Sept. 20, 1960 T. E. PIAZZE 2,952,959

CONTAINER FILLING AND CLOSING MACHINE

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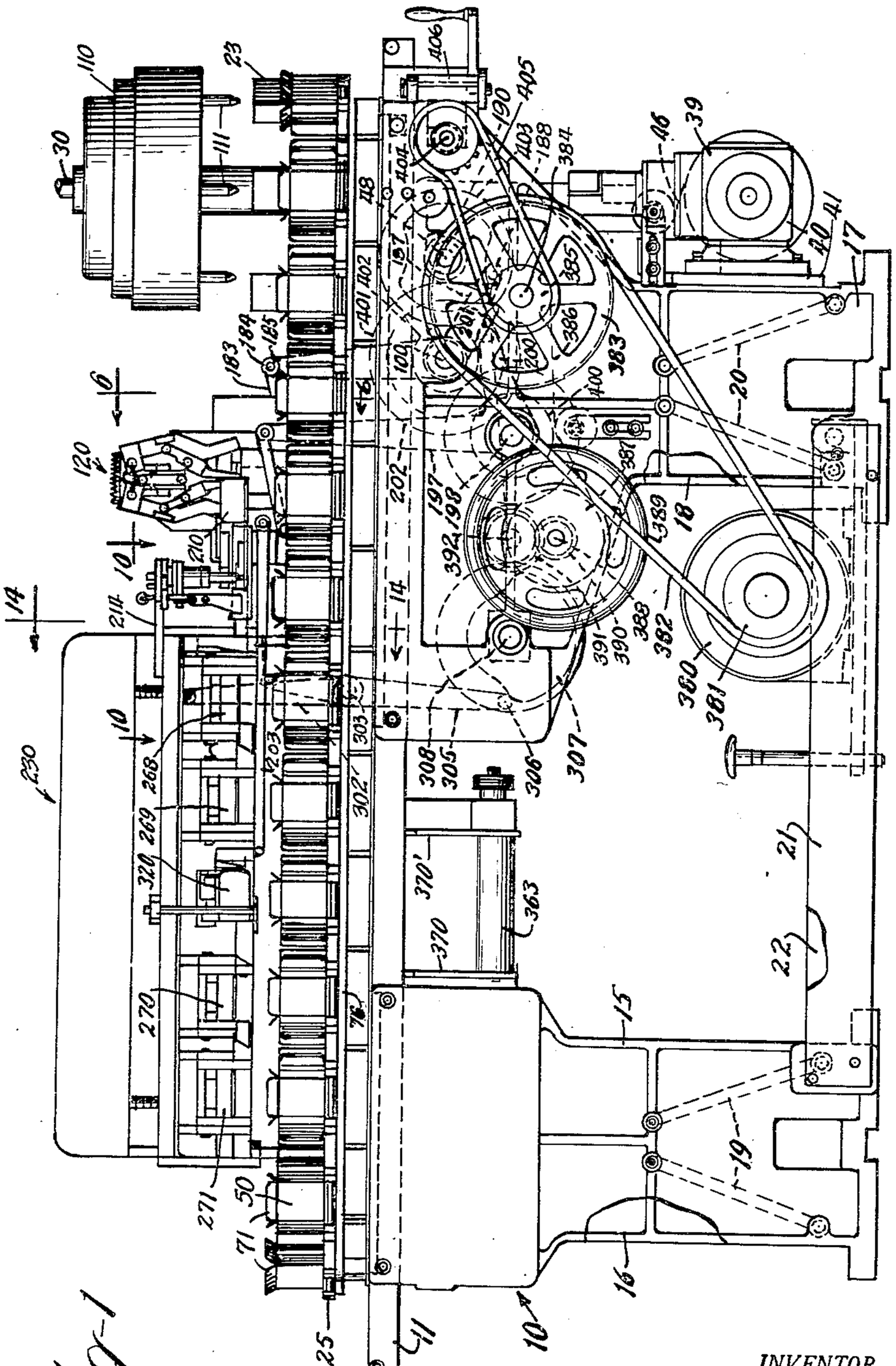

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CONTAINER FILLING AND CLOSING MACHINE

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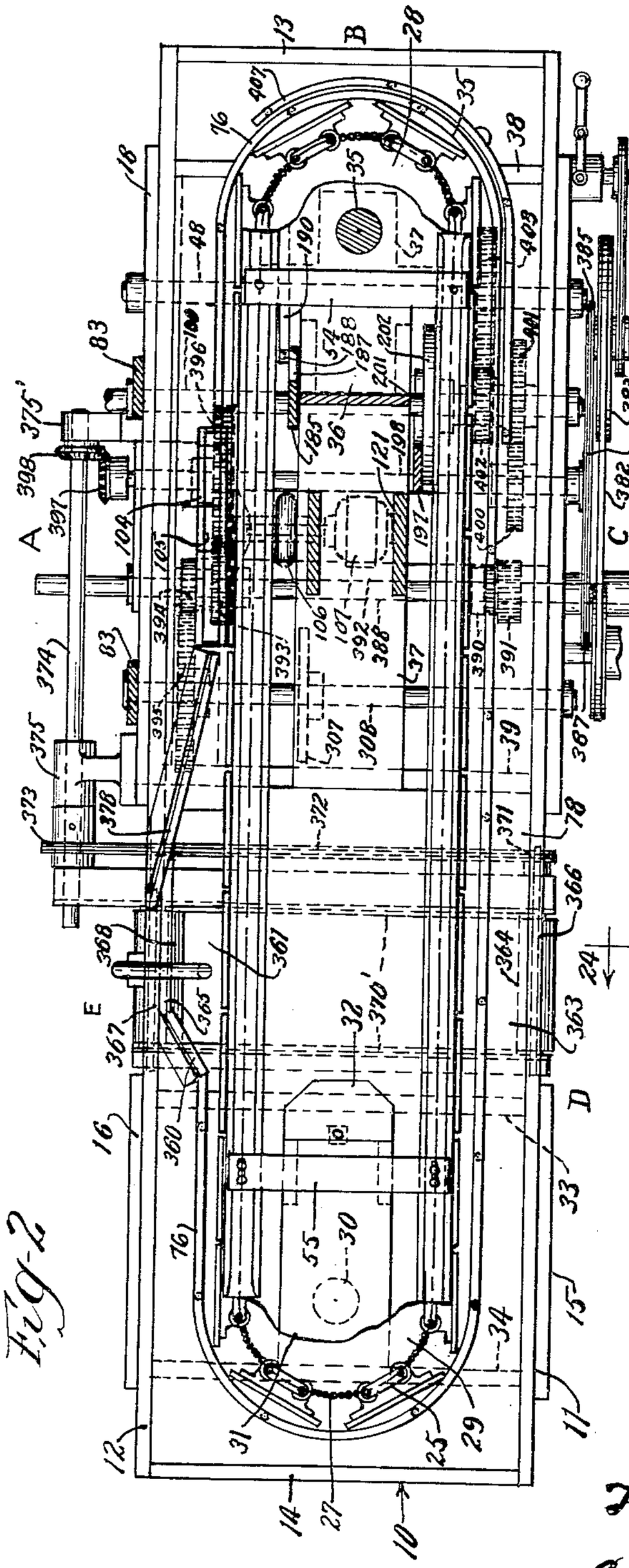

Fig-2

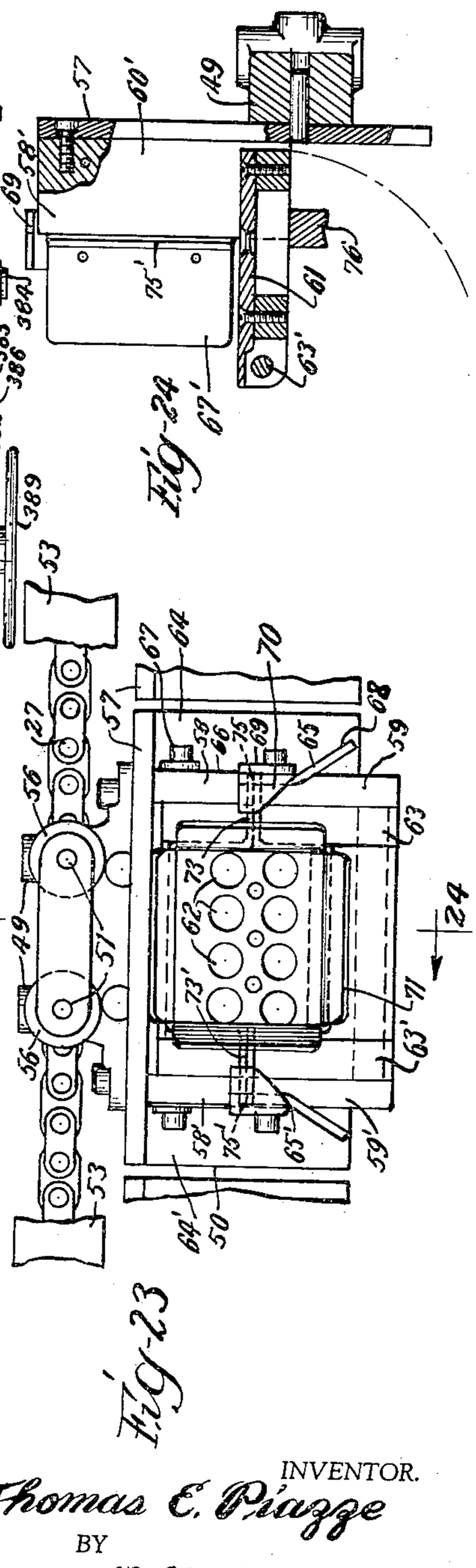

Fig-24

Fig-23

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CONTAINER FILLING AND CLOSING MACHINE

Filed May 20, 1957 13 Sheets-Sheet 3

Fig-3

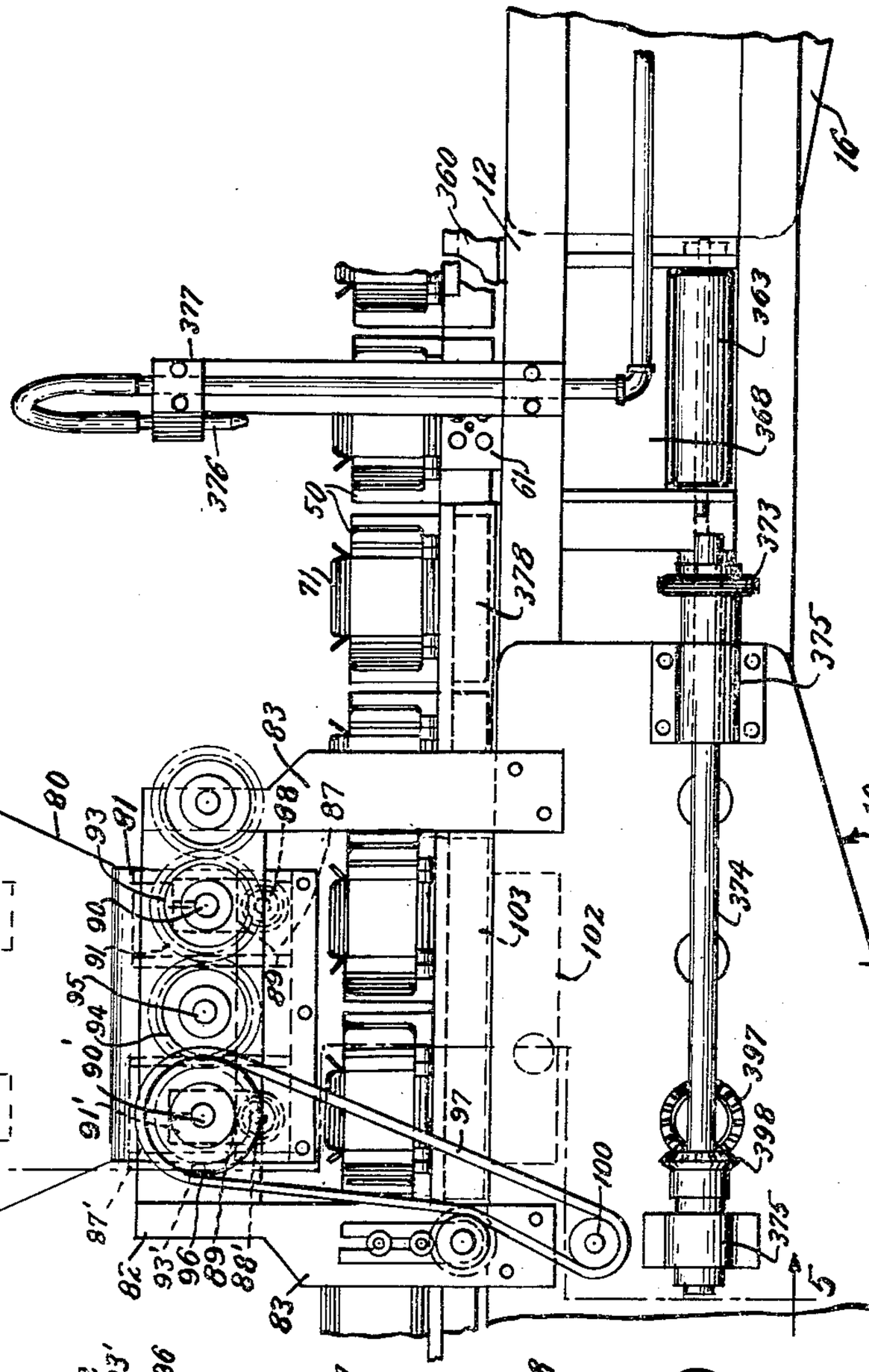

Fig-5

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CONTAINER FILLING AND CLOSING MACHINE

