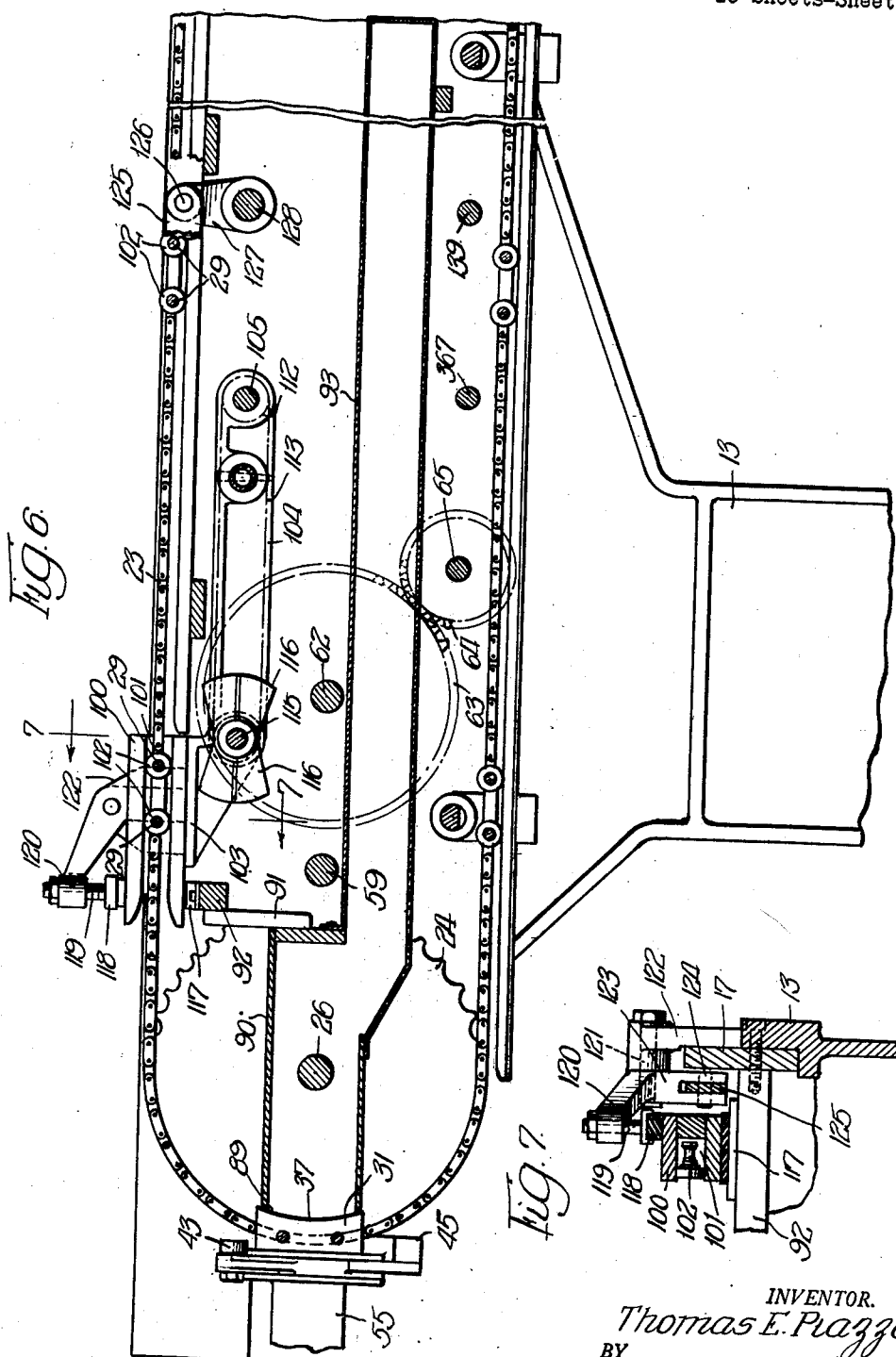
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CONTAINER FILLING, CLOSING, AND SEALING MACHINE

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15 Sheets-Sheet 6



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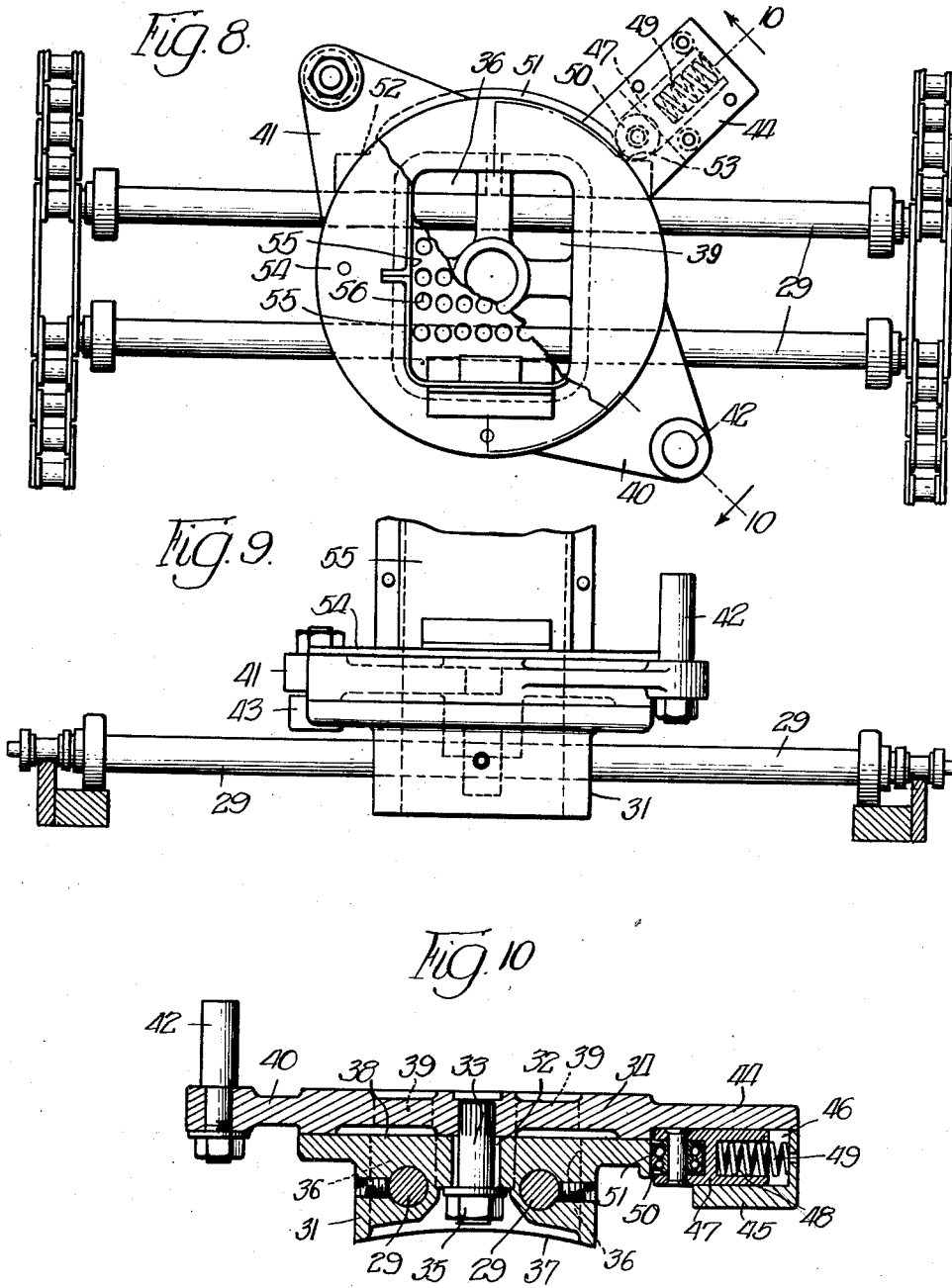
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CONTAINER FILLING, CLOSING, AND SEALING MACHINE

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15 Sheets-Sheet 7



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CONTAINER FILLING, CLOSING, AND SEALING MACHINE

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Fig. 11.

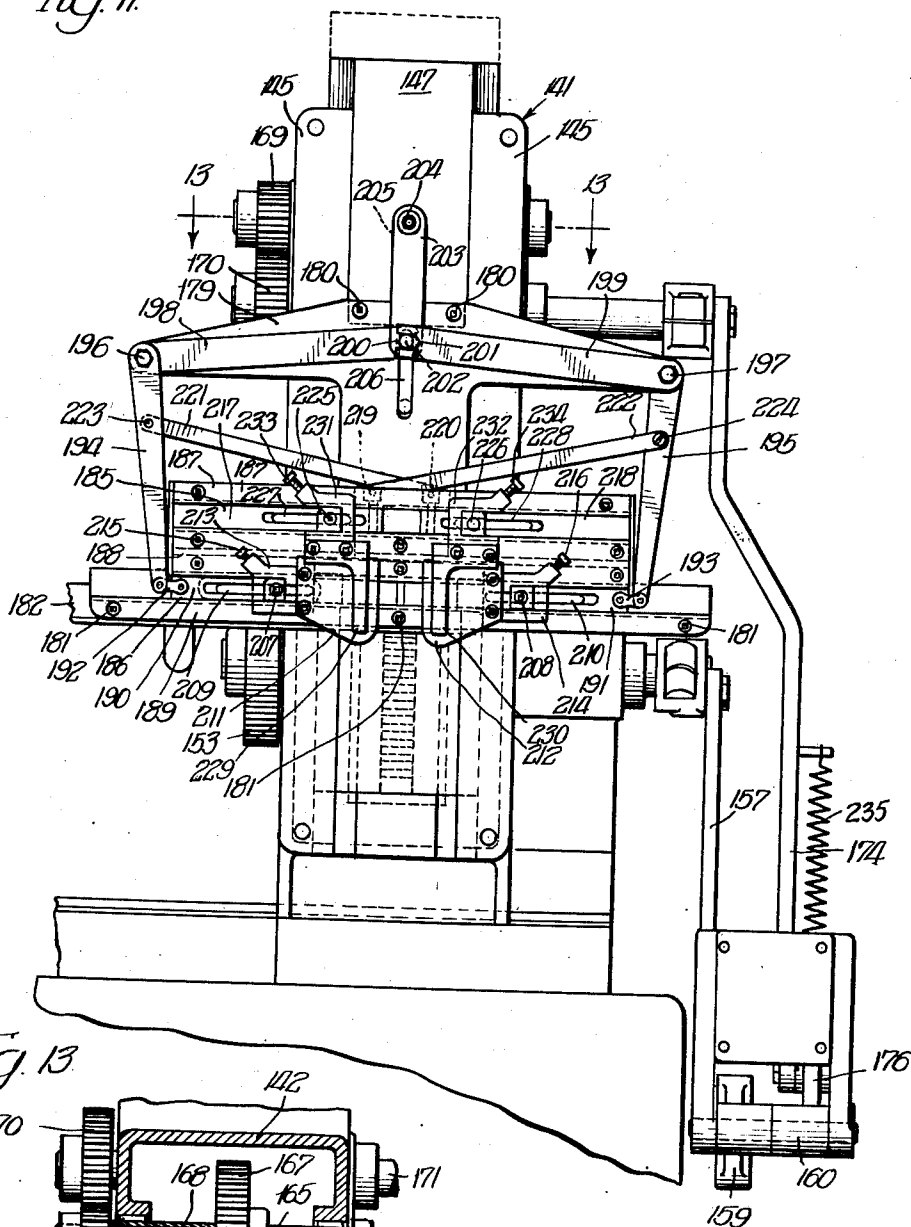
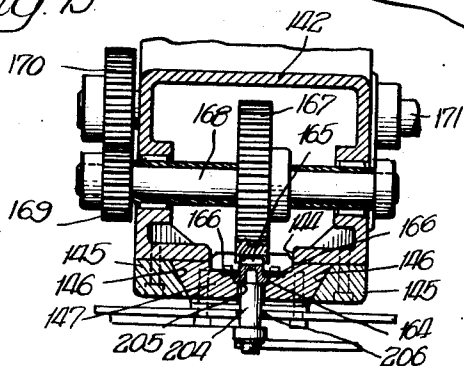


Fig. 13.