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Fig-4

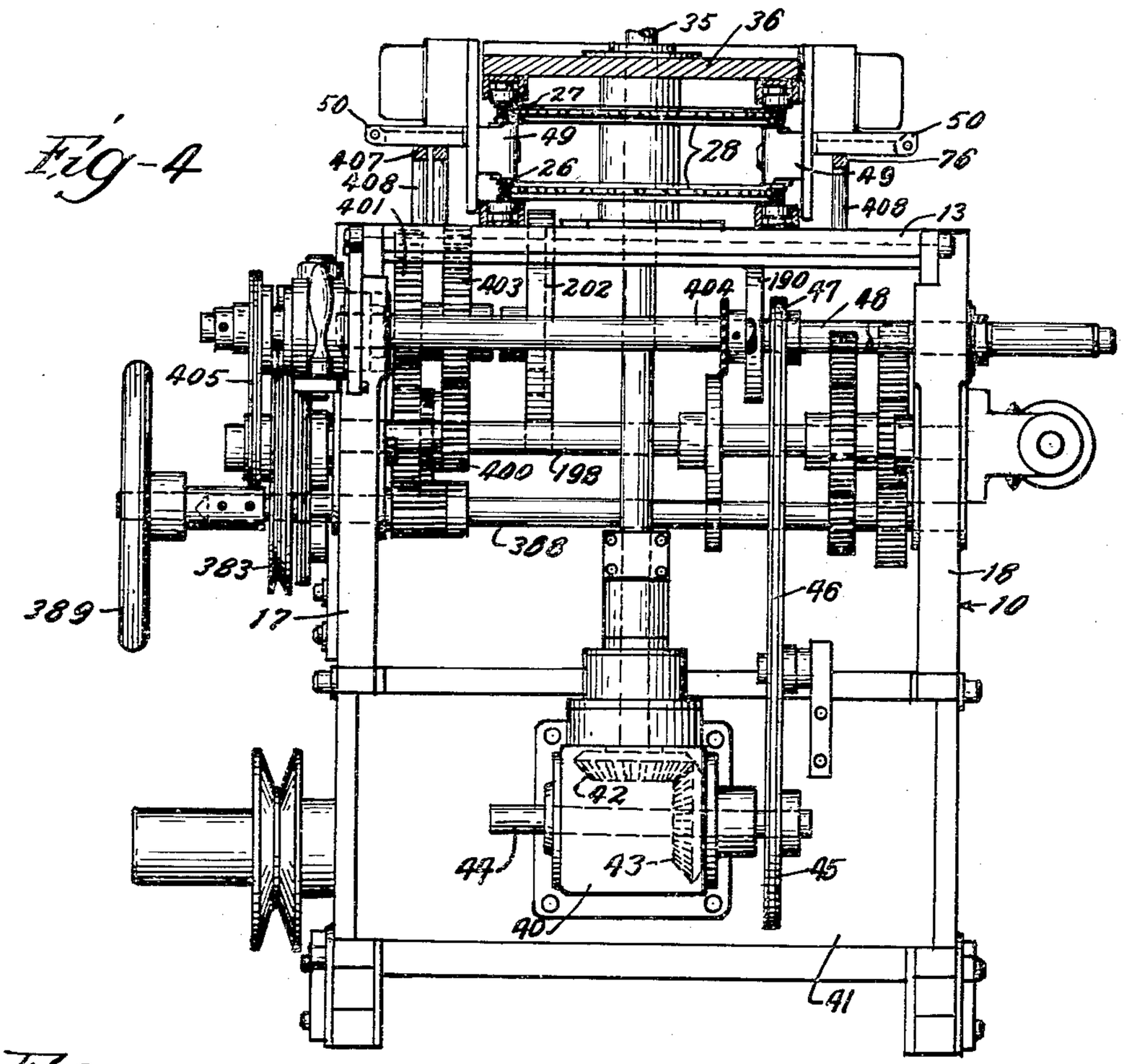
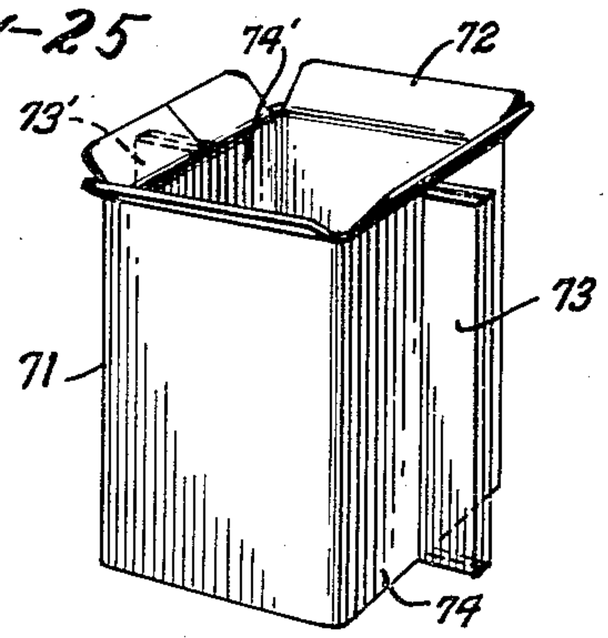


Fig-25



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CONTAINER FILLING AND CLOSING MACHINE

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Fig-6

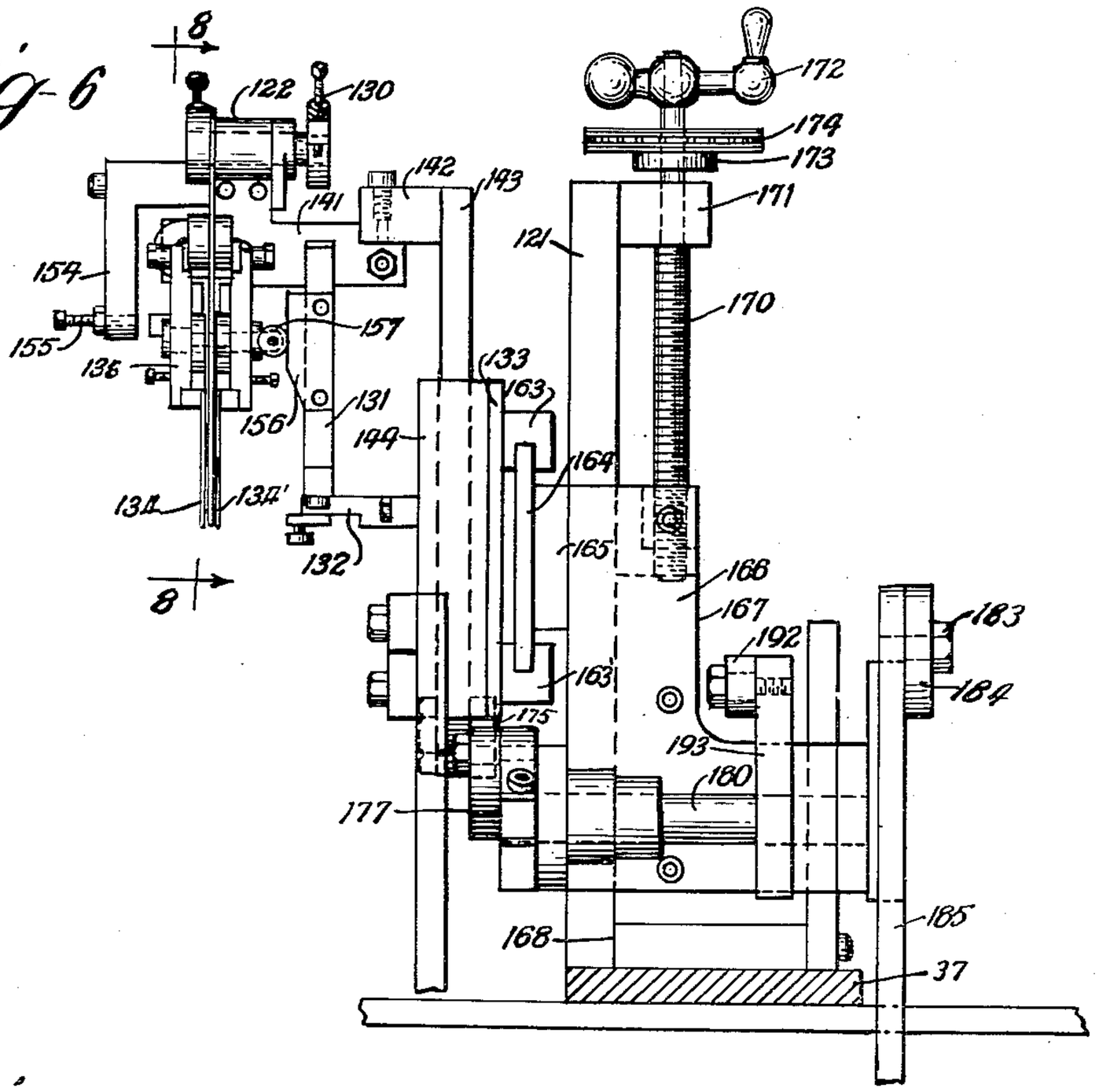


Fig-8

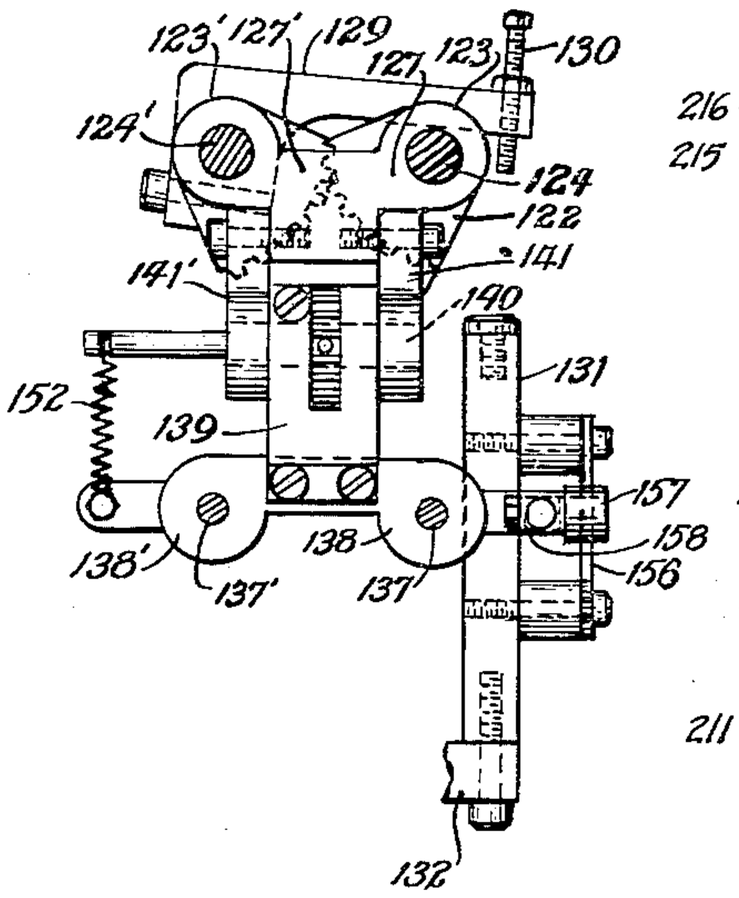
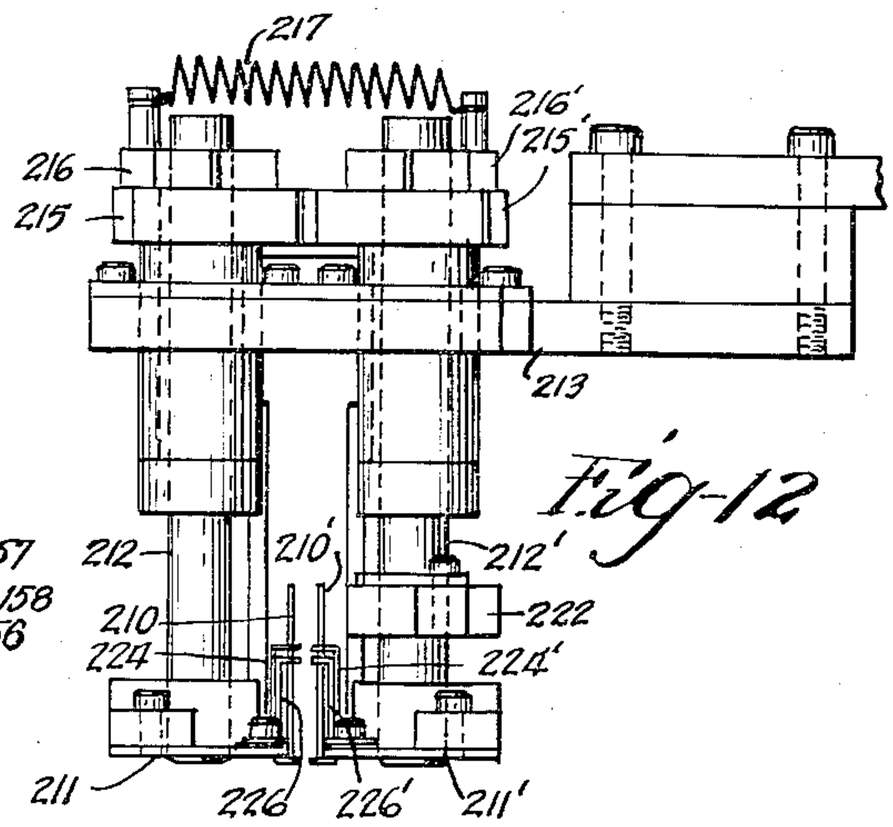


Fig-12



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CONTAINER FILLING AND CLOSING MACHINE