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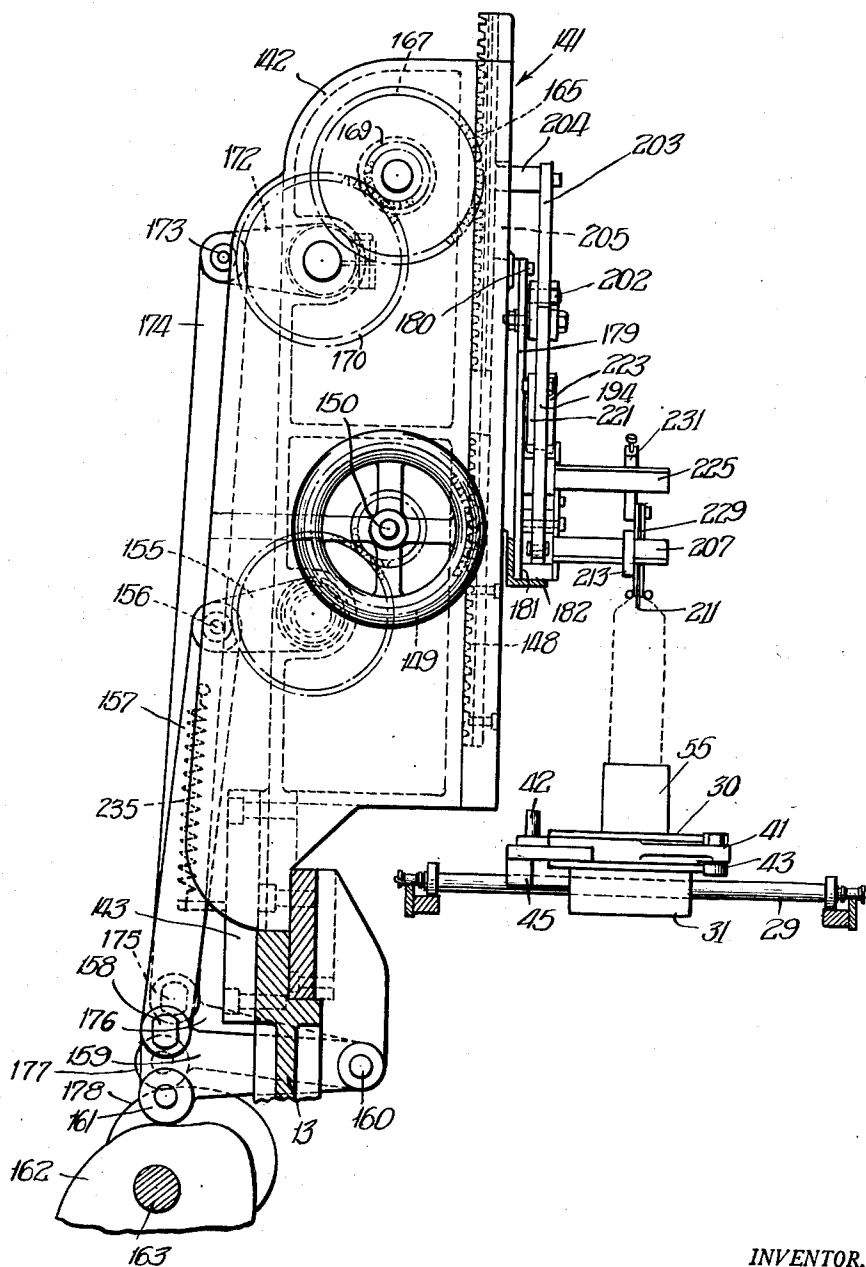
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Fig. 12.



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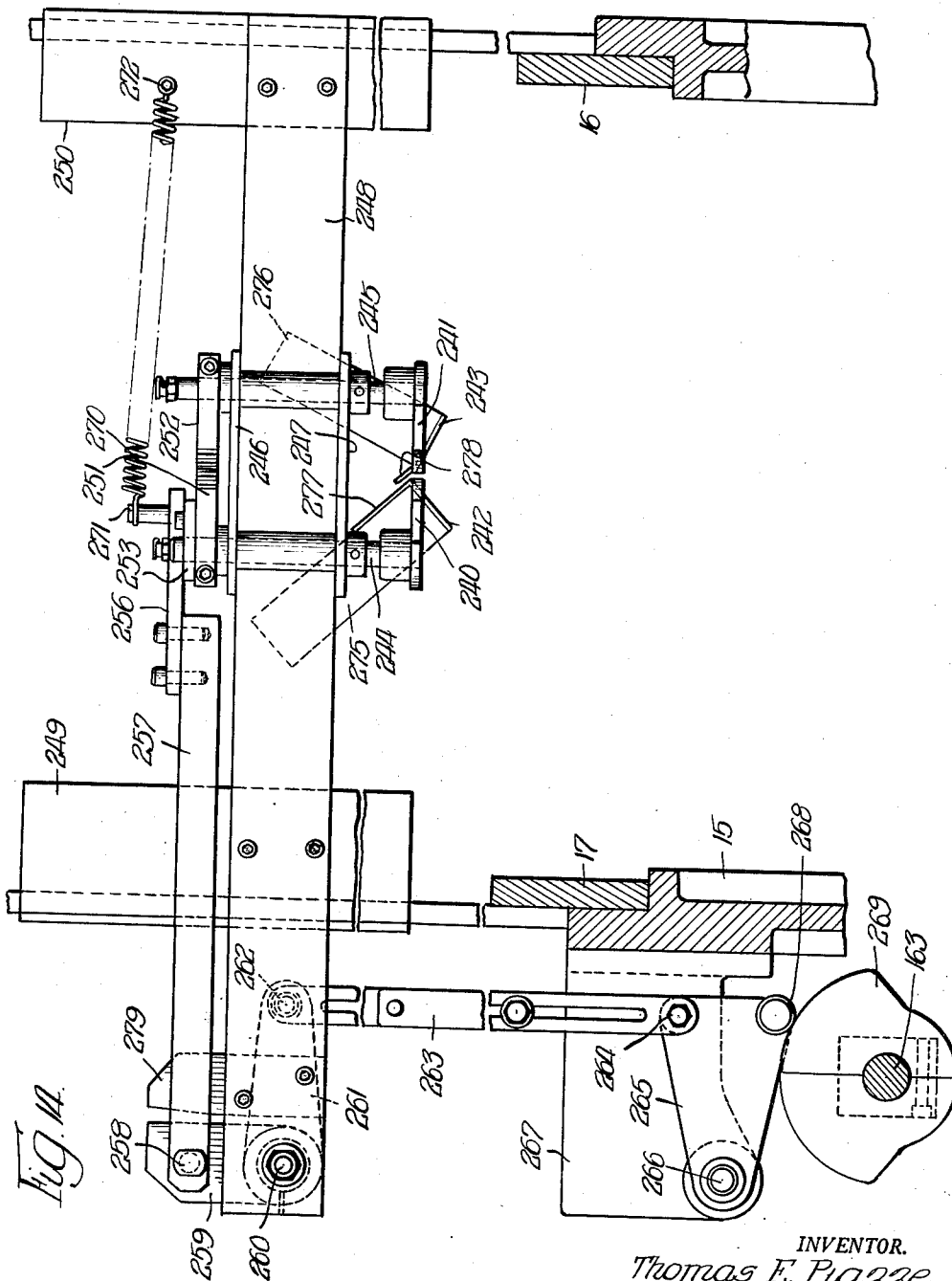
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CONTAINER FILLING, CLOSING, AND SEALING MACHINE

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15 Sheets-Sheet 10



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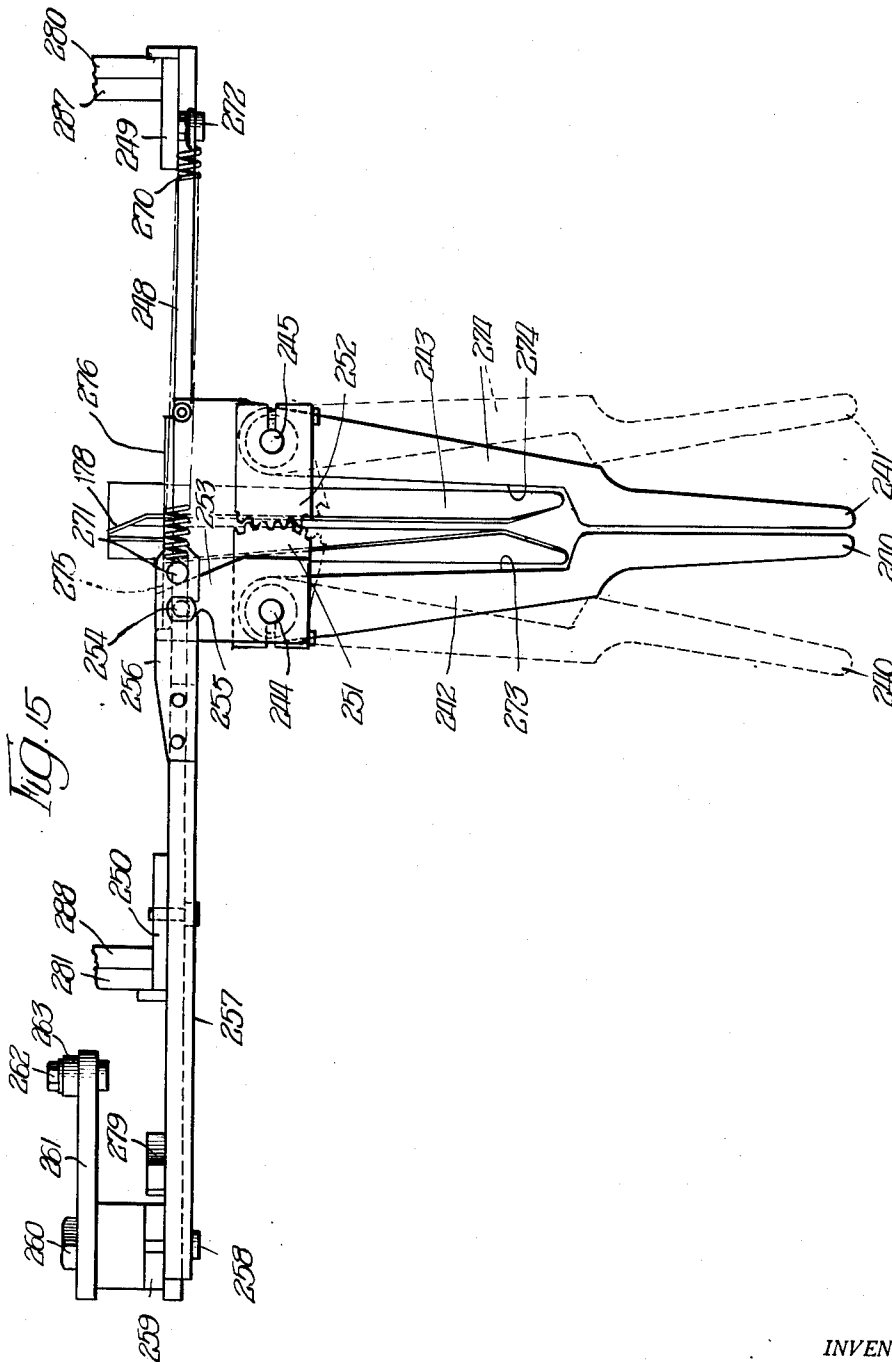
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15 Sheets-Sheet 11



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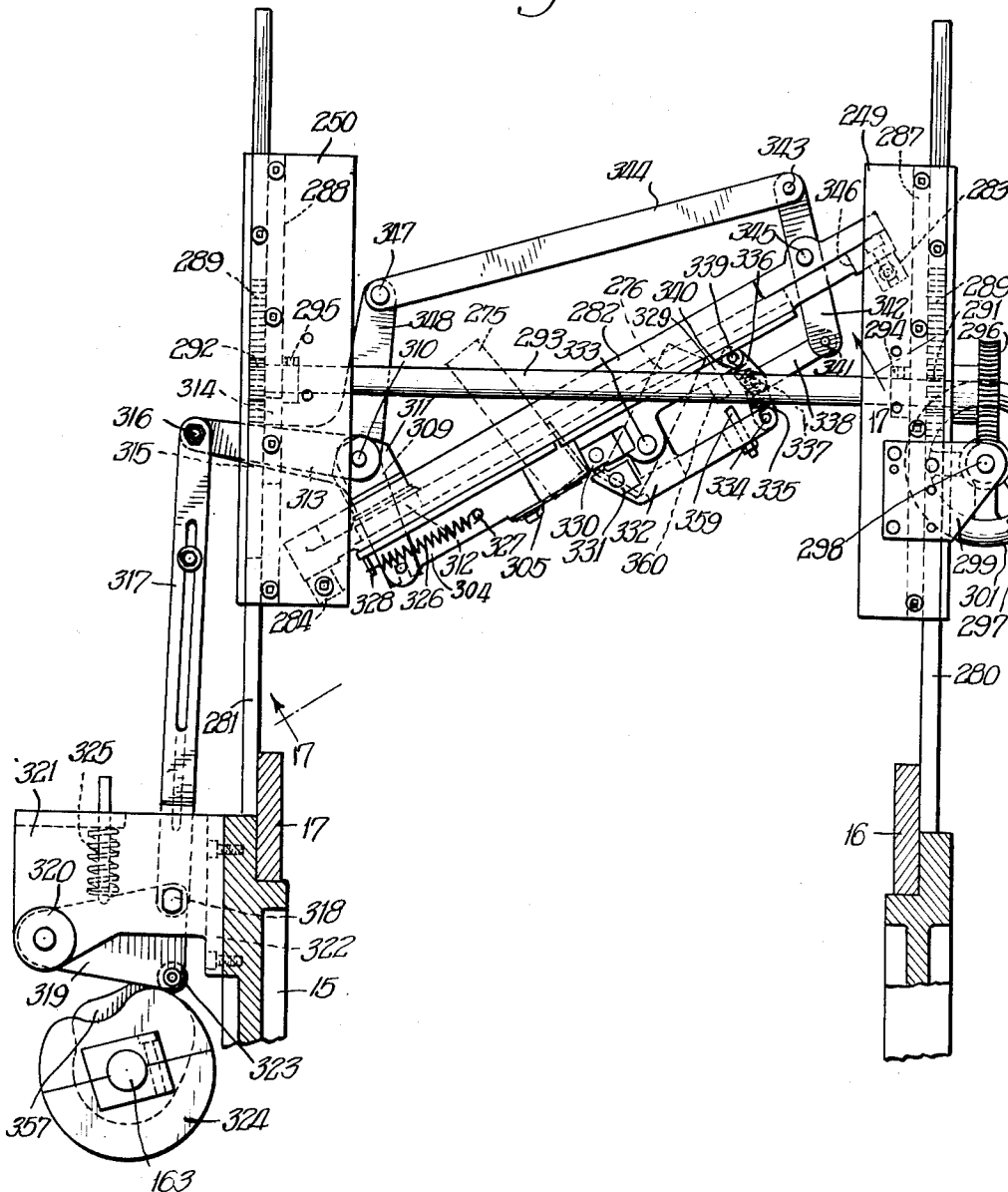
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Fig. 16.



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CONTAINER FILLING, CLOSING, AND SEALING MACHINE

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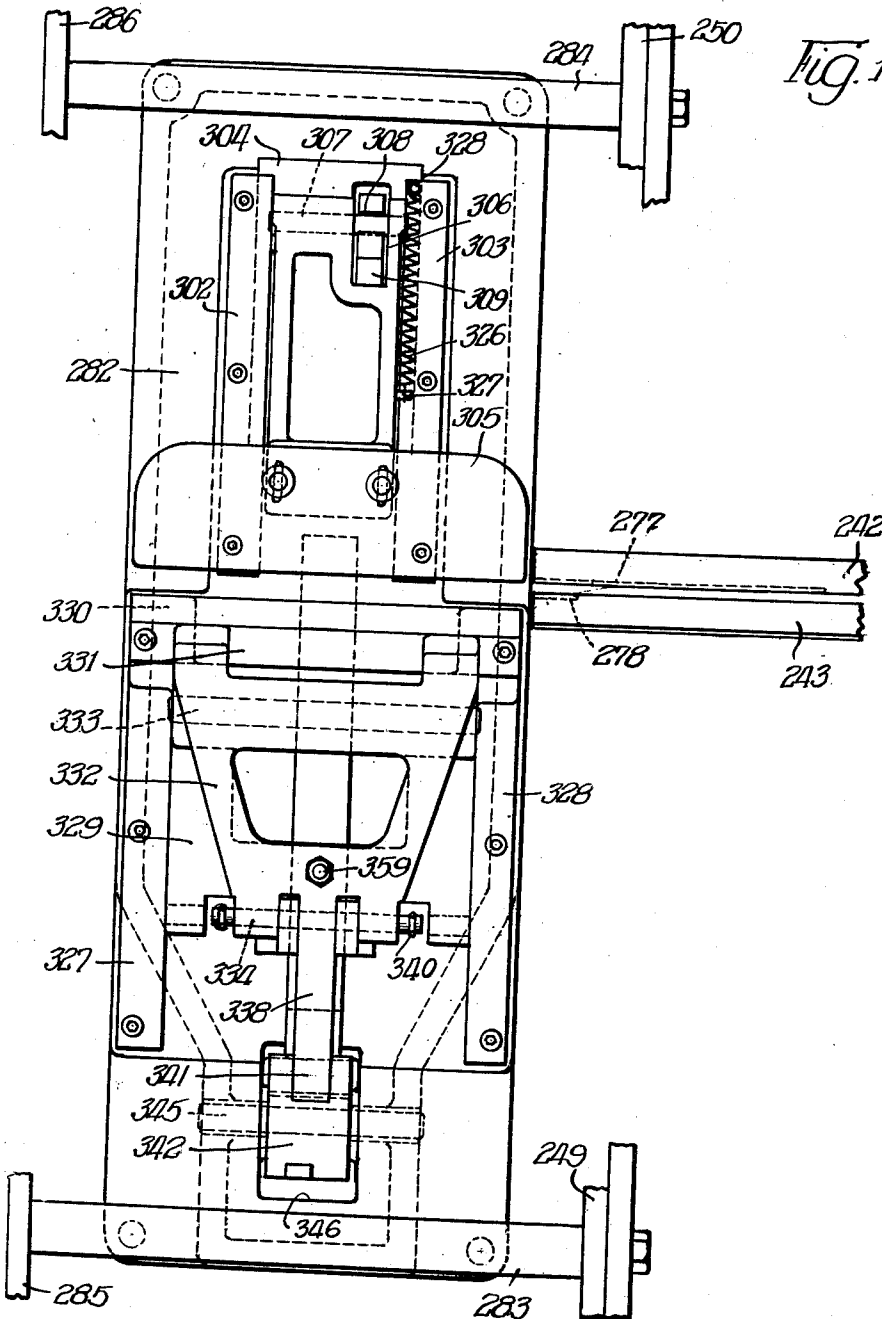


Fig. 17.