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Fig-7

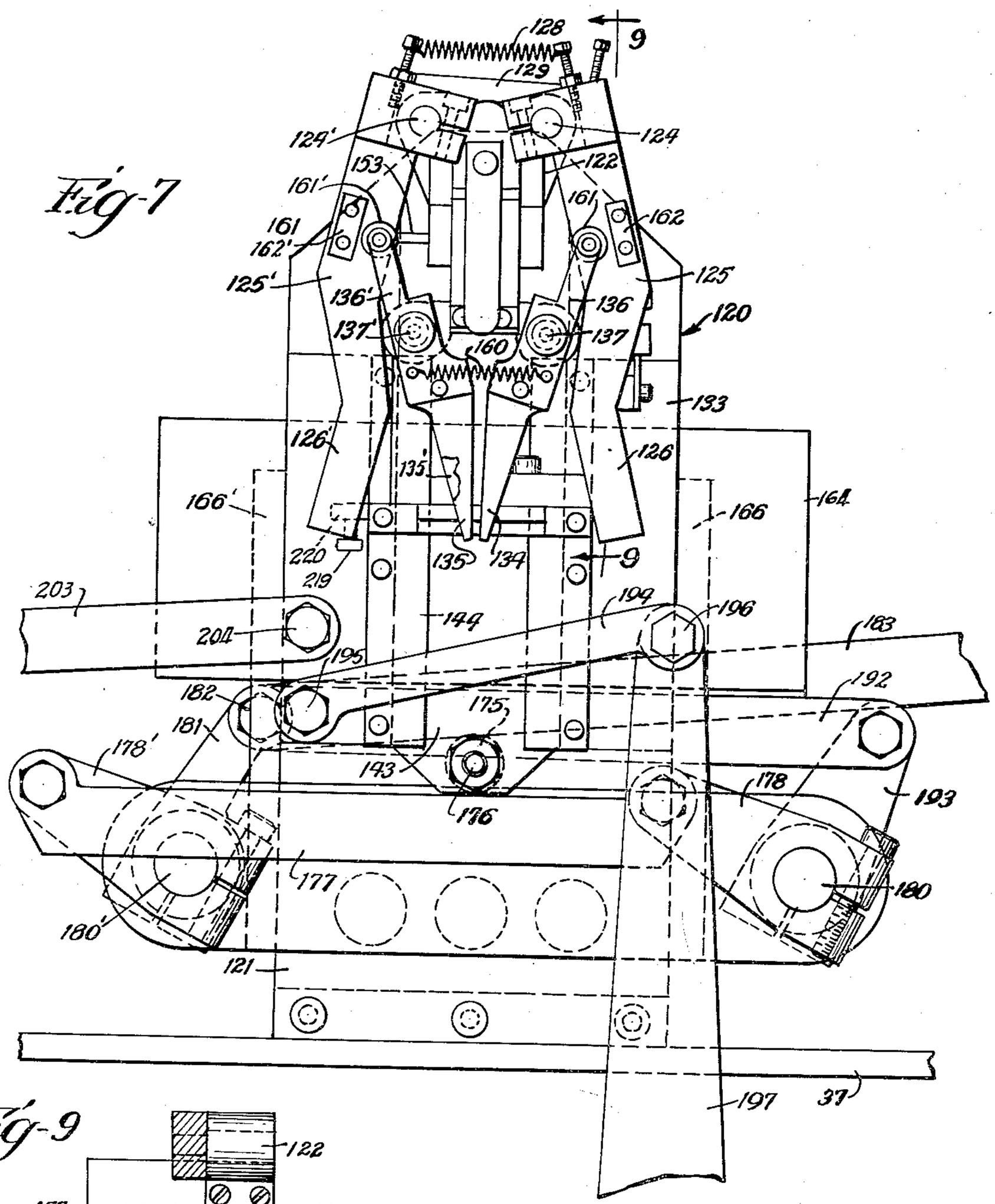
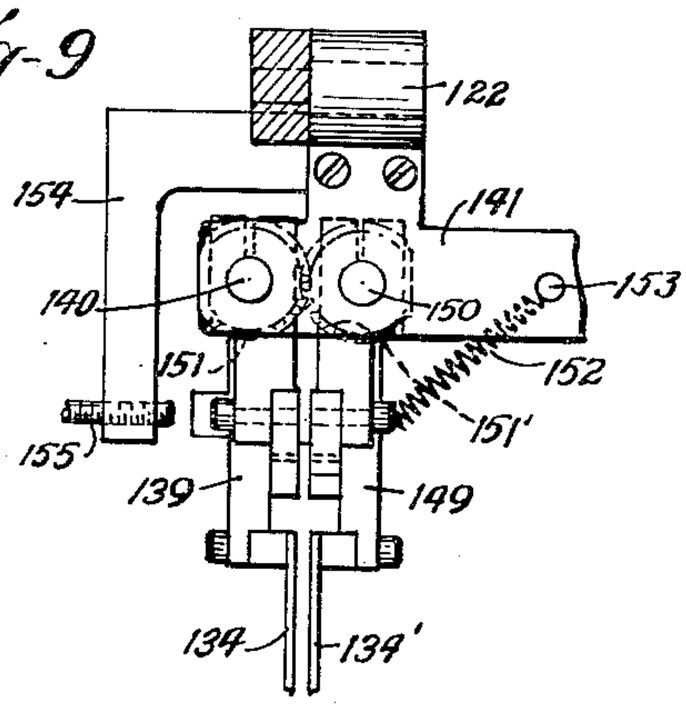


Fig-9



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CONTAINER FILLING AND CLOSING MACHINE

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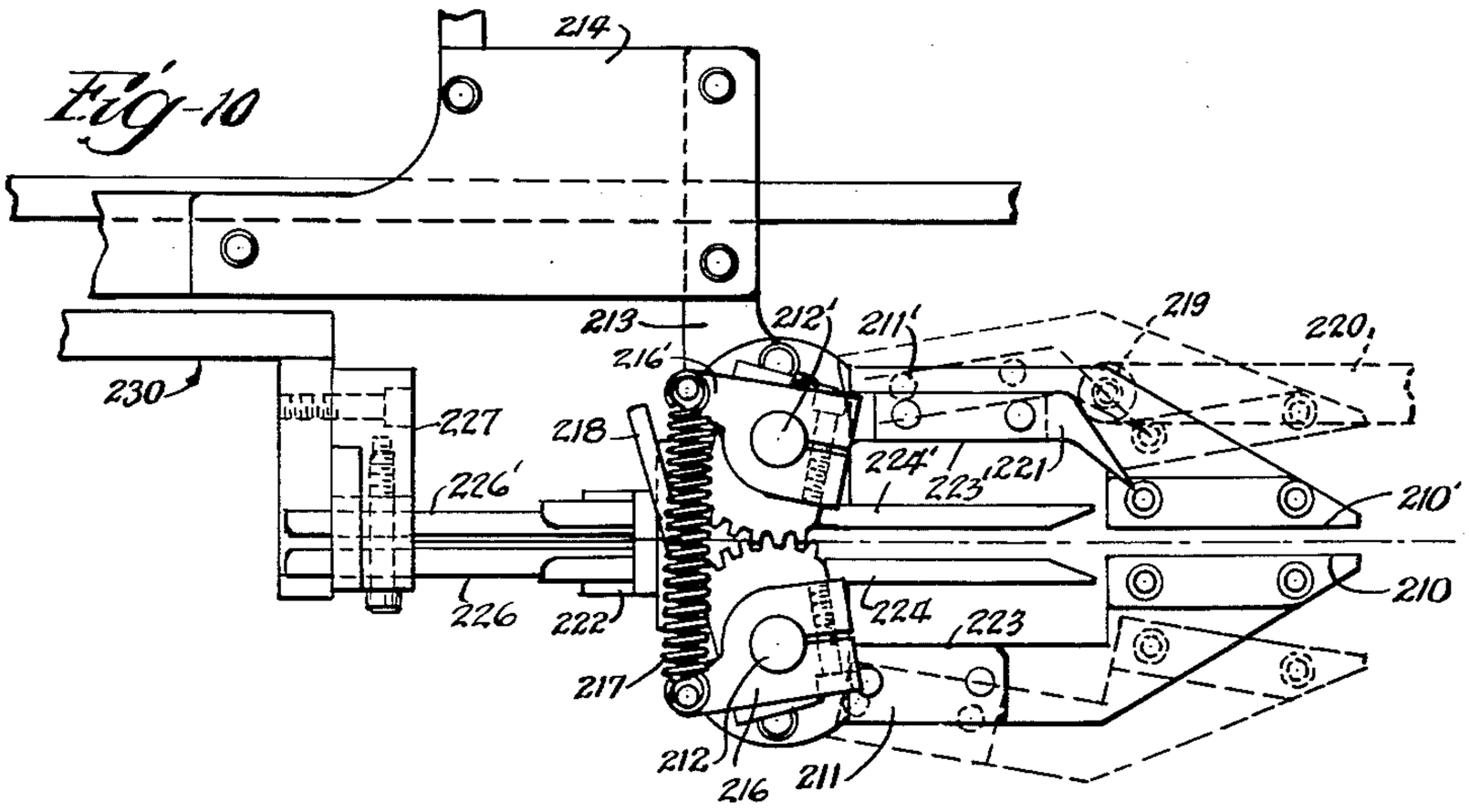
Fig-10



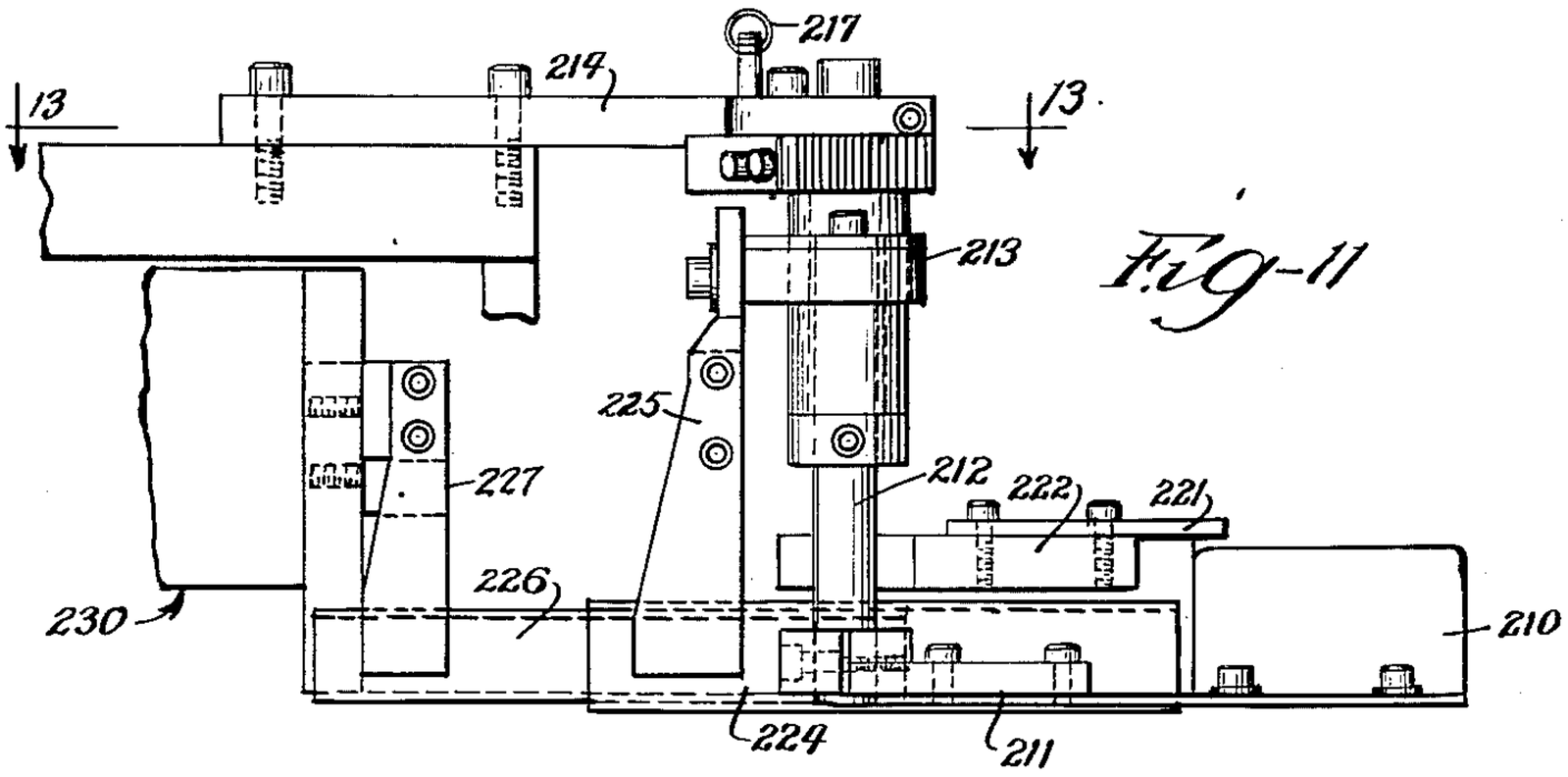


Fig-11

Fig-13

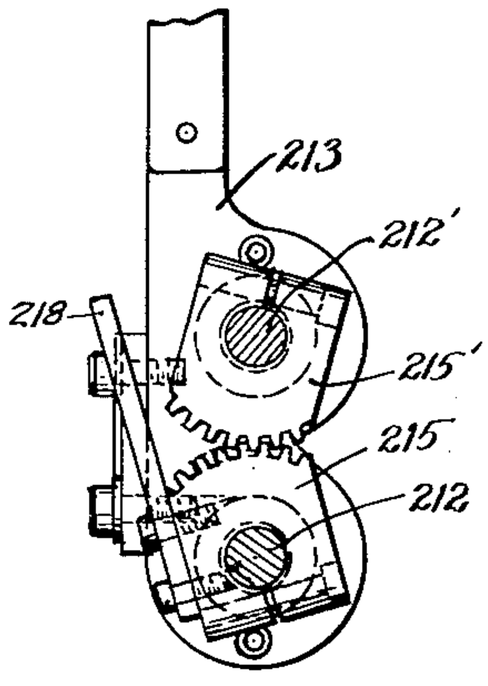


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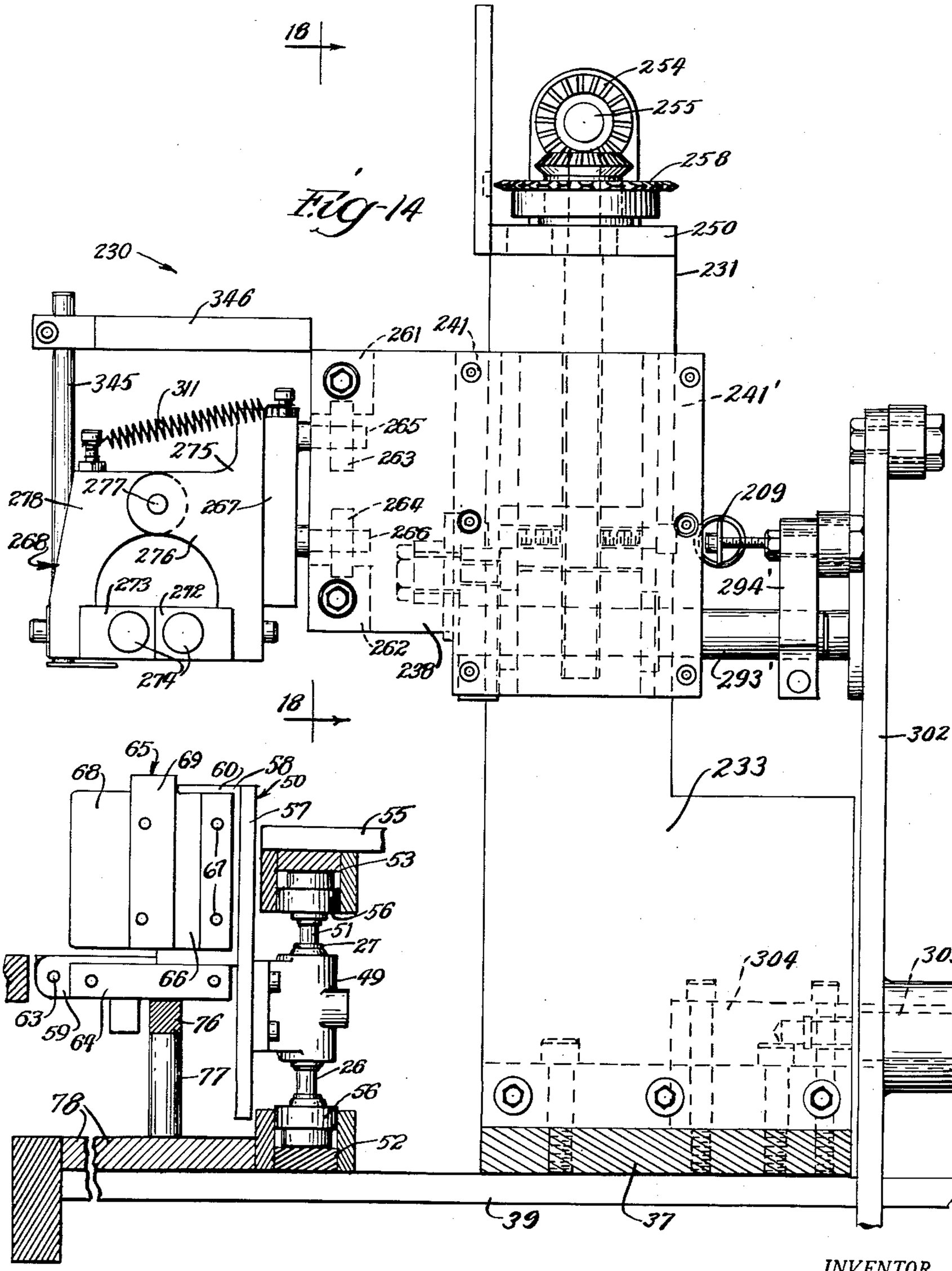
Fig-14



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2,952,959

CONTAINER FILLING AND CLOSING MACHINE

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13 Sheets-Sheet 9

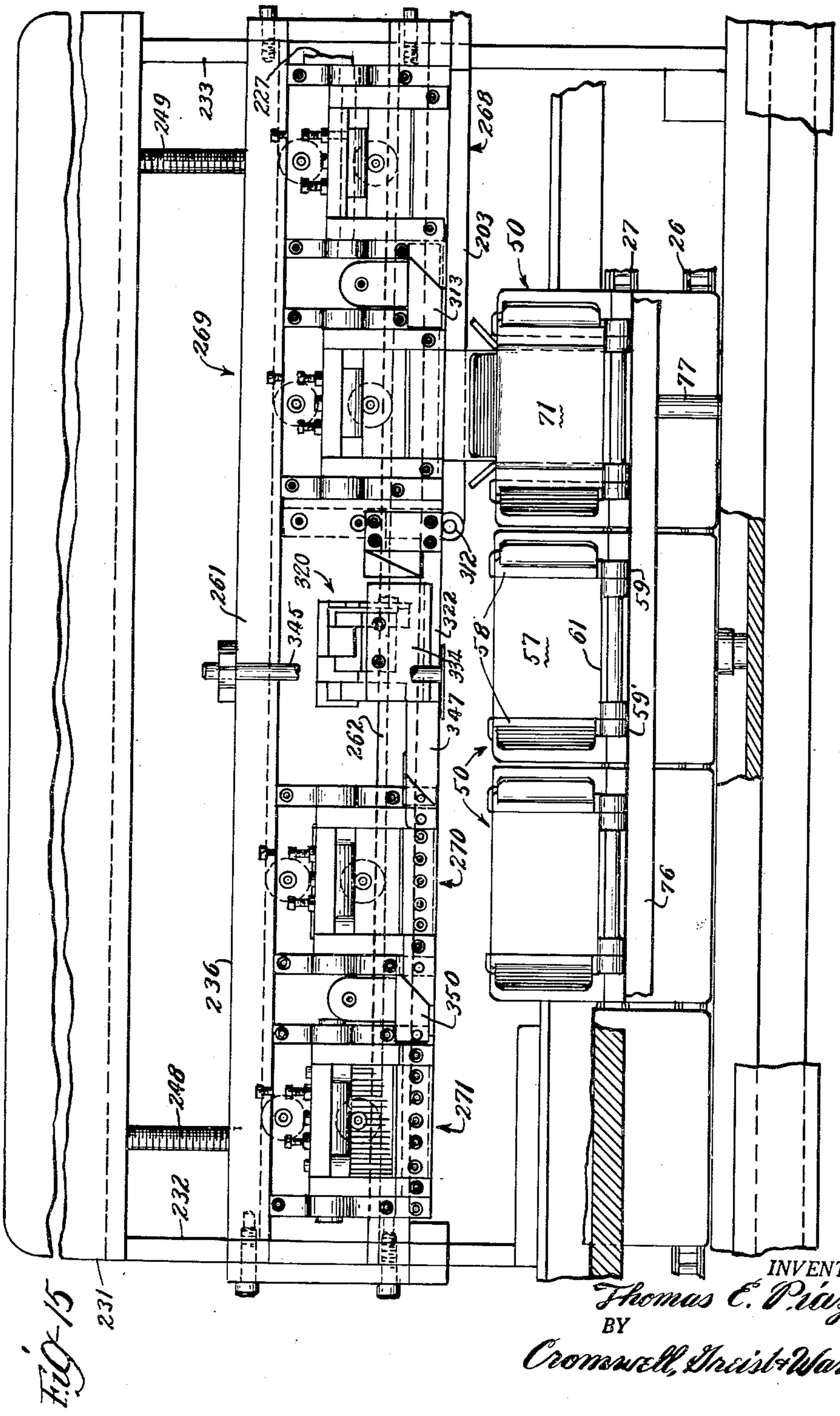

Fig. 15

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CONTAINER FILLING AND CLOSING MACHINE

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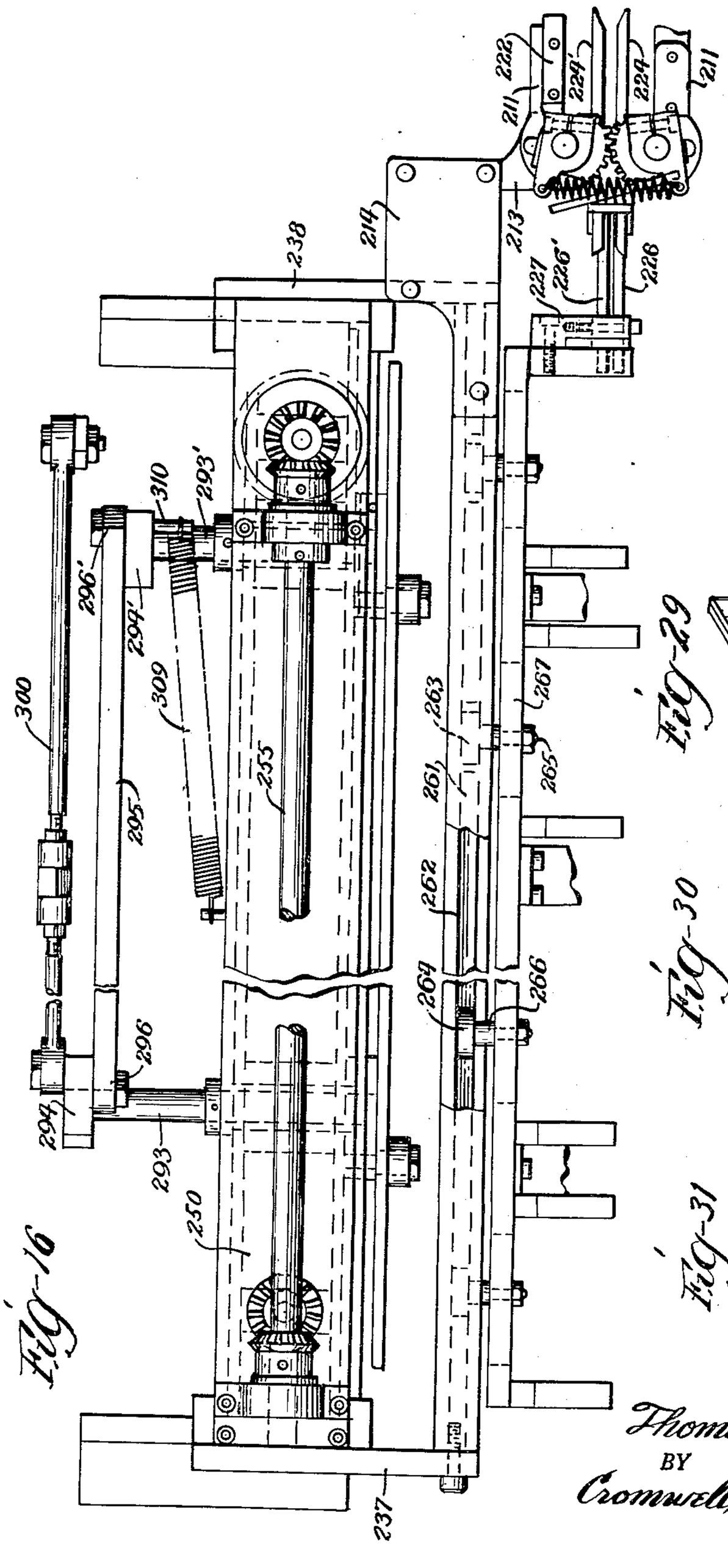

Fig-16

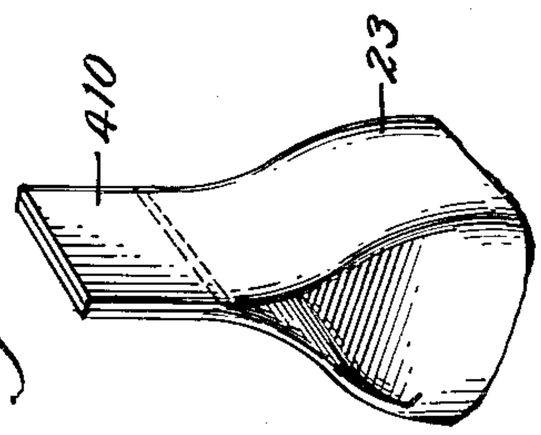

Fig-29

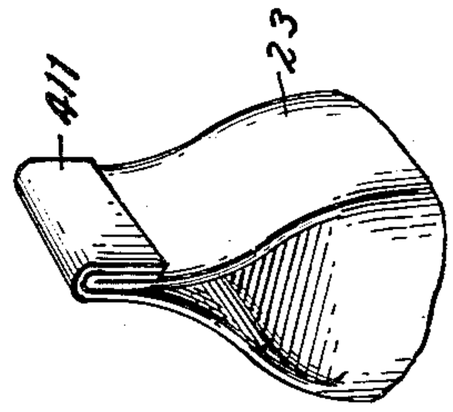

Fig-30

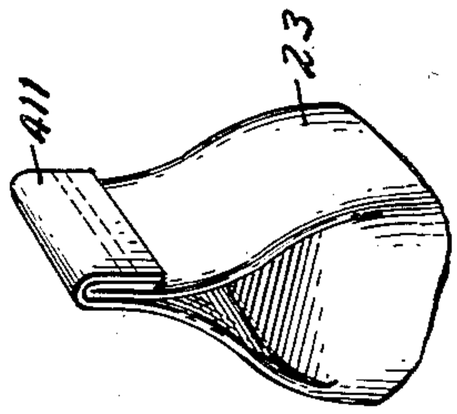

Fig-31

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CONTAINER FILLING AND CLOSING MACHINE

Filed May 20, 1957 13 Sheets-Sheet 11

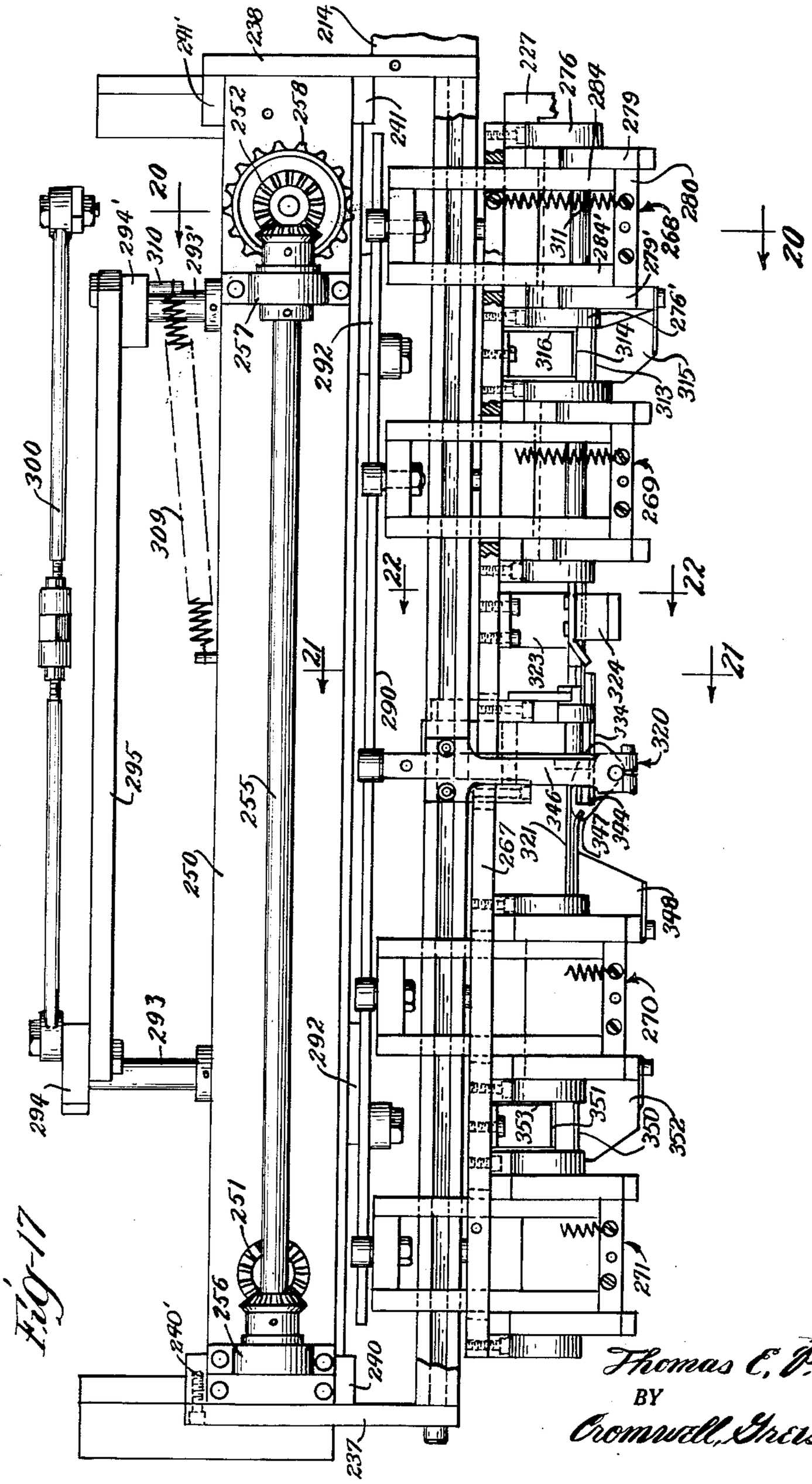

Fig-17

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CONTAINER FILLING AND CLOSING MACHINE