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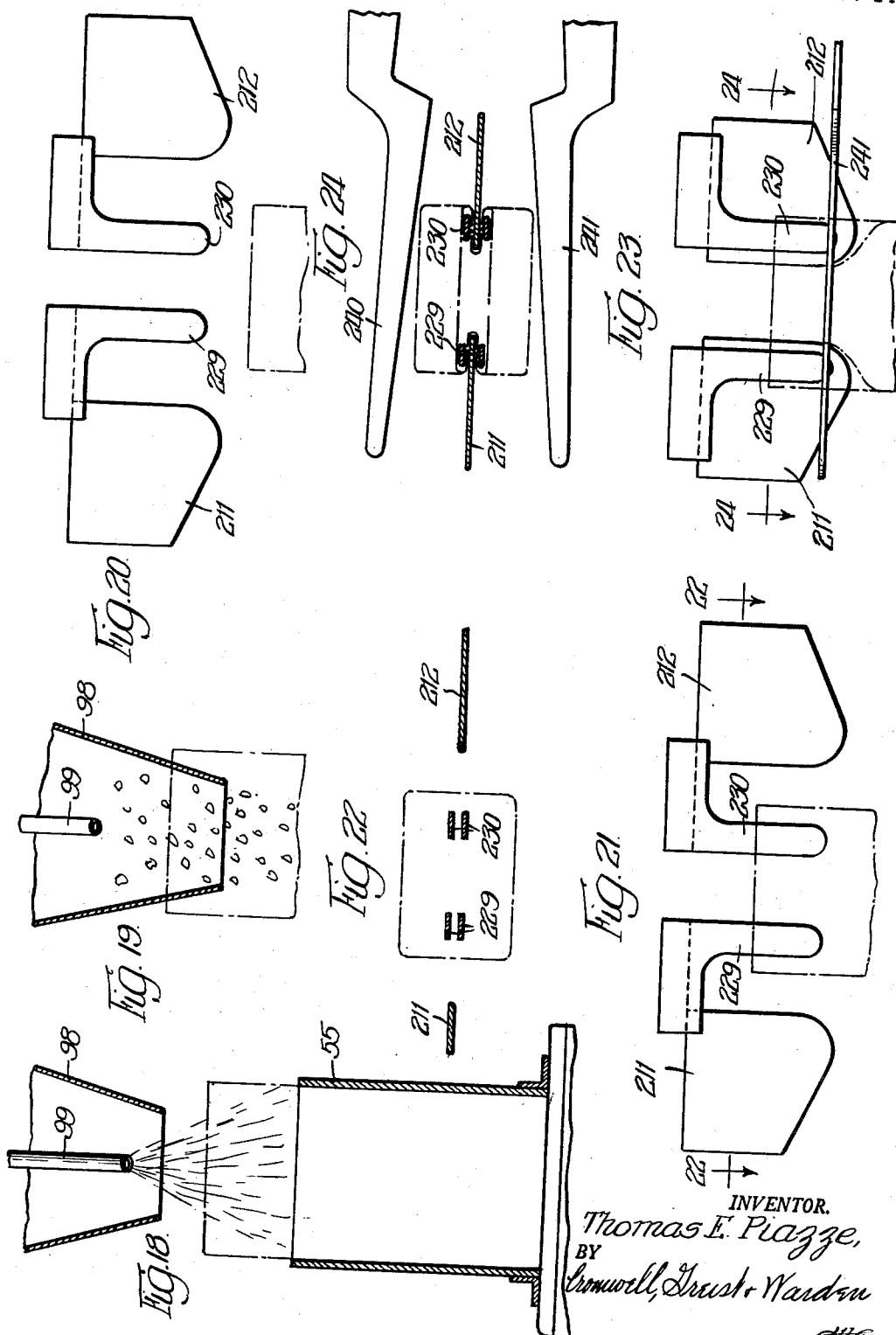
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CONTAINER FILLING, CLOSING, AND SEALING MACHINE

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15 Sheets-Sheet 14



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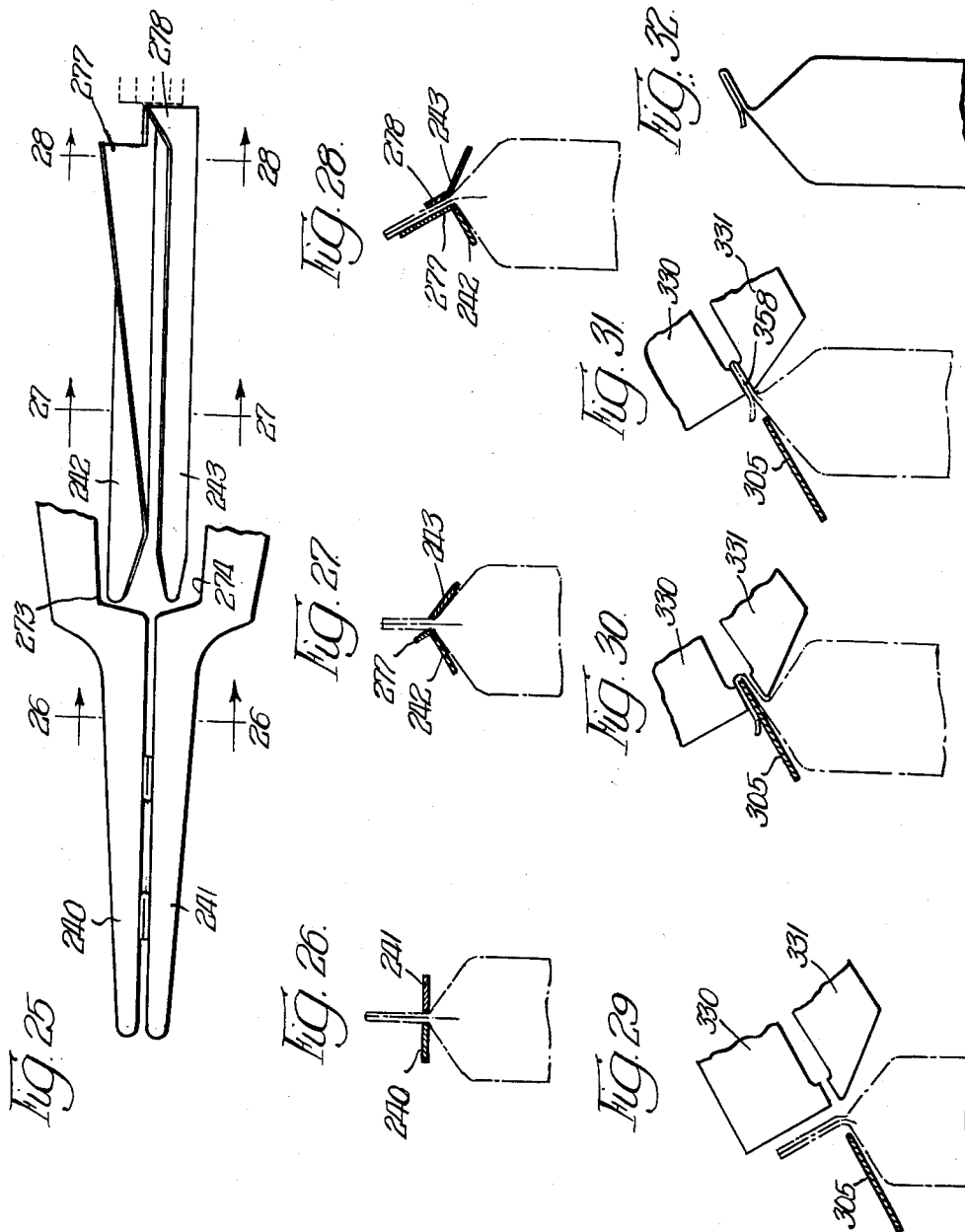
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CONTAINER FILLING, CLOSING, AND SEALING MACHINE

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15 Sheets-Sheet 15



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UNITED STATES PATENT OFFICE

2,676,443

CONTAINER FILLING, CLOSING, AND
SEALING MACHINE

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Application March 12, 1949, Serial No. 81,154

10 Claims. (Cl. 53—144)

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This invention is concerned with improvements in a mechanism for automatically transferring a container or bag formed of pliable sheet material from a container forming machine, filling the container with a commodity, closing the top of the filled container and thereafter sealing the same.

It is an object of the invention to provide a machine having a pocketed conveyor for receiving an open top tubular container of pliable heat sealable material from a container making machine and for intermittently conveying the container along a linear path, including mechanism at successive stations along the path of the conveyor for filling the container with merchandise, tucking the ends walls of the top thereof while bringing the side walls into juxtaposed relation to form a flat closure and for finally heat sealing the closed top.

It is a more specific object of the invention to provide a machine of the type described comprising an intermittently operated conveyor having pockets rotatably mounted thereon, a transfer mechanism for successively removing open-ended tubular bags from a bag making machine and transferring them to the pockets of the conveyor, a filling mechanism for filling each successive bag with merchandise, a top closing mechanism for tucking the end walls of the bag top to form a bellows fold therein and for bringing the side walls of the bag top into face-to-face relation, a sealing mechanism for heat sealing the folded bag top and automatic control mechanism for operating the rotatable pockets to present the bags successively in the proper position to the filling, closing and sealing mechanisms.

It is another object of the invention to provide a machine of the type described wherein mechanism is provided at the filling station for vibrating the bag holding pocket on the conveyor while the bag is being filled to settle the material in the bag.

It is a further object of the invention to provide in a machine of the type described a mechanism for folding and closing the top portions of successive filled bags by placing in the end walls thereof a bellows fold and bringing the side walls into contiguous flat folded relation.

It is another object of the invention to provide in a machine of the type described a mechanism for closing the tops of the successive filled bags by tucking in the end walls and bringing the side walls together in combination with a guide mechanism for maintaining the bag tops in closed con-

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dition while they are moved to the sealing station.

These and other objects of the invention will be apparent from a consideration of the machine which is shown by way of illustration in the accompanying drawings, wherein:

Fig. 1 is a side elevation of a machine embodying the principles of the invention;

Fig. 2 is a plan view of the machine with the filling, tucking and sealing units removed;

Fig. 3 is a partial elevation of the opposite side of the machine at the bag receiving and filling end;

Fig. 4 is a partial elevation of the opposite side of the machine at the tucking and sealing end;

Fig. 5 is a section transversely of the machine taken on the line 5—5 of Fig. 2;

Fig. 6 is a partial longitudinal section taken on the line 6—6 of Fig. 2;

Fig. 7 is a detail section taken on the line 7—7 of Fig. 6;

Fig. 8 is a plan view of one of the conveyor pocket structures;

Fig. 9 is a side elevation of the pocket structure;

Fig. 10 is a section taken on the line 10—10 of Fig. 8;

Fig. 11 is an elevation to an enlarged scale showing the front of the tucking unit;

Fig. 12 is a side elevation showing the tucking unit;

Fig. 13 is a section taken on the line 13—13 of Fig. 11;

Fig. 14 is a partial transverse section showing the guide mechanism for retaining the container top in closed relation as it is moved from the tucking mechanism to the sealing mechanism;

Fig. 15 is a plan view of the guide mechanism shown in Fig. 14;

Fig. 16 is a partial section taken transversely of the machine showing the sealing mechanism;

Fig. 17 is a bottom view of the sealing mechanism taken generally on the line indicated at 17—17 of Fig. 16;

Figs. 18 and 19 are schematic views illustrating the filling of the container;

Figs. 20 to 24 are schematic views illustrating the operation of the tucking elements;

Figs. 25 to 28 are schematic views illustrating the operation of the guide members between the tucking mechanism and the sealing mechanism;

Figs. 29 to 31 are schematic views illustrating the operation of the sealing elements; and

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Fig. 32 is a partial view of the container in completely sealed condition.

Referring to the drawings, there is illustrated a mechanism for filling and closing a container which is particularly adapted for use with a container fabricating machine of the type in which a series of mandrels are carried on an endless conveyor and sheets of bag making material are folded over the ends of the mandrels to form a flat bottom container having vertical side seams. After the material is folded over the mandrel and the seams are sealed the container is adapted to be removed from the mandrel in a horizontal direction, generally with the widest side of the container extending crosswise of the machine.