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Fig-18

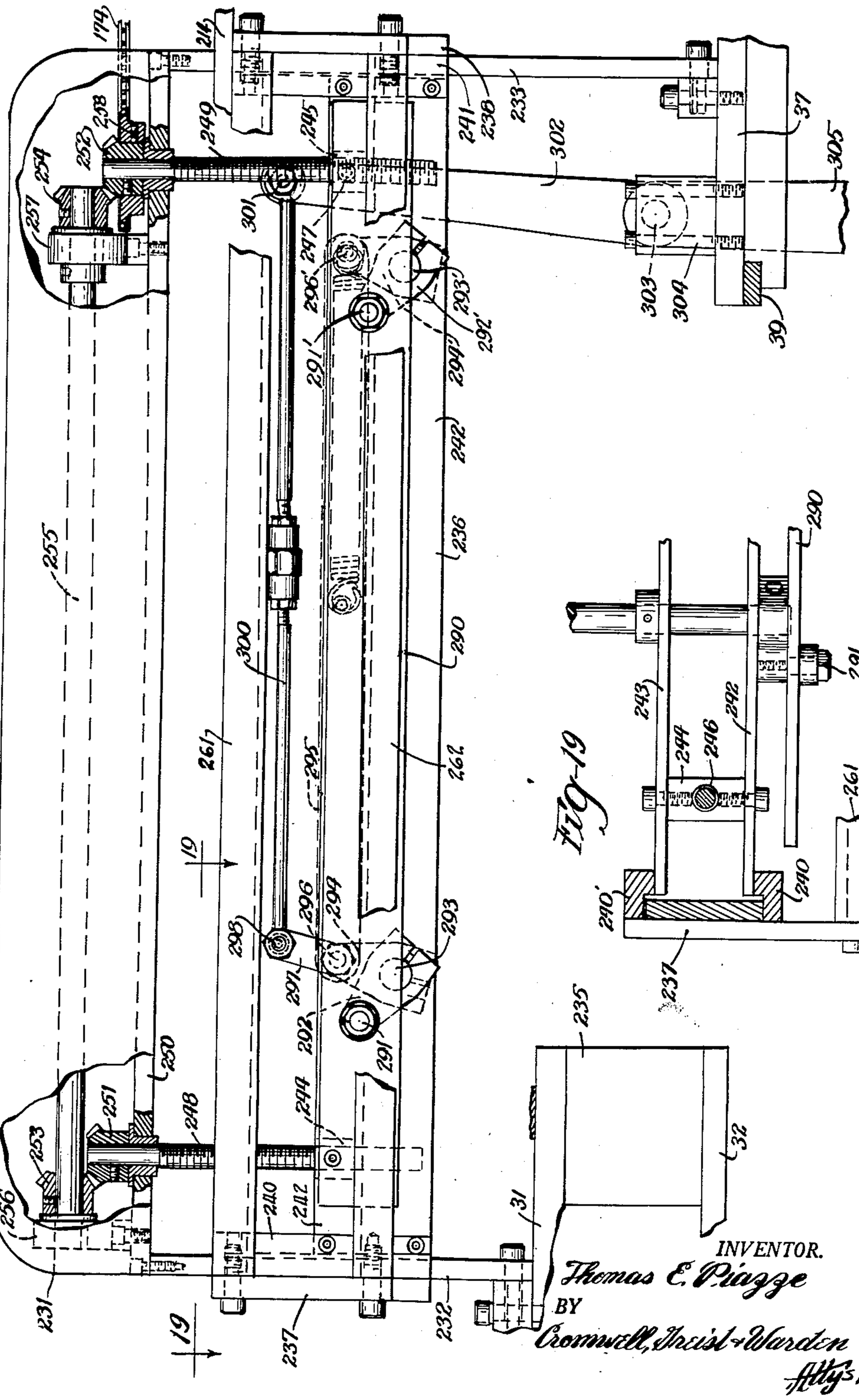

Fig-19

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CONTAINER FILLING AND CLOSING MACHINE

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Fig-20

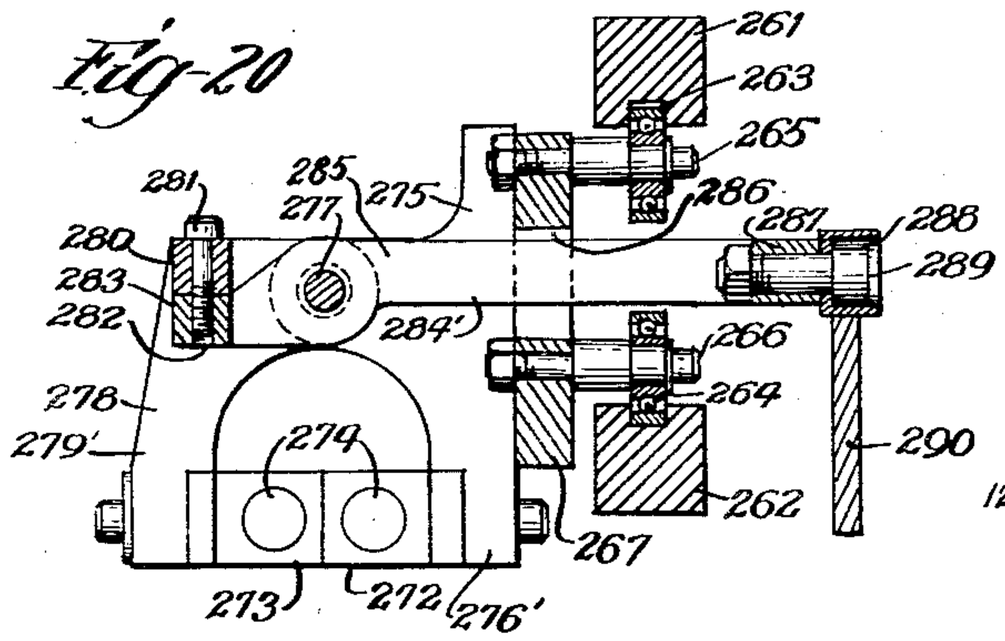


Fig-26

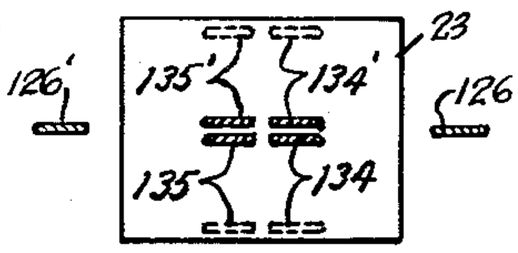


Fig-27

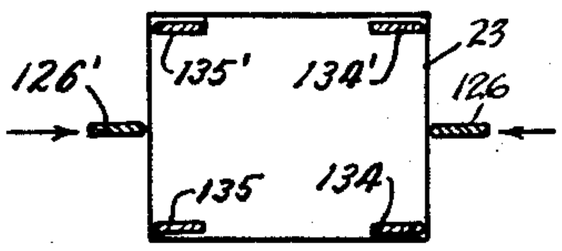


Fig-21

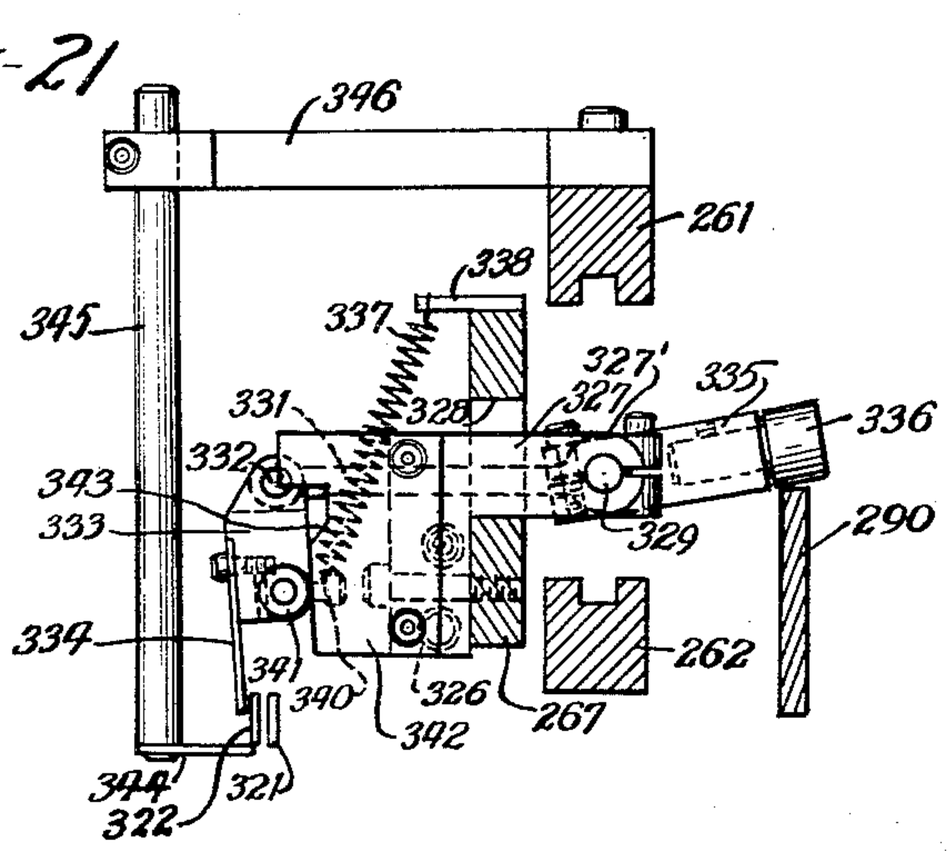


Fig-28

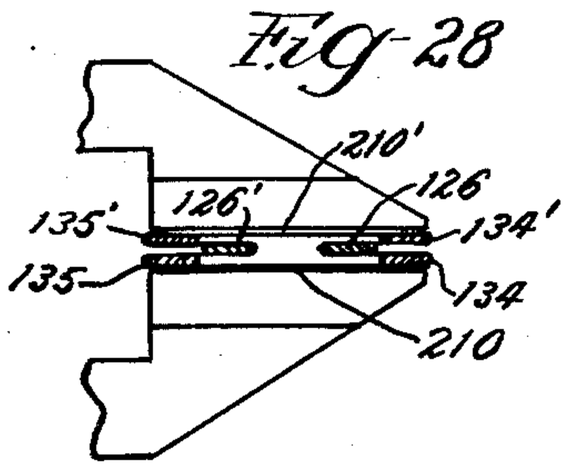
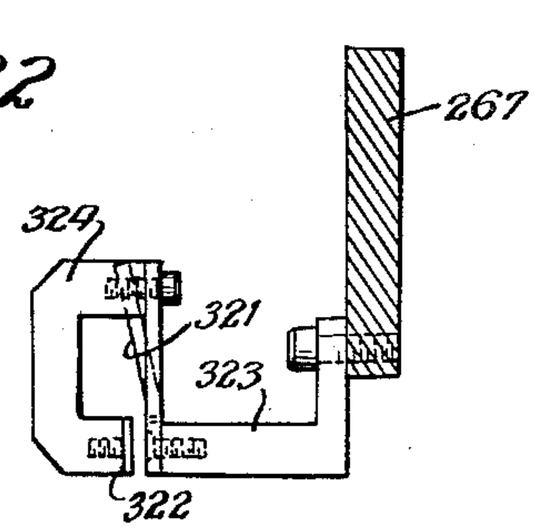


Fig-22



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United States Patent Office

2,952,959

Patented Sept. 20, 1960

2,952,959

CONTAINER FILLING AND CLOSING MACHINE

Thomas E. Piazze, Mount Vernon, Ohio, assignor to Continental Can Company, Inc., New York, N.Y., a corporation of New York

Filed May 20, 1957, Ser. No. 660,299

13 Claims. (Cl. 53—266)

This invention relates to packaging machines and is more particularly concerned with the improvements in a machine for receiving a container formed of pliable sheet material from a container forming machine, filling the container with a commodity, closing the top of the filled container and sealing the same.

It is a general object of the invention to provide a continuously operating machine having a pocketed conveyor for receiving open topped tube-like containers of pliable heat sealable material from a container making machine and for advancing the container beneath successive mechanisms positioned along the path of the conveyor for filling each container with a predetermined quantity of merchandise, for tucking the upstanding top portions of the end walls of the container while bringing the top portion of the side walls into juxtaposed relation to form a flat closure, and for heat sealing the closed top.

It is a more specific object of the invention to provide a container filling and closing machine comprising a continuously operated conveyor having a series of removable pocket forming mandrels for receiving in upright open position flat bottom bags formed from heat sealable material, the conveyor being arranged to operate in a horizontal plane and to advance the bags successively beneath a device for filling each 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 flattened face-to-face relation, a sealing, folding and pressing mechanism for heat sealing the flattened bag top, and for subsequently folding the sealed portion and further sealing the same, and mechanism for discharging the filled and closed bags from the machine.

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

It is a further object of the invention to provide in a machine of the type described an improved mechanism for sealing the tops of the successive filled bags after they have been closed by a folding and tucking mechanism wherein an initial cross seal is formed in the flattened bag top and subsequently the top is folded over onto itself and a final cross seal is placed therein.

It is still another object of the invention to provide a mechanism for receiving successive pairs of open bags from a supply line and for properly seating the bags in the pocket forming mandrels on the continuously operated conveyor of a bag filling and closing mechanism.

Another object of the invention is to provide in a container forming, filling and closing operation a method and means for transferring containers from an intermittently operating container fabricating machine in multiple side-by-side relation to upwardly opening container receiving

pockets which are arranged in single file relation on the continuously traveling conveyor of a container filling and top closing and sealing machine.