The machine of this invention includes an intermittently driven endless conveyor which is provided with a series of pocket-forming mandrels in which the flat bottom containers are adapted to be received from the container fabricating machine. A transfer mechanism is provided whereby the containers are successively stripped from the mandrels of fabricating machine and transferred to the mandrels or pockets of the filling and closing machine. A filling mechanism, a container top tucking mechanism and a top sealing mechanism are arranged on the filling and closing machine along the upper run of the mandrel carrying conveyor and each container is successively presented to these mechanisms for the filling, closing and sealing operations. The filling and closing machine is provided with appropriate drive mechanism for direct connection with the drive mechanism of the container fabricating machine or is operated by independent drive mechanism with appropriate means for synchronizing the movement of the conveyor and the operation of the filling and closing mechanisms with the movement of the mandrel carrying conveyor of the container fabricating machine.

While the filling and closing mechanism illustrated is particularly designed for use with a container fabricating machine of the type referred to, it may be used in connection with any container feeding or supplying arrangement whereby containers of the flat bottom type are successively presented to the receiving mandrels at a point preceding the location of the filling unit.

In describing the filling and closing machine the side shown in Fig. 1 will be referred to as the front side of the machine and the end of the machine which is connected to the container fabricating machine will be referred to as the receiving end of the machine. The opposite side and end will be referred to as the rear side and discharge end, respectively.

The various mechanisms are supported on a generally rectangular frame 10 (Figs. 1 and 2) which comprises a base 11, upstanding front and rear side frame members 12 and 13 which are laterally spaced at the receiving end of the machine, upstanding side frame members 14 and 15 which are laterally spaced at the discharge end of the machine, and top front and rear side plates 16 and 17 which extend longitudinally of the machine and connect the upstanding side frame members 12, 14 and 13, 15, respectively. The side plates 16 and 17 are connected at the receiving end to side frame members of the container fabricating machine 18 by connecting plates 19 and 20 which extend between the side frame members of the container machine and

the plates 21 and 22 depending from the ends of the frame members 16 and 17.

A pair of transversely spaced endless conveyor chains 23 are carried on spaced pairs of sprockets 24 and 25 at the receiving and discharge ends of the machine. The sprockets 24 are secured to the driven shaft 26 and the sprockets 25 are secured to the idler shaft 27. The shaft 26 is journaled in the side frame members 12 and 13 and the shaft 27 is journaled in adjustable bearing blocks 28 mounted in the side frame members 14 and 15. The endless chains 23 are connected at longitudinally spaced intervals by transversely extending pairs of rods 29 which support intermediate their ends a series of hollow mandrels 30 for receiving and carrying the containers.

Each mandrel 30 (Figs. 2, 5 and 8 to 10) comprises a base 31 secured on the supporting rods 29 and having a central aperture 32 for receiving a pivot pin 33 depending from a circular plate 34. The pin 33 is secured in rotatable relation in the aperture 32 by the nut 35. The base 31 is provided with relatively large apertures 36 peripherally spaced around the central aperture 32. The bottom face of the base 31 is curved at 37 in a direction transversely of the machine. The top face 38 of the base 31 is flat and provides a bearing surface for the bottom of the rotatable plate 34. Plate 34 is provided with apertures 39 which are adapted to communicate with the apertures 36 in the base 31.

Two generally opposite radial extensions 40 and 41 are provided on the periphery of plate 34. The extension 40 carries an upwardly projecting pin 42 while the extension 41 carries a depending roller 43. The pin 42 and the roller 43 are adapted to be engaged by cam members, which will be described, for rotating the plate 34 relative to the base 31.

A third radial extension 44 is provided on plate 34 intermediate the two radial extensions 40 and 41. Extension 44 is provided with a depending cover plate 45, secured thereto on the underside, to define a chamber 46 for receiving in sliding relation therein a block 47. The sliding block 47 is provided with an end recess 48 in which a compression spring 49 operates to urge the block 47 inwardly towards the base member 31. The inner end of the sliding block 47 carries a roller 50 which is adapted to engage a cam-like track 51 formed on a part of the periphery of the base 31 and provided with notches or stop recesses 52 and 53 at the opposite ends thereof. The roller 50 is adapted to travel on the track 51 as the plate 34 is rotated relative to the base 31 and to seat in the recesses 52 and 53 at the ends of the track 51 for positioning the plate 34 in the two positions required in the operation of the machine. The recesses 52 and 53 are separated by an angle of approximately 90 degrees providing for approximately a quarter turn of the plate 34.

A cover plate 54 is secured on the upper face of plate 34 and carries upwardly projecting pocket forming members 55. The members 55 form a hollow tube section for receiving the bag, and the cover plate 54 is perforated or provided with apertures 56 within the hollow tube section which communicate with apertures 39 and 36 so that in both positions of the plate 34 there is a communicating passageway between the bottom of the bag supporting members 55 and the curved bottom of the base 31.

The chains 23 on which the mandrels 30 are mounted are intermittently moved by operation of the shaft 26 which carries the sprockets 24 at

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the receiving end of the machine. The shaft 26 is provided with a gear 57 adjacent the front side of the frame member 12 which meshes with a gear 58 on the transverse shaft 59. The shaft 59 is journaled in the frame members 12 and 13 and is provided on its other end with a Geneva mechanism comprising the driven element 60 and the continuously operating driving element 61 which is mounted on the shaft 62.

The shaft 62 is provided with a gear 63 on the inside of the frame member 13 which meshes with the pinion 64 on the shaft 65 which is journaled in the side frame members 12 and 13. Shaft 65 is provided with a sprocket 66, on the outside of the frame member 13, which is connected by a chain 67 with a drive sprocket 68 on a stub shaft 69. An idler sprocket 70 is supported on a bracket 71 which is adjustably mounted on the side frame 13 to provide tensioning in the chain 67.

The stub shaft 69 is journaled on the rear side frame member 13 and carries a sprocket 72 which is connected by a drive chain 73 to the power drive shaft of the container fabricating machine 18 and which supplies driving power for operating the container filling and closing mechanism in timed relation with the movement of the mandrels 74 on the container fabricating machine 18.

The mandrels 30 are adapted to be operated in such a manner that they will be brought successively to a point or station at the receiving end of the machine where the pocket forming members 55 extend outwardly in alignment with a transverse chute 75. The chute 75 is horizontally positioned somewhat lower than the mandrel 74 on the container machine 18 when the latter is positioned for removal of the container. The chute 75 provides a passageway for the containers as they are stripped successively from the mandrels 74 and transferred to the pocket forming members 55.

The chute 75 comprises a three-sided or channel-shaped fixed member 76 which is supported on a cross bar 77 adjustably mounted at its ends on the side connecting plates 19 and 20 by bolt and slot connections 78. The chute 75 is provided with a movable side 79 which is secured to a pivoted cross bar 80. The cross bar 80 is journaled in the upstanding side plates 81 which are connected at their base to the side connecting plates 19 and 20. An arm 82 is secured on the one end of the cross bar 80 and pivotally connected to the upper end of a link 83 the lower end of which is pivotally connected to an operating arm 84. The arm 84 is pivotally secured to the frame member 13 at 85 and provided with a cam roller 86 engaging the cam 87 mounted on the stub shaft 69 adjacent the driving sprocket 72. The stub shaft 69 also carries a sprocket 88 for driving the chain 88' which operates a charge measuring and filling device located adjacent the filling station directly above the same.

When a container receiving mandrel 30 is positioned at the container receiving station in line with the transfer chute 75 the curved bottom surface 37 of the mandrel base 31 engages with the curved open end 89 (Fig. 6) of the forward portion 90 of a vacuum tunnel which is supported by a bracket 91 depending from a cross rail 92 which extends between the frame members 12 and 13. The vacuum tunnel includes an offset rearward portion 93 which extends beyond the center of the machine and which is connected by a downwardly extending tunnel member 94 with a suction pump 95. The suction pump 95

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may be motor driven or operated in any other conventional manner to provide suction in the tunnel 90, 93 sufficient to pull the container through the transfer chute 75 and into the receiving pocket on the mandrel 30.

The container carrying mandrels 30 are successively moved from the container receiving station to a filling station to receive a measured charge of the material being packaged. A vibrating mechanism is provided which shakes or vibrates the container to settle the material as it falls into the container.

The charge measuring and filling mechanism which is indicated at 97 (Fig. 1) above the filling station includes a downwardly extending spout 98. A small air pipe 99 extends into the spout 98 for blowing air into the open top of the container while a charge of material is fed into the container through the spout 98. The pipe 99 may be supplied with air from any conventional source. The supply of air may be conveniently controlled by a valve which may be operated by a cam on any one of the continuously driven shafts of the machine (not shown). The stream of air supplied by pipe 99 assists in holding the bag top open and also in settling the material.

The vibrating mechanism (Figs. 1 to 7), which operates on the mandrel 30 while the container is being filled, comprises a pair of channel-shaped side members 100 each provided with an inwardly directed recess 101 through which the chains 23 travel. The recess 101 is approximately the same width or depth as the rollers 102 which are provided on the ends of the mandrel carrying bars 29. The channel-shaped members 100 are mounted on the forward ends 103 of laterally spaced side frame members 104 of a vibrating frame. The side frame members 104 are pivotally mounted at their rearward ends on a transverse drive shaft 105.

The drive shaft 105 extends transversely of the machine and is journaled in the main frame members 12 and 13. The drive shaft 105 is extended outwardly at the front of the machine and provided with a gear 106 which meshes with a gear 107 on a stub shaft 108 extending outwardly of main frame member 12. The shaft 108 is provided with a pulley 109 which is connected by a belt 110 with a continuously operating motor 111 supported on the base 11.

A friction pulley 112 is mounted on the shaft 105 and is connected by means of a belt 113 with a pulley 114 secured on a cross shaft 115 which is journaled between the side frame members 104 of the vibrating frame adjacent the forward end 103 thereof. The shaft 115 is provided with pairs of oppositely disposed weights 116 arranged on opposite sides of the frame adjacent the ends 103 thereof. Rotation of the shaft 115 causes the frame to be vibrated by the action of centrifugal force on the weights 116. The side arms 104 being pivoted about the shaft 105 are caused to vibrate in the vertical direction.

A limited movement of each of the members 100 is permitted in the space provided between a lower bumper plate 117 on the cross frame member 92 and an adjustable upper bumper member 118. Each of the bumper members 118 is mounted on the bottom end of an adjustable threaded post 119 depending from the end of a supporting arm 120. The arms 120 are pivotally mounted on pins 121 which are journaled in blocks 122 attached to the main frame members 16 and 17, respectively.

Each arm 120 is provided with an integral de-

pending arm 123, pivotally connected at 124 to a link 125, which extends longitudinally of the machine. The links 125 are pivotally connected at the other end at 126 to arms 127 which are secured to the transversely extending shaft 128. The shaft 128 is journaled in the side frame members 12 and 13 with one end extending at the rear side of the machine and provided with an arm 129. The arm 129 carries at its free end a downwardly projecting pin 130 engaging in an aperture 131 in a projecting bracket 132 attached to the side frame member 13 and carrying a compression spring 133 tending to urge the arm 129 in the upward direction. The arm 129 is limited in its upward movement by a stop pin 134 which is adjustably mounted in a bracket 135 secured on the frame member 13. The shaft 128 is extended at its other end and provided with an arm 136 carrying on its free end a cam roller 137 which engages a cam 138 on the driven shaft 139.

The configuration of the cam 138 is such that the vibrating mechanism is permitted to operate on the container receiving mandrel 30 at the filling station during the time in which the container is being filled with the commodity and for a short interval thereafter. When the cam roller 137 is resting on the high point of the cam 138 the arm 136 positions the shaft 128 to hold the upper bumper members 118 in lowered position through connecting arms 127, links 125 and arms 123 and 120. When in the lowered position the bumpers 118 hold the side members 100 against the lower bumpers 117 and prevent their movement. When the cam roller 137 is resting on the low point of the cam 138 the bumper members 118 are held in the raised position by the spring 133 operating on the arm 129 and the side members 100 are freed for a limited vertical movement. The shaft 115 is constantly rotated by the drive belts 110 and 113 which connect it with the motor 111 and the side members 100, when they are free to move, are vibrated by the action of centrifugal force on the rapidly rotating counterweights 116. The adjustable posts 119 which carry the upper bumper members 118 permit adjustment on both sides of the machine to insure that both members 100 are permitted to vibrate the same amount. The stop pin member 134 is adjustable to control the length of the swing of the vibrator frame by varying in a single operation the space between the upper bumper members 118 and the lower bumper members 117. The stop member 134 is located outside the main frame of the machine where it is readily accessible for adjustment while the machine is in operation.

The charge measuring and delivering mechanism (which has not been described) may be provided with an interrupter device having an operating arm in the path of movement of the top of the container so that should there be any failure of the container mechanism resulting in the absence of a container in the container receiving pocket the charge for that container will not be delivered to the chute 90 and there will be no loss or spilling of the commodity.

The container receiving mandrels 30 are moved by the conveyor from the filling station to the top tucking and closing station. Between the filling station and the top tucking station there is provided a cam member 140 secured to the frame side plate 16 and extending into the path of the rollers 43 on the mandrels 30 so that as a mandrel 30 is moved past the cam 140 the roller 43 engages with the cam 140 and the mandrel 30 is rotated through 90° to bring the container top into the

proper position for operation of the tucking mechanism. The containers are generally rectangular in cross section and are delivered from the container fabricating machine to the mandrels 30 with the longest side wall extending transversely of the machine. The containers are filled while in this position relative to the machine and are thereafter successively rotated by movement of the mandrels 30 to position the longer sides of each container lengthwise of the machine and the shorter sides transversely of the machine so that the tucks may be properly formed in the short sides of the top margins of the container by the tucking mechanism.

The top tucking mechanism which is generally indicated at 141 and which is shown in detail in Figs. 4, 11, 12 and 13, comprises a vertical housing 142 which is secured at its base to the main frame member 13 and side plate 17 by an attaching block or plate 143 (Figs. 4 and 12). The housing 142 is generally rectangular in cross section (Fig. 13) and is provided on its front face with a vertical slot 144. Laterally spaced, vertical side edge guideway forming plates 145 are provided having opposed inwardly beveled guideway forming faces 146 which receive a slide plate 147.

The slide plate 147 is vertically movable relative to the housing 142 and carries the entire tucking mechanism. A toothed rack 148 extends vertically along the center of the plate 147 from the lower end thereof to a point approximately half the height of the plate. The rack 148 is operated by a pinion 149 which is mounted on the cross shaft 150 journaled in the side walls of the lower portion of the housing 142. The shaft 150 extends exteriorly of the housing 142 at the one end and has secured thereon a pinion 151 and a hand-operating wheel 152. The pinion 151 engages with a gear 153 secured on the end of a cross shaft 154 which is journaled in the housing 142 and which extends exteriorly of the other side thereof. An arm 155 is secured on the extended end of the shaft 154 and is pivotally connected at 156 to the top of a vertically extending link 157. The lower end of link 157 is pivotally connected at 158 to one end of an arm 159. The arm 159 is pivotally mounted at its other end on a short shaft 160 which is mounted in bearings secured to the frame member 13. The arm 159 carries a cam roller 161 which engages an operating cam 162 which is secured on a driven shaft 163 extending longitudinally along the rear side of the machine.

The slide plate 147 is provided on its rear face with a slot or recess 164 extending along the center thereof from its upper edge which provides a guideway for a movable rack member 165. The rack member 165 is generally T-shaped in cross section with its head portion sliding in the recess 164 and retained therein by side plates 166 secured to the slide plate 147. The rack 165 is operated by a pinion 167 which is mounted on a transverse shaft 168 journaled in the upper side walls of the housing 142. The shaft 168 extends outwardly at one side of the housing 142 and is provided with a pinion 169 which engages with a gear 170 mounted on the end of a transverse shaft 171. The other end of the shaft 171 extends outwardly at the opposite side of the housing 142 and is provided with an arm 172 which is pivotally connected at 173 to a vertically extending link 174. The other end of the link 174 is pivotally connected at 175 to one end of an arm 176 which is pivotally mounted at the

other end on the small shaft 160. The arm 176 carries at its outer end a cam roller 177 which engages with the cam 178 on the driven shaft 163. The movement of the slide plate 147 relative to the housing 142 and the movement of the rack member 165 relative to the slide plate 147 is controlled by rotation of the shaft 163 and the configuration of the respective operating cams 162 and 178.

The slide plate 147 carries a supporting head plate 179 on its front face intermediate the top and bottom edges which is secured thereto in slightly spaced relation. The head plate is generally H-shaped (Fig. 11) and is positioned with the cross bar portion extending vertically in front of the slide plate 147. It is secured directly to the slide plate 147 at the top at 180 while at the bottom it is secured at 181 to an angle bar 182 which extends longitudinally of the machine. The angle bar 182 has its vertical leg secured between the face of the slide plate 147 and the back of the head plate 179 and is extended at the one end towards the filling mechanism to receive vertical and horizontal frame members 183 and 184 (Fig. 1). The frame members 183 are adjustably connected to the angle bar 182 and the frame members 184 carry the filling funnel 98 so that the vertical movement of the slide plate 147, which occurs in the operation of the tucking mechanism, positions the filling funnel 98 within the top of the container at the filling station, permitting the filling of the next succeeding container while the tucking operations are performed on the filled container at the tucking station.

The lower portion of the head plate 179 is provided with upper and lower guideway forming recesses 185 and 186 which extend longitudinally of the machine. The recesses 185 and 186 are formed into guideways by longitudinally extending plate members 187, 188 and 189 which are secured to the front of the head plate 179 with their edges extending slightly over the face of the recesses 185 and 186. The lower guideway 186 receives sliding blocks 190 and 191 which operate in opposite ends of the guideway and which are connected at their outer ends by short links 192 and 193 with the lower ends of the arms 194 and 195, respectively, of a pair of bell cranks which are pivotally mounted at 196 and 197 on the outer ends of the longitudinally extending top portions of the head plate 179. The other arms 198 and 199 of the bell cranks extend inwardly toward each other and are slotted at the inner ends at 200 and 201 to receive an operating pin 202. The pin 202 is mounted on the lower end of a link 203 which is connected at its top end to a post 204 secured on the sliding rack member 165. The post 204 extends through a slot 205 in the slide plate 147 which permits vertical movement of the post 204. The pin 202 extends into a guide slot 206 in the head plate 179. Movement of the rack 165 relative to the slide plate 147 results in movement of the sliding blocks 190 and 191 toward and from each other through the connecting links 192 and 193, bell crank arms 194, 198 and 195, 199 and the vertical operating link 203. The slide plates 190 and 191 support forwardly projecting posts 207 and 208 which are adjustably mounted in slots 209 and 210. The posts 207 and 208 support the outer tucker plates 211 and 212 which are adjustably mounted on the posts by means of the apertured supporting

brackets 213 and 214 having clamping screws 215 and 216, respectively.

The upper guideway 185 receives at opposite ends the sliding blocks 217 and 218 which are pivotally connected by pins 219 and 220 to the inner ends of cross links 221 and 222. The outer end of the links 221 and 222 are pivotally connected at 223 and 224 to the vertical arms 194 and 195, respectively, of the bell cranks which operate the lower slide blocks 190 and 191. Outward movement of the arms 194 and 195 results in movement of the blocks 217 and 218 inwardly towards each other, the pins 219 and 220 operating in a recess provided beneath the guideway forming plate 187. The blocks 217 and 218 support outwardly projecting posts 225 and 226 which are adjustably mounted in slots 227 and 228 in the blocks. The posts 225 and 226 support pairs of L-shaped inner tucking plate members 229 and 230 which are adjustably supported thereon by means of slotted supporting brackets 231 and 232 having adjusting screws 233 and 234. The L-shaped inner tucker plates 229 and 230 are arranged in opposed pairs in spaced relation and are adapted to receive between the downwardly extending legs thereof the outer tucker plates 209 and 210 when the plates are moved into the tucking position as illustrated in Figs. 20 to 24. A tension spring 235 is connected at one end to pin 236 on the link 174 and at the other end to the machine frame to hold cam roller 177 on the cam 178 and to insure smooth operation of the tucking members in the tucking operation.

The cams 162 and 178 are formed so that in one cycle of operation the tucking mechanism is operated to close and tuck the top of a filled container. While the slide plate 147 is moved downwardly the inside tucker plates 229 and 230 are moved toward each other to their innermost position and the outside tucker plates 211 and 212 are moved outwardly to the outermost position. As the slide 147 reaches the lower limit of movement the inside tucker plates 229 and 230 are moved into the top of the container. Thereafter the inside tucker plates 229 and 230 are moved outwardly while the outside tucker plates 211 and 212 are moved inwardly between the inside tucker plates to form the tucks in the sides of the container top. Before withdrawal of the tucker plates from the top of the container the inside tucker plates 229 and 230 are moved slightly toward each other and the outside tucker plates 211 and 212 are moved outwardly. After withdrawal of the tucker plates from the container top the slide plate 147 is moved upwardly and the cycle of movement is repeated.

A guide mechanism for retaining the top of the container in closed tucked position while it is moved between the tucking station and the sealing station is arranged longitudinally of the machine in spaced relation above the conveyor. The mechanism is supported on portions of the supporting frame for the sealing mechanism (Figs. 14 to 25).