A further object of the invention is to provide a method of closing and heat sealing the tops of filled containers which are continuously advanced on a supporting conveyor by performing simultaneously the closing and heat sealing operations on the tops of a plurality of successive containers without interrupting the advancing movement of the supporting conveyor.

A still further object of the invention is to provide a method of discharging containers from continuously moving receptacles on a conveyor which comprises temporarily removing the bottoms of the receptacles at a discharge station and allowing the containers to drop by gravity to a delivery conveyor.

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

Figure 1 is a side elevation of a mechanism which embodies the principal features of the invention;

Figure 2 is a plan view of the mechanism with portions removed or broken away;

Figure 3 is a partial elevation of the side of the mechanism which is opposite the side shown in Figure 1;

Figure 4 is an elevation, to an enlarged scale, of the filling end of the mechanism with the filling device omitted and with other portions broken away;

Figure 5 is a cross section taken on the line **5—5** of Figure 3;

Figure 6 is a partial cross section taken on the line **6—6** of Figure 1, to an enlarged scale, showing in end elevation, the bag top tucking mechanism;

Figure 7 is a front side elevation, to a larger scale, of the bag top tucking mechanism shown in Figure 6;

Figure 8 is a cross section taken on the line **8—8** of Figure 6 to an enlarged scale;

Figure 9 is a partial section taken on the line **9—9** of Figure 7;

Figure 10 is a fragmentary plan view taken on the line **10—10** of Figure 1, to an enlarged scale;

Figure 11 is a front side elevation of the mechanism shown in Figure 10;

Figure 12 is an end elevation of the mechanism shown in Figure 10;

Figure 13 is a cross section taken on the line **13—13** of Figure 11;

Figure 14 is a partial cross section taken on the line **14—14** of Figure 1, to an enlarged scale, showing an end elevation of the bag top sealing mechanism;

Figure 15 is a front elevation of the sealing mechanism shown in Figure 14, to a smaller scale and with portions broken away;

Figure 16 is a plan view of the sealing mechanism with portions broken away;

Figure 17 is a plan view similar to Figure 16 with other portions being broken away;

Figure 18 is a vertical section taken on the line **18—18** of Figure 14, with portions broken way;

Figure 19 is a fragmentary horizontal section taken on the line **19—19** of Figure 18;

Figure 20 is a cross section taken on the line **20—20** of Figure 17 to an enlarged scale;

Figure 21 is a cross section taken on the line **21—21** of Figure 17 to an enlarged scale;

Figure 22 is a cross section taken on the line **22—22** of Figure 17 to an enlarged scale;

Figure 23 is a plan view, to an enlarged scale, of a portion of the conveyor showing one of the bag supporting assemblies;

Figure 24 is a cross section on the line **24—24** of Figure 23;

Figure 25 is a perspective view of one of the pocket forming mandrels removed from the conveyor;

Figure 26 is a plan view of the open bag top showing the position of the bag folding and tucking fingers as they are lowered toward the bag top;

Figure 27 is a view similar to Figure 24 at a later stage of the bag top tucking and closing operation;

Figure 28 is a view similar to Figure 24 at the completion of the tucking and closing operation;

Figure 29 is a perspective view of the bag top as it appears after the first cross sealing operation;

Figure 30 is a perspective view of the bag top after the top fold is formed and the final cross seal is applied; and

Figure 31 is a perspective view of the bag top upon completion of the final seal pressing operation.

Referring to the drawings, there is illustrated a machine for filling and closing a container of the square bottom type which is formed of heat sealable sheet or web material and which is delivered to the machine in squared up or opened condition. The machine is particularly adapted for use with a container fabricating machine of the type in which a series of forming mandrels are carried in double line arrangement on an endless conveyor and sheets of relatively flexible container forming material are folded over the ends of the mandrels to form flat bottom containers having vertical side seams. After the material is folded over the mandrels and the seams are formed, the containers are removed from the mandrels and delivered through a transfer mechanism to the machine in which the present invention is embodied. A suitable machine for fabricating the containers is disclosed in my copending application, Serial No. 657,853, filed May 8, 1957.

The machine illustrated in the drawings includes a continuously driven endless conveyor supported on a frame structure for movement in a horizontal plane and provided with a series of upwardly opening pocket forming mandrels in which the flat bottom containers or bags are adapted to be received from the container fabricating machine. A bag feeding mechanism is arranged at a station along the conveyor for delivering successive pairs of the bags in upwardly open relation into the mandrel pockets on the endless conveyor. A suitable filling mechanism is arranged at the end of the machine in advance of the bag feeding mechanism for feeding a measured amount of a product into the open top of each successive bag. A bag top tucking mechanism is arranged at a succeeding station along the conveyor for forming bellows folds in the top margins of the end walls of each bag and for bringing the side walls into flat face-to-face relation. The folded or closed top of each bag is then cross sealed, the sealed top is folded upon itself and a final seal applied by a combination heat sealing and fold forming mechanism arranged at a succeeding station along the conveyor. The closed and sealed bag is then moved by the conveyor to a discharge station where the completed package is dropped through the bottom of the mandrel in which it is carried to a discharge conveyor which delivers it from the machine.

In describing the machine, the side thereof which is shown in Figure 1 will be referred to as the front side of the machine while the opposite side will be referred to as the rear side. The bag carrying conveyor travels from left to right along the back run thereof as shown in Figure 2 with the empty bags being delivered to the machine at a station indicated at A adjacent one end of the rear side thereof. The bags are filled at the end of the machine indicated as station B. The bag top folding and tucking mechanism is at station C. The heat sealing mechanism is at station D and the completed packages are delivered to the discharge conveyor at station E.

The machine comprises a generally rectangular upright supporting structure **10** (Figures 1 to 4) with a top frame comprising side rails **11** and **12** and end rails **13** and **14** with transversely extending brace members which will be hereinafter referred to. The top frame is supported on base forming upright side plate members **15** and **16** at one end of the machine and **17** and **18** at the other end of the machine. The base members **15, 16** and **17, 18** are tied together near the bottom by pairs of transversely extending reinforcing plates **19** and **20**, respectively. The pairs of plate members **15, 17** and **16, 18** at each side of the machine are tied together by longitudinally extending bottom side brace rails **21** and **22**, respectively.

Mechanism for supporting and carrying the bags **23** (Figures 1, 2 and 4) is provided which comprises a bag carrying and supporting conveyor **25** which is mounted on the top frame of the supporting structure **10** for movement in a horizontal plane. The conveyor **25** comprises a pair of vertically spaced endless chains **26** and **27** (Figures 2, 4 and 14) which are supported on paired vertically spaced sprockets **28** and **29** mounted at opposite ends of the supporting structure **10**. The sprockets **29**, at the end of the machine adjacent stations D and E, are mounted on a relatively short, vertically extending stub shaft **30** which is journaled in vertically spaced horizontal top and bottom supporting plate members **31** and **32**, which plate members are mounted in longitudinally extending relation with the bottom plate member **32** secured on the longitudinally spaced cross frame members **33** and **34** extending between the side rails **11** and **12**, and with the top plate member **31** constituting a part of an upstanding subframe. The stub shaft **30** is an idler shaft and its mounting structure including the plates **31** and **32** is supported for adjustment longitudinally of the supporting frame structure **10** to maintain proper tension in the chains. The sprockets **28** at the other end of the conveyor adjacent the station B are supported on a vertically extending drive shaft **35** which is journaled in vertically spaced horizontal top and bottom suppporting plate members **36** and **37**. The bottom plate member **37** extends longitudinally approximately half the length of the supporting frame structure **10** and is mounted on longitudinally spaced cross frame bars **38** and **39** which extend between the top frame side members **11** and **12**. The top support plate **36** constitutes the top member of an upstanding subframe mounted on the outer end of the plate **37**.

The vertical drive shaft **35** (Figure 4) depends from the bottom support plate **37** to a gear box **40** which is mounted on a vertical cross plate **41** extending between the side frame members **17** and **18** at the filling end of the machine. The shaft **35** carries a bevel gear **42** on its lower end which is in engagement with a cooperating bevel gear **43** on a relatively short driven cross shaft **44** which is journaled in the vertical side walls of the gear box **40** and which carries on one end a drive sprocket **45** with the latter connected by a drive chain **46** with the sprocket **47** on the cross shaft **48**. The cross shaft **48** extends between upper portions of the side frame members **17** and **18** and forms a combination cam and drive shaft controlling the operation of certain of the mechanism hereinafter referred to.

The conveyor chains **26** and **27** are held in vertically spaced relation by pairs of brackets **49** which extend in spaced relation along the conveyor **25** and which carry pocket forming mandrel supporting assemblies **50** (Figures 1, 14, 15, 23, 24 and 25). The brackets **49** of each pair thereof are connected to the chains **26** and **27** by link connecting vertical pivot pins **51**. The chains **26** and **27** are supported and guided in vertically spaced channel-like guide formations **52** and **53**. The bottom guide formation **52** is supported on the cross frame members **33, 34, 38, 39** and the upper guideway formation **53** is supported on cross bars **54** and **55** (Figure 2) at opposite ends of the machine which are mounted

on the subframes supporting the conveyor sprockets. The pivot pins **51** on which the brackets **49** are supported are extended at opposite ends beyond the chain links and provided with guide or bearing rollers **56** which engage in the channels **52** and **53** and hold the mandrel assemblies **50** in upright position.

Each of the pocket forming mandrel supporting assemblies **50** (Figures 14, 23 and 24) comprises a vertically extending back or base plate **57** which is attached to the bracket members **49** and extends in a vertical plane outside of the guide channels **52** and **53** projecting slightly above the uppermost guide channel **53**. The back plate **57** carries an outwardly extending frame formation which comprises spaced vertical side plates **58, 58'** of generally L-shaped configuration with the bottom legs **59, 59'** extending outwardly of the vertical portions **60, 60'** and back plate **57** and forming side supports for a bottom forming plate **61** which is apertured at **62** and which is swingably mounted on the pivots **63, 63'** between the outer ends of the legs **59, 59'** so that it may swing downwardly and outwardly away from the back plate **57** as indicated in Figure 24. Bottom brace blocks **64, 64'** are secured outside the bottom legs **59, 59'** and identical spring clamp devices **65, 65'** are attached to each of the vertical portions **60, 60'** of the side plates **58, 58'**. The clamp device **65** comprises a relatively thin spring plate **66** which is secured along one vertical edge to the vertical portion **60** of the side plate **58** adjacent the back edge by bolts **67** and extends beyond the outer edge thereof where it is attached to the inner edge of an outwardly flared plate member **68** and to a vertical plate member **69** having an inturned top flange **70**. The clamp device **65'** has corresponding members which are indicated by the same numbers primed. The spring plates **66, 66'** enable the outwardly flared plates **68, 68'** at the open side of the assembly **50** to be spread apart to receive a removable bag receiving and supporting mandrel **71**, one of which is shown in Figure 25.

The mandrels **71** may be conveniently formed by shaping two plate sections as shown and joining them to form an open ended tubular member of rectangular cross section having outwardly flared flanges **72** at the top end and outwardly directed vertical fins **73, 73'** extend from the oppositely disposed side walls **74, 74'** and are adapted to be received in the pockets **75, 75'** formed between the inner edges of the outwardly flared entrance plates **68, 68'** of the clamp devices **65, 65'** and the outer edges of the vertical portions **60, 60'** of the side plates **58, 58'** of the assembly **50** with the open bottom end of the mandrel **71** being seated on the bottom plate **61** and over the perforations **62** therein. The mandrels **71** may be interchanged with any of the assemblies **50** and different size mandrels **71** may be provided for varying the size of the bag which the machine will accommodate. The mandrels **71** may be varied in length and width with the overall dimension in the plane of the fins **73** remaining constant so that the mandrels may be properly seated and held in the supporting assemblies **50**.

Additional support is provided for maintaining the assemblies **50** in proper upright position which comprises a supporting rail **76** (Figures 2, 4 and 14) extending along the conveyor **25** beneath the path of movement of the assemblies **50** at all points except at the empty bag receiving station A and the finished package discharge station E. The rail **76** is mounted on a series of upright post members **77** which are spaced along the same and extend upwardly from top plate members **78** which are supported on the cross frame bars **33, 34, 38** and **39** adjacent the side and end members **12, 13, 14** and **15** of the top frame.

The empty bags shown at **23** (Figure 5) are supplied to the pocket forming mandrels **71** in pairs from a suitable source, preferably an intermittently operating duplex bag making machine associated with the present apparatus such as disclosed in my copending application Serial No. 657,853. The bags **23** are delivered to the conveyor **25** at the station indicated at A in Figure 2 through a transfer chute mechanism **80** (Figures 3 and 5). The bags are delivered to a vertical hopper 81 which is mounted on an upright frame **82** of inverted U-shaped configuration having the lower ends of the legs **83** spaced along and secured to the outer face of the rear frame member **18** at the bag delivery station A. The hopper **81** comprises a vertical front plate **84** and a back plate **85** with the back plate **85** having a rearwardly flared upper flange section **86**. The hopper **81** which is of generally rectangular cross section and open at the top and bottom is supported in forwardly extending relation on the upright frame **82** so that the bottom end is positioned above and in vertical alignment with the open tops of the pocketed mandrels **71** which are carried on the conveyor **25**. The hopper **81** is divided into two separate, spaced bag receiving sections or passageways by vertically extending channel-like members **87, 87'** positioned between the front and back walls **84** and **85** and spaced a distance apart corresponding to the spacing of the mandrels **71** on the conveyor **25**. The hopper **81** is moved in a closed circular path to deliver the bags two at a time to the pockets in the continuously advancing conveyor **25** beneath the same. The rear plate **85** of the hopper **81** is provided with a pair of pivot pin members **88, 88'** which are spaced in the longitudinal direction of the machine and pivotally mounted in the ends of a pair of crank arms **89, 89'** which are in turn secured on the inner ends of a pair of shaft members **90, 91'**, the latter being supported in bearing members **91, 91'** secured in the upper cross or top plate **92** of the supporting frame **82**. The operating shafts **90, 90'** each carry a gear **93, 93'** at the outer end. The gears **93, 93'** are connected by an idler gear **94** mounted on a stub shaft **95** so that the two gears **93, 93'** rotate in the same direction to drive the crank arms **89, 89'** simultaneously in the same direction. One shaft **90** has its outer end extended and receives a sprocket **96** which is connected by a drive chain **97** with a sprocket **98** on the cross shaft **100** which extends between the side frame members **17** and **18** and which constitutes one of the combination cam and drive shafts for the mechanism.