The guide mechanism comprises a pair of cooperating laterally movable guide plates 240, 241 (Fig. 25) and a pair of fixed guide plates 242, 243. The guide plates 240, 241 are secured at their ends to vertical shafts 244 and 245 which constitute pivots for the guide plates and which are journaled in top and bottom supporting plate members 246 and 247 arranged on top and bottom sides of the supporting cross bar 248 which is secured adjacent opposite ends to vertical plates

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249 and 250 on the sealing mechanism. The guide plates 240, 241 are secured to the lower ends of the shafts 244, 245 and at their upper ends the shafts 244, 245 are provided with cooperating gear segments 251 and 252. Gear segment 251 has secured thereto one end of a longitudinally extending arm 253 which is provided at its other end with a pivot pin 254. The pivot pin 254 is received in a slot 255 adjacent the one end of a reciprocating plate member 256 which is secured at its other end on a transversely extending reciprocating bar 257. The other end of bar 257 is pivotally connected at 258 to the vertically extending arm 259 of a bell crank which is pivoted at 260 on the outwardly extending end of the supporting cross bar 248. The other arm 261 of the bell crank extends inwardly of the machine and is pivotally connected at 262 to the upper end of an adjustable vertical link member 263 which is pivotally connected at the lower end at 264 to a cam arm 265. The cam arm 265 is pivotally mounted at 266 on a bracket 267 which extends outwardly of the machine and is secured to the rear face of the rear frame member 17. The cam arm 265 is provided with a cam roller 268 which rides on a cam 269 secured on the longitudinally extending cam shaft 163. A tension spring 270 which is connected at one end to a pin 271 on the end of the reciprocating plate 256 and at the other end to a pin 272 on the vertical supporting plate 249 tends to rotate the operating arm 253 in a direction to position the guide plates 240, 241 in a separated or open position, as indicated in dotted lines in Fig. 15.

The movable guide plates 240, 241 are recessed at 273 and 274 to accommodate the longitudinally extending fixed guide plates 242, 243. The fixed guide plates 242, 243 are supported by means of attaching plates 275 and 276 which are secured on the supporting cross bar 248, and are arranged at an angle to each other. The guide plate 242 is provided with an upstanding triangular wall portion 277 which extends along its inner edge and which terminates adjacent the sealing mechanism. The guide plate 243 is provided with a short upstanding triangular wall section 278 at the end adjacent the sealing mechanism.

The cam 269 on the cam shaft 163 is shaped to operate the movable guide plates 240, 241 in timed relation to the operation of the tucking mechanism. The guide plates are held in open position while the tucking operation is performed. As the tucking plates 211, 212 and 223, 230 are withdrawn from the top of the container by the upward movement of the slide plate 147 the cam 269 operates the movable guide plates to bring them into closed position (Figs. 15 and 25) in parallel spaced relation thereby providing a guideway for the closed top of the container. The container top is held in closed condition in the guideway while it is moved away from the tucking mechanism towards the sealing mechanism. The fixed guide plates 242, 243 provide a continuation of the guideway for receiving the closed container top and guiding it as it continues on its path to the sealing mechanism. As soon as the closed container top is moved between the fixed guide plates 242, 243, the movable guide plates 240, 241 are free to be moved to the open position by the cam 269 to permit the next succeeding container to move without interference into position beneath the tucking mechanism. A stop plate 279 is provided on the cross bar 248 adjacent the bell crank arm 259 which

limits the movement of the guide plates 240, 241 in the outward direction away from each other.

The fixed guide plates 242, 243 are positioned in parallel spaced relation at an angle to each other with sufficient space between their opposed edges to form the guideway for the container top and with their respective lower faces at an angle to the top of the filled portion of the container. The guide plates are adjusted to press on the contents of the container when it is desired to seal the top of the container closely adjacent to the top of the contents. The upstanding wall portions 277 and 278 on the guide plates 242, 243 tilt the flattened and closed top portion of the container, positioning the same at a slight angle as it is received in the sealing mechanism. The entire guide mechanism is supported on the cross bar 248 which is secured to the sealing mechanism and is vertically adjustable therewith to provide the proper height of the guide plates relative to the top of the container.

The sealing mechanism, which is longitudinally spaced from the tucking mechanism, is mounted for vertical adjustment on upstanding side plates 280 and 281 which are secured to the front and back frame members 16 and 17, respectively. The sealing elements are carried on a head plate or casting 282 which is arranged in angular relation relative to the top of the machine and which is pivotally supported on opposite ends by longitudinally extending bars 283, 284. The bars 283, 284 are journaled in pairs of vertically arranged longitudinally spaced end plates 249, 285 and 250, 286 which are secured to opposite side edges of inner slide plates 287 and 288. The vertical end plates 249, 250, 285 and 286 are flanged at their outer edges for cooperation with the slide plates 287 and 283 to provide channels or guideways for receiving the vertical supporting plates 280 and 281. The supporting plates 280 and 281 are provided with rack members 289 which are mounted in slots 290 in the oppositely disposed side edges of the plates. The racks 289 are engaged by pinions 291 and 292 which are secured adjacent the ends of an adjusting shaft 293. The shaft 293 extends transversely of the machine and is journaled at 294 and 295 on the inner slide plates 287 and 288. The one end of shaft 293 extends outwardly of supporting plate 280 and is provided with a pinion 296 which engages a spiral gear 297 on a longitudinally extending shaft 298. The shaft 298 is journaled at its ends in brackets 299 and 300 on the vertical end plates 249 and 285 and is provided with a hand wheel 301 at the one end for manually adjusting the vertical position of the head plate 282 relative to the container carrying conveyor.

The sealing head 282 is provided on the lower end of its bottom face with guideway forming members 302, 303 which receive in sliding relation the plate-like reciprocating block 304. The sliding block 304 carries at its inner end a tucking plate 305. At its outer end the block 304 is slotted at 306 and provided with a pin 307 which extends transversely of the slot 306. The pin 307 is engaged in a slot 308 in the end of one arm 309 of a bell crank which is pivotally mounted at 310 in brackets 311 projecting upwardly of the top face of the head plate 282. The head plate 282 is provided with an aperture 312 to accommodate the crank arm 309. The other arm 313 of the bell crank extends outwardly through vertically extending apertures 314 and 315 in the slide plate 288 and the vertically supporting plate 281, re-

spectively. The crank arm 313 is pivotally connected at its outer end at 316 to an adjustable vertically extending link 317. The link 317 is pivotally connected at its lower end at 318 to an inwardly extending triangular cam arm 319 which is pivotally mounted at 320 to one side leg 321 of a U-shaped bracket having its base 322 secured to the machine frame member 15. The cam arm 319 is provided with a cam roller 323 which engages a cam 324 on the longitudinally extending cam shaft 163. The cam arm 319 is urged into engagement with the cam 324 by a compression spring 325 mounted above the same on the bracket leg 321. The block member 304 is normally urged into withdrawn or retracted position by a tension spring 326 which is connected at one end to a pin 327 on the block 304 and at the other end to a pin 328 on the head plate 282.

The head plate 282 is provided on the bottom face at its upper end with guideway forming plates 327, 328 which receive a sliding block member 329 having formed thereon adjacent its lower edge a sealing jaw 330. A cooperating sealing jaw 331 is mounted in opposed relation thereto on a bracket member 332 which is pivoted to the block member 329 at 333 for swinging movement relative to the jaw 330. The sealing jaws 330 and 331 are provided with conventional electrical heating elements which are connected to a suitable source of current to provide the necessary heat in the jaws for the sealing operation. The supporting bracket 332 extends in generally parallel relation to the slide block 329 and is pivoted at its outer end at 334 to the lowermost one of a pair of toggle links 335 and 336. Both toggle links 335 and 336 are pivotally connected at 337 to the one end of an operating link 338 and the upper toggle link 336 is pivotally connected to the block 329 at 339. A tension spring 340 is connected at its ends to the pivot points 334 and 339 and tends to urge the sealing jaws 330 and 331 into the open position. The operating link 338 is pivoted at the outer end at 341 to the lower end of an arm 342 which is pivoted at its upper end at 343 to a link 344 and which is pivotally mounted intermediate its ends at 345 on the head plate 282. The head plate 282 is provided with an aperture 346 through which the arm 342 extends. The link 344 is pivotally connected at its other end at 347 to one end of an arm 348 of a bell crank member which is pivotally mounted on the head plate at 310. The other arm 349 (Fig. 4) of the bell crank extends through the apertures 314 and 315 in the vertical slide plate 288 and the supporting plate 281 with its end pivotally connecting at 350 to the upper end of an adjustable vertically extending link 351. The link 351 is pivotally connected at its lower end at 352 to a triangular cam arm 353. The cam arm 353 which is similar to cam arm 319 is pivotally mounted at 354 to the leg 355 of the U-shaped supporting bracket which carries the cam arm 319. The cam arm 353 is provided with a cam roller 356 which engages the cam 357 on the driven shaft 163. A compression spring 358 which is mounted on the bracket leg 355 bears on the cam arm 353 and urges the cam roller 356 into engagement with the cam 357.

The entire sealing mechanism is adjusted vertically so that when the filled container is moved beneath it the tucker plate 305 and the sealing jaws 330 and 331 will be properly positioned to fold and seal the flattened top of the container at the desired level above the top of the contents

of the container, generally as close as practical to the contents. The tucker plate 305 is operated by the cam 324 to engage against the upstanding container top adjacent the top of the contents and to move the same forwardly between the open sealing jaws 330 and 331 to provide a reverse fold in the container top (Figs. 29 and 30). The cam 357 then moves the sealing jaw 331 towards the cooperating fixed sealing jaw 330 while the tucker plate 305 is being withdrawn to grip the reversely folded top of the container and perform the sealing operation. Thereafter the sealing jaw 331 is moved by operation of cam 357 to the open position and the slide block 329 is retracted to allow clearance for the movement of the next succeeding container. The supporting bracket 332 carrying the movable sealing jaw 331 is provided with a stop pin 359 which is adapted to engage a corresponding stop pin 360 on the slide block 329 to limit the outward movement of the jaw 331 and to cause the slide block 329 to be moved into retracted position by continued movement of the link 338 beyond the movement required to open the jaw 331.

The driven shaft 163 which extends longitudinally of the back of the machine and operates as a cam shaft for controlling the tucking and sealing mechanisms is journaled at its ends in bearing supports 361 and 362 (Fig. 2) which are spaced longitudinally of the machine and which extend rearwardly from the frame members 13 and 15, respectively. The end of shaft 163 adjacent the bearing 361 is extended forwardly of the machine and provided with a bevel gear 363 which is engaged in driving relation by a bevel gear 364 on the rearwardly extending end of the transversely extending driven shaft 139 (Figs. 1, 2 and 4).

The driven shaft 139 extends transversely of the machine and is journaled in the frame members 12 and 13. The end of shaft 139 extends at the front side of the machine and carries the cam 138 for controlling the vibrator mechanism. A gear 365 is provided on the shaft 139 adjacent the inside face of the frame member 12 which engages with a pinion 366 on the transverse shaft 367 which is also journaled between the frame members 12 and 13 (Fig. 5). The pinion 366 engages a gear 368 on the driven transverse shaft 65 which has been previously described.

The transverse shaft 367 extends forwardly of the front side of the machine and is provided with a hand wheel 369 for manual adjustment or operation of the entire drive of the machine. The shaft 367 is also provided adjacent the hand wheel 369 with an idler pulley 370 which is engaged by the belt 110, previously described.

At the discharge end of the machine (Fig. 2) an inwardly projecting pin 371 is provided on the frame member 17 which extends into the path of the pins 42 on the rotatable container pocket members. As the completely filled and sealed containers are discharged at the end of the machine the pin 42 on each successive mandrel 30 is engaged by the pin 371 and the mandrel is rotated to properly position the pocket structure for receiving an empty container at the other end of the machine.

The operation of the combined machines will be apparent from the description of the various mechanisms provided. The container fabricating machine 18 which operates intermittently forms the containers around the mandrels 74 and successively presents the mandrels in horizontal

alignment with one end of the transfer chute 75. The filling and closing machine operates intermittently in timed relation to the operation of the fabricating machine 12 to present successive pocket formations 55 on the mandrels 30 in horizontal alignment with the other end of the transfer chute 75. The containers are successively transferred through the chute 75 to the pockets 55 by suction in the vacuum line 96, 93 and 94 (Figs. 1 and 6). The chute wall 79 is swung upwardly to provide clearance for movement of the mandrels 30 after each container is transferred. Each mandrel 30 is first moved to the filling station beneath spout 93 where the container receives a charge of a commodity. The air line 99 holds the container open in the pocket 55 and also aids in settling the material. While the container is being filled the vibrator mechanism is operated to settle or pack the material in the container. Thereafter the mandrel is moved beneath the tucking head. In moving from the filling station to the tucking station the mandrel 30 is rotated 90 degrees to position the container with its longest sides lengthwise of the machine. The tucking head is then operated to move the inside tucker plates 229, 230 into the open top of the container and the outside tucker plates 211, 212 into opposed relation on the outside of the container adjacent the end walls of the same. Further movement of the tucker plates forms end tucks or bellows folds in the top portions of the container and brings the side walls of the same into closed position. As the tucker plates are withdrawn from engagement with the container end walls the movable guide bars 240, 241 move toward each other and hold the container top in closed condition (Figs. 15, 24 and 25). The mandrel 30 then moves to sealing position beneath the sealing head. The fixed guide bars 242, 243 hold the container top in closed position during part of its movement so that the movable guide bars 240, 241 may be opened to avoid interference with the movement of the container in the next succeeding mandrel as the latter is moved beneath the tucking head. As the mandrels come to rest beneath the sealing head the tucker plate 305 (Figs. 16, 17 and 29 to 31) moves forwardly to engage the folded top of the container and move it between the sealing jaws 333, 331 at the same time doubling the folded container material over upon itself. The heated sealing jaws 333, 331 are moved into closed position to heat seal the folded over container top. As the mandrel moves away from the sealing head it is rotated in the reverse direction by engagement of pin 42 with the pin 371 to place it in proper position for receiving an empty container at the other end of the machine. The filled container is discharged from the mandrel as it moves into inverted position beyond the pin 371.

While specific details of construction have been referred to in describing the illustrated mechanisms, it will be understood that other details of construction may be resorted to within the spirit of the invention.

I claim:

1. In a machine having a conveyor provided with pocket formations for supporting containers therein, a container closing mechanism mounted adjacent the path of said conveyor for operating on the top of a container supported in a pocket formation, said closing mechanism comprising a vertically arranged support, a vertically slidable head plate mounted on said support, opposed

pairs of inner tucker plates mounted on said head plate for sliding movement laterally of the head plate toward and from each other, cooperating opposed outer tucker plates mounted on said head plate for sliding movement toward and from each other, interconnected link members for operating said inner and outer tucker plates, means for moving said head plate to position said tucker plates in operating relation with the top of said container and means mounted for vertical movement on said head plate and operatively connected to said link members for moving said link members to engage said tucker plates with said container top whereby to provide end folds in the container top and to bring the side walls thereof into closed relation.

2. In a machine having a conveyor provided with pocket formations for supporting containers therein, a container closing mechanism mounted adjacent the path of said conveyor for operating on the top of a container supported in a pocket formation, said mechanism comprising a vertically arranged support, a head plate mounted on said support, said head plate having laterally extending upper and lower arms, said lower arms having parallel guideways extending transversely of said head plate, pairs of opposed slide plates mounted in said guideways for sliding movement toward and from each other, inner tucker plates mounted on one pair of said slide plates, cooperating outer tucker plates mounted on the other pair of said slide plates, operating bell crank members pivotally mounted on the upper arms of said head plate, one arm of said bell crank members being pivotally connected to said first mentioned pair of slide plates, a pin slidably mounted relative to said head plate, the other arms of said bell crank members being connected to said pin, links connecting said first mentioned slide plates with said first mentioned bell crank arms, and means for moving said head and said pin in timed relation to position said inner and outer tucker plates in operative engagement with the top margins of said container and to bring said top margins into closed relation.

3. In a container closing and sealing machine having an intermittently operated conveyor provided with a plurality of spaced pocket formations for supporting filled containers therein, a container top closing mechanism for providing end tucks in opposed side walls of the top of a container supported in a conveyor pocket to thereby bring the adjacent container walls into juxtaposed position, a sealing mechanism spaced from said closing mechanism for sealing the container top, guideway forming means extending between said closing mechanism and said sealing mechanism for engaging on opposite sides of the container top as it is moved by the conveyor from said closing mechanism to said sealing mechanism said guideway forming means comprising a pair of elongate blade members pivotally mounted at one end adjacent said sealing mechanism, said blade members having a free end portion movable to bring the closed edges thereof toward and from substantial parallel bag top engaging position beneath said closing mechanism, said blade members having recesses in opposed edges thereof adjacent said sealing mechanism and fixed guideway forming members mounted adjacent said sealing mechanism and extending into said recesses in said blade members when the free end portions thereof are moved into bag top engaging position.

4. In a container closing and sealing machine

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having an intermittently operated pocketed conveyor for supporting a plurality of filled containers, a container top closing mechanism for folding and closing the top of a container supported in said conveyor, a sealing mechanism spaced from said closing mechanism for sealing said closed container top, said sealing mechanism being mounted on a cross frame, said cross frame being mounted for adjustment toward and from said conveyor, and guideway forming means extending between said closing mechanism and said sealing mechanism for retaining said container top in closed condition as it is moved by the conveyor from said closing mechanism to said sealing mechanism, said guideway forming means being mounted on said cross frame whereby said guideway forming means is adjustable relative to said conveyor independently of the operation of said closing mechanism, said guideway forming means comprising cooperating laterally spaced members fixed on said cross frame and cooperating movable members forming, in closed position, extensions of said fixed members which project beneath said closing mechanism, and said movable members being pivotally mounted on said cross frame for lateral movement in a plane extending transversely of said conveyor from said closed position to an open position for receiving the open container top as it is moved into position relative to said closing mechanism.

5. In a machine having a pocket formation for supporting a container therein, a container closing mechanism for operating on the top of the container, said closing mechanism comprising a vertically arranged support, a vertically slidable head plate mounted on said support, opposed pairs of inner tucker plates mounted on said head plate for sliding movement laterally of the head plate toward and from each other, cooperating opposed outer tucker plates mounted on said head plate for sliding movement toward and from each other, interconnected link members mounted for movement in vertical planes and operating said inner and outer tucker plates, means for sliding said head plate on said support to position said tucker plates in opposed relation on opposite sides of the end walls of the top of said container, and means mounted on said head plate for vertical sliding movement relative to said head plate and operatively connected to said link members to move said tucker plates toward each other into engagement with said container walls whereby to provide end folds in the end walls and to bring the side walls thereof into closed relation.

6. In a machine having a conveyor provided with a pocket formation for supporting a container therein, a container closing mechanism for operating on the top of the container, said mechanism comprising a vertically arranged support, a head plate slidably mounted on said support, said head plate having transversely extending guideways adjacent the bottom thereof, pairs of opposed blocks movably mounted in said guideways, outwardly extending posts on said blocks, inner tucker plates adjustably mounted on the posts on one pair of said blocks, cooperating outer tucker plates mounted on the posts on another pair of said blocks, link members pivotally connected at opposite ends to said last mentioned pair of blocks and to said head plate, link members pivotally connected at one end to said first mentioned pair of blocks and at the other end to said first mentioned link members, means for moving said head plate into and out of operating relation with the top of said container, and means for op-

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erating said link members relative to said head plate to move said pairs of blocks relative to each other whereby to engage the end walls of said container top between said inner and outer tucker plates to provide bellows folds therein and to bring the side walls thereof into closed relation.

7. In a machine as recited in claim 6 wherein said means for operating said link members comprises a rack slidably mounted relative to said head plate, means pivotally connecting said first mentioned link members to said rack, and means for moving said rack in timed relation to the movement of said head plate.

8. In a container sealing machine having a pocket formation supporting a filled container with the top thereof in flat folded condition, a sealing mechanism comprising supporting plates extending vertically at opposite sides of the machine, a sealing head extending transversely between said supporting plates, means supporting the ends of said head adjustably on said plates, a pair of pivotally connected sealing jaws slidably mounted on said sealing head for movement transversely of said container top, a folder plate slidably mounted on said sealing head in opposed cooperative relation to said sealing jaws, means for moving said folder plate to move the folded container top between said sealing jaws, and means for operating said sealing jaws to seal said folded container top.

9. In a container sealing machine having a pocket formation for supporting a filled container having a flat folded top portion, a sealing mechanism comprising supporting plates extending vertically at opposite sides of the machine, a sealing head extending between said plates, adjustable means pivotally supporting said head at opposite ends on said plates, said sealing head being arranged at an angle to the horizontal, a pair of pivotally connected sealing jaws mounted for sliding movement along said sealing head and transversely of said container top, a folder plate mounted for sliding movement along said sealing head in opposed relation to said jaws, said sealing jaws and folder plate being arranged in opposed relation on opposite sides of the closed container top, and operating link members for moving said folder plate between said sealing jaws to provide a transverse fold in the container top and for thereafter moving said sealing jaws toward each other into sealing engagement with said folded container top.

10. In a machine having a conveyor provided with pocket formations for supporting containers therein, a container closing mechanism mounted adjacent the path of said conveyor for operating on the top of a container supported in a pocket formation, said mechanism comprising a vertically arranged support, a vertically slidable head plate mounted on said support, said head plate having transversely extending vertically spaced guideways adjacent the bottom thereof, pairs of opposed blocks movably mounted in said guideways, inner tucker plates mounted on one pair of said blocks for movement toward and from each other, cooperating outer tucker plates mounted on another pair of said blocks for movement toward and from each other, link members pivotally secured to said blocks, said link members connecting corresponding blocks of each pair and being connected to each other, means vertically slidably on said head plate and operatively connected to said link members to move said tucker plates relative to said head plate, and means for moving said head plate into and out of operating rela-

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tion with the top of said container to engage said tucker plates with said container top whereby to permit movement of said tucker plates relative to said container top to provide end folds in the container top and bring the side walls thereof into closed relation.

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