A suction device **101** (Figures 2, 3 and 5) is associated with the conveyor at station A which comprises a suction box **102** having a portion **103** at the top which extends through the plate **78** on the top frame of the supporting structure and has a top plate 104 aligned beneath the path of the mandrels **71** with an opening **105** so that suction is applied through the apertures **62** in the bottom **61** of the mandrels **71** as the latter slide over the suction plate **104** to insure proper seating of the bags **23** therein. The suction box **102** is connected to a pump **106** which is driven by the motor **107** and the entire mechanism is mounted on a cross frame structure extending between the side frame members of the machine.

After the bags **23** are received in the pocket forming mandrels **71**, they are advanced by movement of the conveyor **25** around the filling end of the machine where a predetermined quantity of a commodity is deposited in each of the bags by a rotary head filling mechanism **110** which carries a series of filling nozzles **111** and which is supported on and rotates with the upstanding shaft **35**. The filling mechanism **110** is of the type which delivers successive measured charges through the nozzles **111** as the mechanism rotates about its supporting shaft, the nozzles **111** being aligned with the mandrels **71** on the conveyor **25**. A suitable filling mechanism is disclosed in copending application Serial No. 663,471, now Patent No. 2,888,046. The filling mechanism **110** is provided with a suitable no-fill no-bag control mechanism so that no charge is delivered to a mandrel when there is no bag in the latter.

As the filled bags are advanced beyond the filling sta-

tion B they are moved to a tucking head mechanism **120** (Figures 1 and 6 to 9) which is mounted on the supporting structure **10** at station C and which operates to place tucks or bellows folds in the top marginal portions of the end walls of each filled bag as it moves beneath the tucking head at the station C. The tucking head places the tucks in the end walls of the filled bags and simultaneously brings the top marginal portions of the side walls into flattened juxtaposed relation for subsequent sealing.

The tucking head **120** is mounted on a vertical supporting bracket plate **121** which forms the front member of a head supporting upright frame or stand structure projecting in fixed position above the horizontal support plate **37**. The head **120** is given a four motion movement in an endless path as the tucking and folding operations are accomplished to close the top of the bag while the bag is advanced beneath the same. The head **120** comprises a bracket or block member **122** having upper bearing forming ears **123**, **123'** (Figure 8) receiving pivot pins **124**, **124'** on which the arms **125**, **125'** carrying the outside tucking fingers **126** and **126'** are mounted. The pivot pins **124**, **124'** carry interengaging segments **127**, **127'** which insure simultaneous movement of the arms **125**, **125'**. A tension spring **128** is connected at its opposite ends to the respective arms **125**, **125'** adjacent the pivots **124**, **124'** to normally urge the arms **125**, **125'** in a direction about their pivotal mountings which positions the fingers **126**, **126'** outwardly away from each other with the outward movement of the arms being limited by means of an L-shaped operating bar **129** which has its shorter, vertically extending leg secured on the extended end of the pivot pin **124'**. The longer horizontal leg of the bar **129** extends across and above the extended end of the pivot pin **124** and normally engages the latter. The bar **129** carries an adjusting screw or bolt **130** at its free end which is positioned to engage with the upper end of a vertical bar **131** supported on the end of a forwardly extending bracket member **132** which is fixed to a horizontal slide plate **133** on which the finger supporting bracket **122** is slidingly mounted. The tucking fingers **126**, **126'** are adapted to be moved toward each other when the supporting bracket **122** moves downward a sufficient distance to engage the bolt **130** with the abutment forming bar **131**.

Two pairs of inside fold or corner forming fingers or blade members are mounted for swinging movement in two directions on the supporting bracket **122**, the fingers of the front pair being indicated at **134**, **135** and the fingers of the back pair at **134'**, **135'**. The front fingers **134**, **135** are mounted on arm members **136**, **136'** which are secured intermediate their ends on pivot pins **137**, **137'** journaled in the lower bearing forming ears **138**, **138'** of a front bracket member **139**. The bracket member **139** is secured on a cross pin **140** extending between and journaled in a pair of spaced T-shaped side plates **141**, **141'**, the latter depending from opposite sides of the bracket support member **122** and having horizontally extending leg portions projecting behind the bracket member **122** which are connected by a forwardly extending bracket member **142** to the upper end of a vertical slide plate **143**. The slide plate **143** is mounted for vertical sliding movement in guideways formed by oppositely disposed spaced channel members **144** secured on the horizontally movable slide plate **132**. The rear folding fingers **134'**, **135'** are mounted in the same manner as the front fingers **134**, **135** on a rear bracket member **149**. The bracket member **149** is mounted on the pin **150** journaled in the bearing plates **141**, **141'**. The two pivot pins **140** and **150** are provided with interengaging toothed segments **151**, **151'** which insure that equal swinging movement about the pivot pins **140** and **150** occurs upon movement of either one of the finger supporting arms **139**, **149**. A spring **152** is connected at one end to the rear bracket **149** and at the other end to the pin **153** extending from the supporting plate **141** which urges the two arms **139**, **149** in a direction away from each other about their pivots **140** and **150**, which spreads the front and rear inside folding fingers apart. An L-shaped bracket arm **154** is secured to the face of the supporting bracket **122** which carries on the end of its depending arm an adjusting bolt **155** which limits the movement of the two bracket arms **139** and **149** in the direction away from each other. With this arrangement the front and rear sets or pairs of inner folding fingers **134**, **135** and **134'**, **135'** have limited movement in a lateral direction toward and from each other. The lateral movement of the two support brackets **139** and **149** and the inner folding fingers **134**, **135** and **134'**, **135'** is controlled by a cam plate **156** (Figures 6 and 8) which is mounted on the upright bar member **131** and a cooperating cam roller **157** which is supported on a bracket **158** extending from the rearward support bracket **149**. The cam roller **157** rides on the front edge of the cam plate **156** as the supporting bracket **122** is raised and lowered by movement of the slide **143** and allows the spring **152** to spread the fingers **134**, **135** and **134'**, **135'** when the mechanism is lowered to move the fingers into the open top of a bag on the conveyor **25**.

The front tucking fingers **134** and **135** are urged towards each other in a vertical plane by a tension spring **160** (Figure 7) which has its ends connected to the two finger supporting arms **136**, **136'** below the pivot pins **137**, **137'**. The fingers **134** and **135** are moved apart by cam rollers **161** and **161'** which are carried on the upper ends of the supporting arms **136**, **136'** engaging with cam plates or blocks **162**, **162'** secured on the arms **125**, **125'** which carry the outside tucking fingers **126**, **126'** so that the fingers **134** and **135** spread apart or move outwardly against the bag walls as the fingers **126** and **126'** move inwardly toward each other. The rear pair of tucking fingers **134'**, **135'** are provided with like operating members so that they move in unison with the front pair of fingers **134**, **135** upon movement of the fingers **126**, **126'**.

The horizontal slide plate **133** is provided on its rear face with upper and lower oppositely facing channel shaped members **163** and **163'** which provide a guideway for receiving the horizontal edges of a vertically disposed track forming plate **164** which is secured to a vertically adjustable bracket member **165**. The bracket member **165** extends between the side plates **166**, **166'** of a carriage **167** which is adjustably mounted in sliding relation on the upright plate member **121** of the supporting frame **168** which is secured on the horizontal support plate **37** at the filling end of the machine. The carriage **167** is held in adjusted position on the upright fixed frame member **121** by an adjusting screw **170** which is journaled in a rearwardly extending bracket arm **171** on the top of the frame member **121** and has its lower end in screw threaded engagement with a suitable threaded aperture in a top member of the carriage **167**. The adjusting screw **170** carries a handle **172** at its upper end for manual operation and also a sprocket **173** which is connected by a chain **174** with similar adjusting mechanism for the sealing mechanism which will be subsequently described.

The tucking head is reciprocated in a vertical direction by movement of the slide plate **143**. The slide plate **143** carries a cam roller **175** (Figures 6 and 7) on a pin **176** which extends from the rear face of the plate **143** and rides on the top of a lifting bar **177**. The lifting bar **177** is carried on a pair of parallel support arms **178** and **178'** which are mounted on the shafts **180** and **180'** with the latter journaled in the bottom portion of the carriage **167** and having an operating arm **181** on its rear or inner end. The arm **181** is pivoted at its upper end at **182** to an operating link **183** which is connected at its other end at **184** to the upper end of the upstanding arm **185** of a bell crank lever which is pivotally mounted on the cross shaft **100** and which carries

on the end of its lower arm **187** a cam roller **188** which engages with the operating cam **190** on the cross shaft **48**. The arm **181** on the shaft **180'** is connected by a link **192** with a parallel arm **193** on the pivot shaft **180** and operates the shaft **180** simultaneously with the shaft **180'** so that the bar **177** is held horizontal while it is moved in a circular path which raises and lowers the head while permitting its horizontal movement.

Horizontal movement of the plate **133** is accomplished by means of an operating link **194** which is connected at one end by a pivot pin **195** to the bottom edge of the plate **133** and at the other end by pivot **196** to the upper end of a vertically extending crank member **197**. The crank member **197** is pivoted on the cross shaft **198** (Figure 1) and carries on its lower horizontal arm **200** a cam roller **201** which engages in a cam track on cam plate **202** on the cross shaft **100**. The horizontally reciprocating plate **133** is connected to the movable frame of the adjoining sealing mechanism by a link **203** which is pivoted at one end to the plate **133** at **204**.

As the conveyor **25** moves a filled bag **23** beneath the tucking head the finger supporting bracket **122** is lowered until the inside folding fingers **134, 135** and **134', 135'** enter the top of the bag, the head being moved horizontally to the right in Figure 1. The outside tucking fingers **126** and **126'** move down on the outside of the end walls of the bag top, the fingers being in the position shown in Figure 7 as they begin the downward movement. As the head is lowered the two pairs of inside folding fingers **134, 135** and **134', 135'** are given a lateral movement by movement of the cam roller **157** over the edge of the cam plate **156** and the action of the spring **152**. At the same time the outside tucking fingers **126, 126'** are moved inwardly towards each other to engage the end walls of the bag and the cam plates **162, 162'** engage the cam rollers **161, 161'** to move the inside folding fingers **134, 134'** away from the fingers **135, 135'**, respectively, so that the inside fingers move out towards the four corners of the bag top while the tucking fingers **126** and **126'** move in between the inside fingers at each end of the bag. As these movements are accomplished the entire head is moved forward, by reciprocation of the plate **133**, with the moving bag. As the bag and the head advance the tucked bag top advances between a pair of top pressing plates **210** and **210'** (Figures 10 to 13) which are normally held in a laterally swung or open position and which are closed on the bag top as the head member **122** is moved upwardly and the folding and tucking fingers withdrawn from engagement with the bag top.

The top pressing plates **210** and **210'** extend vertically from a pair of horizontally disposed supporting arm members **211, 211'**. The supporting arms **211, 211'** are mounted on vertically extending parallel pivot shafts **212, 212'** which are journaled in a horizontally extending bracket **213** projecting forwardly of and attached to the fixed supporting frame for the sealing mechanism by a bracket plate **214**. The pivot shafts **212, 212'** carry at their upper ends above the bracket support **213** a pair of cooperating toothed segments **215, 215'** which insure that the two vertically extending fold pressing plates **210** and **210'** will be moved in unison about the pivot shafts **212, 212'**. A pair of relatively short arm members **216, 216'** are secured on the upper ends of the pivot shafts **212, 212'** with their free ends connected by a tension spring **217** which urges the two plate supporting arms **211, 211'** into open position as indicated in dotted lines in Figure 10. One of the segments **215** carries a tangential bar **218** which is adapted to engage with the other segment **215'** to limit the opening movement of the arms **211, 211'** so as to provide sufficient space between the vertical plates **210** and **210'** for passage of the collapsed bag top. The vertical plates **210, 210'** are operated to close on the folded bag top by engagement of the cam roller **219**, which is carried on a bracket **220** extending forwardly of the movable slide plate **133** on the tucking head, with a cam plate **221** which is carried on the arm **222** secured on the rearmost vertical shaft **212'** so that the plates **210, 210'** are closed at the end of the forward movement of the tucking head.

The supporting arms **211, 211'** are cut out at **223, 223'** to accommodate a pair of fixed guideway forming plate members **224, 224'** which are channel-shaped in cross section (Figure 12) and which are supported on a bracket **225** depending from the bracket **213** and arranged with their opposed top and bottom flanges spaced to form a longitudinal and vertical guideway for receiving the bag top as it advances beyond the pressing plates **210, 210'**. A pair of similar channel-shaped plate members **226, 226'** are supported on a bracket **227** which depends from a movable frame portion of the adjoining sealing mechanism **230**. The plate members **226, 226'** telescope within the plate members **224, 224'** and form a movable guideway section extending between the fixed guideway and the first sealing device on the sealing mechanism **230**.

The mechanism **230** for sealing the bag top comprises an upright fixed frame **231** (Figures 14 to 22) having upright end plates **232** and **233** spaced longitudinally of the supporting frame structure **10** and secured at their lower ends to the horizontal supporting plate members **31** and **37**, respectively. The fixed frame end plates **232** and **233** form supporting vertical rails or guide members for a vertically adjustable rectangular frame **236**. The adjustable frame **236** comprises vertically extending end plates **237** and **238** at opposite ends thereof, each of which has attached to its inner face a pair of laterally spaced vertical angle members **240, 240'** and **241, 241'** arranged to provide guideways for receiving the vertical plates **232** and **233** of the fixed frame **231**. Laterally spaced longitudinally and vertically extending front and rear plates **242** and **243** which form the body of the movable frame are connected between the guideway forming members **240, 241** and **240', 241'**. The vertical plates **242** and **243** are connected at opposite ends of the frame by cross block members **244** and **245**, each of which has a central threaded bore **246** and **247** for receiving the threaded ends of depending adjusting screws **248** and **249**. The screws **248** and **249** are journaled at their upper ends in a longitudinally extending horizontal plate **250** forming part of the fixed frame **231**. The screws **248** and **249** carry bevel gears **251** and **252** at their upper ends which are in tooth engagement with bevel gears **253** and **254** on a longitudinally extending shaft **255** which is journaled in the space bearings **256** and **257** mounted on the support plate **250**. The one adjusting screw **249** also carries at its upper end a sprocket **258** for receiving the chain **174** connecting the mechanism with the adjusting mechanism for the tucking head for simultaneous vertical adjustment of the same. Rotation of the screws **248** and **249**, of course, moves the adjustable frame **236** vertically on the fixed frame **231** to position the sealing devices on the mechanism at the proper height above the line of travel of the mandrels on the conveyor **25**, to engage with the flattened bag tops.

The end plates **237** and **238** of the adjustable frame **236** are extended forwardly of the fixed frame **231** and are connected by upper and lower track forming rail members **261** and **262**. The rail members **261** and **262** have longitudinally extending recesses along their opposed horizontal surfaces which form guideways for receiving upper and lower rollers **263** and **264** which are rotatably mounted on supporting pins **265** and **266** extending rearwardly of a vertical plate **267** which forms the rear part of a horizontally movable frame on which are mounted the forwardly extending longitudinally spaced sealing devices **268, 269, 270** and **271**.

The sealing devices **268, 269, 270** and **271** which operate on the successive bag tops as the latter are advanced by the conveyor **25** beneath the devices are constructed in an identical manner except as hereinafter

described and all of them are supported in a like manner on the horizontally reciprocated frame plate **267**. The first sealing device **268** which performs the initial sealing operation on the folded and flattened bag top comprises a pair of sealing irons **272** and **273** (Figures 14 and 20) which are provided with suitable electrical heating elements **274**. The rear sealing iron **272** is mounted on the lower end of a bracket member **275** which extends forwardly of the support plate **267** and has spaced parallel bearing forming arms **276**, **276'** for supporting a bearing pin **277** on which the support bracket **278** for the outer sealing iron **273** is mounted. The bracket **278** comprises a pair of spaced depending outer arms **279**, **279'** which support between their lower ends the outer sealing iron **273** and which are connected by a top bar **280**. The top bar **280** has an adjusting screw **281** with its threaded end engaged in a threaded aperture **282** in a lower cross bar **283** which is connected between the forwardly extending portions of the side members **284**, **284'** of an operating frame **285**, the latter being pivotally mounted on the pivot rod **277**. The operating frame **285** extends through an aperture **286** in the vertical plate **267** and has an inner end cross bar **287** on which a cam roller **288** is mounted on the pivot pin **289**. The cam roller **288** is positioned for engagement with the top edge of a vertically movable operating cam plate **290**.

The cam plate **290** is mounted on a pair of longitudinally spaced pins **291**, **291'** which are pivotally connected to the ends of a pair of parallel crank arms **292**, **292'**. The crank arms **292**, **292'** are mounted on transversely extending longitudinally spaced shafts **293**, **293'** which are journaled in the vertical frame plates **242** and **243** of the adjustable supporting frame **236**. The shafts **293**, **293'** extend at the rear of the fixed frame plate **243** and have crank arms **294**, **294'** which are connected by a link bar **295** pivoted at **296**, **296'** to the same. One of the crank arms **294** has an extension **297** which is pivotally connected at **298** to an operating link **300**. The link **300** is pivotally connected at **301** to the upper end of a crank arm **302** which is pivotally mounted at **303** on the bearing blocks **304** on the frame support plate **37** and which has a depending arm **305** with a cam roller **306** on the lower end which engages with an operating cam plate **307** on the transverse shaft **308**. A tension spring **309** is connected by pin **310** to the outer end of one of the crank arms **294'** and at its other end to the vertical frame plate **243** to hold the cam roller **306** against the cam plate **307**. A tension spring **311** is connected at one end to the vertical plate **267** and at the other end to the top cross bar **280** of the bracket **278** and urges the pivotally mounted bracket **289** in a direction to separate the sealing irons **272** and **273**. The horizontally movable frame of the sealing mechanism is pivotally connected to the end of link **203** which is pivoted to the tucking head at **204**, the link **203** being pivotally connected to the vertical frame plate **267** of the sealing mechanism at **312** (Figure 1) so that the two mechanisms reciprocate longitudinally in unison.

The first and second sealing devices **268** and **269** which are carried on the movable frame of the sealing mechanism are identical and perform successive cross sealing operations on the bag top. A pair of laterally spaced guide plates **313** and **314** extend between the two devices with the outer plate **313** being attached by bracket **315** to the sealing device **268** and the plate **314** attached by bracket **316** to the frame plate **267**. As the bag top moves beyond the second sealing device **269** the top margin of the flattened and sealed top is folded over upon itself by a fold forming device **320** which is arranged between the two sealing devices **269** and **270**. Two laterally spaced guideway forming plates **321** and **322** are arranged between the sealing device **269** and the folding device **320** which are supported on an L-shaped bracket **323** (Figures 17 and 22) extending from the vertical plate **267**. The

inner guide plate **321** is carried on the end of the bracket **323** while the outer guide plate **322** is carried on an outwardly extending C-shaped bracket **324** attached to the upper edge of the guide plate **321**.

The fold forming device **320** (Figures 17 and 18) comprises an L-shaped supporting bracket **326** which has a depending leg attached to the support plate **267** and a horizontally extending leg **327** extending through a slot **328** in the plate **267** and providing a pair of bearing ears **327'** for receiving a pivot pin **329** on which an arm **331** is mounted, the latter supporting at its forward end, on the pivot **332**, a depending bracket arm **333** having a fold plate **334** secured thereon. The arm **331** has a rearward extension **335** which carries a cam roller **336** adapted to ride on the top of the vertically movable operating plate **290**. A tension spring **337** is connected at one end to an anchor plate **338** at the top edge of the vertical frame plate **267** and at its other end to a pin **340** on the bracket arm **333** for the fold plate **334** to urge the latter in a counter-clockwise direction about the supporting pivot **332**. The bracket arm **333** for the fold plate **334** carries a cam roller **341** which is adapted to engage with the forward edge of a vertical cam plate **342** which is mounted on the supporting bracket **326** and which has a recess **343** forming a cam track for permitting inward swinging movement of the fold plate **334** to fold the top marginal portion of the bag about the outer guide plate **322** which extends between the fold forming device **320** and the preceding sealing device **269**. The folded top is then in position to pass back of an outer guide plate **344** which is adjustably supported on the bottom of a depending support pin **345**. The pin **345** is attached at its upper end to a bracket plate **346** extending from the upper rail member **261** of the support frame **236**.

As the bag is advanced by the conveyor **25** from the fold forming device **320** to the next adjacent sealing device **270** the folded over portion of the bag top passes between the inner guide plate **321** and an outer guard plate **347** which is supported on the pivoted support bracket of the sealing device **270** by the bracket plate **348**.

The sealing device **270**, which is identical with the first sealing device **268**, cross seals the folded over top of the bag and the bag then advances to the sealing device **271** which presses the seal as the bag is advanced beneath the same. The sealing device **271** is identical with the first sealing device **268** except that it is provided with presser bars in place of the sealing irons which are unheated and which have opposed serrated faces for engaging the bag top so as to compress the seal which has been formed in the preceding heat sealing device **270**. Guide plates **350** and **351** form a passageway between the sealing devices **270** and **271** for the bag top, the guide plate **350** being supported on a bracket **352** on the sealing device **270** and the guide plate **351** being attached by bracket **353** to the vertical support plate **267**.

After the bag passes the last sealing device **271** the sealing operation is completed. Since the sealing devices are all mounted on the support plate **267** and the latter is reciprocated longitudinally of the machine as the bags pass beneath the same, the sealing occurs while the bags are being advanced continuously by the conveyor **25**, the plate being reciprocated with a return movement through a closed path by operation of the link **302** while the sealing and folding devices carried on the plate **267** are operated by vertical movement of the cam plate **290** in timed relation to the horizontal movement of the plate **267**.

The completely closed and sealed bag or package moves around the end of the machine on the conveyor **25** to the discharge station E (Figure 2) where the supporting rail **76** beneath the bag supporting assembly **50** is interrupted and the pivoted bottom **61** of each assembly **50** rides downwardly to open position on an outwardly angled cam forming member **360**. An opening **361** in the horizontal frame plate **76** at station E permits each

successive bag to be dropped through the open bottom of the mandrel and its supporting assembly and to be discharged onto the upper run of a belt delivery conveyor **363** which extends transversely of the machine. The conveyor **363** is supported at its opposite ends on the rollers **364** and **365**, the latter being mounted on spaced shafts **366** and **367** beneath the top frame **11** of the machine. A guide plate **368** directs the filled bag onto the conveyor and spaced side guide plates **370**, **370'** are provided for insuring that the completed packages will be delivered at the front side of the conveyor. The forward supporting shaft **366** of the conveyor **363** is extended at one end and carries a sprocket **371** connected by a drive chain **372** with a sprocket **373** on a longitudinally extending drive shaft **374** which is mounted in spaced bearings **375**, **375'** at the rear of the machine.

An air jet **376** is provided at station E for insuring that an empty bag which has not been filled by the filling mechanism will be properly removed from the mandrel **71** in which it is carried. The air jet **376** is mounted on a bracket **377** extending upwardly of the side frame member **12** and is supplied with air from a suitable source. A cam plate **378** extends from the leading side of the discharge aperture **361** which swings the pivoted bottom **61** of each mandrel support **50** back into horizontal position before the mandrel reaches the bag receiving station A.

The machine is powered by a motor **380** (Figure 1) having a drive pulley **381** which is connected by belt **382** with a pulley **383** on the stub shaft **384**. The shaft **384** carries a sprocket **385** which is connected by the drive chain **386** with a sprocket **387** on the main drive shaft **388**, the latter extending transversely across the machine and having a hand wheel **389** on one end. The drive shaft **388** has a pinion **390** inside the main frame member **17** and which is connected in driving relation with a gear **391** on the cross shaft **392**. At its opposite end inside the frame member **18** the shaft **392** carries pinions **393** and **394** which engage in driving relation with gears **395** and **396** on the cross shafts **308** and **198**, respectively. The cross shaft **198** extends beyond the rear face of support member **18** and carries a bevel gear **397** which engages in driving relation with a bevel gear **398** on the horizontal drive shaft **374**. At its other end the cross shaft **198** carries inside the frame member **17** a pinion **400** which engages in driving relation with a gear **401** on the cross shaft **100**. The cross shaft **100** has a pinion **402** adjacent the gear **401** which engages in driving relation with gear **403** on the cross shaft **48** which drives the vertical drive shaft **35**. A drive for a pump (not shown) for the filling head **110** may be taken from shaft **404** (Figure 1) which is driven by belt connection **405** from the shaft **384** and provided with a suitable clutch **406**.

A bag vibrator may be provided on the machine at the filling station B. This may consist of a supplemental rail member **407** (Figures 2 and 4) which is supported for vertical movement on the posts **408**, the latter being connected to a suitable mechanism (not shown) for imparting vertical reciprocation thereto while the product is being deposited in the bags **23** by operation of the filling head **110**.

The operation of the machine will be understood from the preceding description. The bags are delivered to the pockets formed by the mandrels **71** on the conveyor **25** and carried past the filling station B where each bag is filled with a predetermined quanity of the product being packaged. As the filled bags move beneath the tucking head **120** at station C the tucking head descends and the top margins of the bag walls are closed by operation of the tucking and folding fingers **126**, **126'** and **134**, **135**, **134'**, **135'** as illustrated in Figures 26 to 28. As the outside folding plates **210** and **210'** close on the folded bag top (Figure 28) the tucking head is raised and the folding and tucking fingers are withdrawn from engagement with the bag. The bag is advanced by continued movement of the conveyor **25** to the sealing mechanism **230** at station D where successive sealing operations are performed on the closed bag top. The first two sealing devices **268** and **269** on the horizontally and vertically reciprocating frame **267** apply successive cross seals to the flattened bag top **410** which is in the condition shown in Figure 29 as it is operated upon by these devices. The flattened and sealed bag top is then moved through the top fold forming device **320** which folds over the top as shown at **411** in Figure 30. Thereafter, the folded top portion **411** is cross sealed by the sealing device **270** and finally pressed by the pressing device **271** to complete the operations on the bag top which is shown in the completed condition in Figure 31. The completed bag or package is discharged from the supporting conveyor **25** at station E and delivered from the machine by the discharge conveyor **363**.

While particular materials and specific details of construction are referred to in describing the illustrated machine, it will be understood that other materials and variations in the details of construction are contemplated within the spirit of the invention.

I claim:

1. A bag closing machine having a continuously traveling horizontal conveyor for supporting filled bags in upright position, a bag top tucking station, a fixed stand adjacent said station and a bag top tucking device mounted for vertical adjustment on said stand, said tucking device comprising a pair of outer tucking fingers swingably mounted on a supporting bracket, two pairs of inner folding fingers for cooperation with the outer tucking fingers, the fingers of each pair of said inner folding fingers being pivotally mounted on supporting members, said supporting members being pivotally mounted on the supporting bracket for lateral movement, said supporting bracket being attached to a vertical slide plate, said slide plate being slidably mounted for vertical movement on a horizontal track plate, said horizontal track plate being mounted for horizontal sliding movement on said stand, means to move said slide plate and said track plate in timed relation to the movement of the conveyor to position said tucking and folding fingers vertically for engagement with the top marginal portions of each successive bag and to advance the same horizontally with each bag during a predetermined portion of its movement, and means to pivot the tucking and folding fingers relative to each other to infold end wall portions of the bag top and to bring the opposed side wall portions thereof into flat folded relation.

2. In a bag closing machine having a continuously moving conveyor for supporting thereon in upright spaced relation a series of filled bags, a bag top tucking station, a fixed stand at said station and a bag top tucking device mounted for vertical adjustment on said stand, said tucking device comprising a pair of outer tucking swingably mounted on a supporting bracket for movement toward and from each other in a vertical plane, two pairs of inner fold forming fingers for cooperation with the outer tucking fingers, said pairs of inner fingers being pivotally mounted on two supporting members, said supporting members being pivotally mounted on the supporting bracket, the axes of the pivots for the supporting members being at right angles to the axes of the pivots for said fold forming fingers, said supporting bracket being attached to a vertical slide plate, said vertical slide plate being slidably mounted on a horizontal track plate, said track plate being mounted for horizontal sliding movement on said stand, means to move said slide plate vertically and said track plate horizontally in timed relation to the movement of the conveyor to insert said fold forming fingers into the top of each successive bag and to advance the same with each bag during a predetermined portion of its movement, means to pivot the tucking fingers toward each other to infold end wall portions of the bag top and interengaging means on said tucking fingers and

said fold forming fingers to pivot the latter away from each other upon infolding movement of said tucking fingers thereby to bring the opposed side wall portions of the bag top into flat folded relation.

3. A bag closing machine having a continuously traveling conveyor and means thereon for supporting a series of filled bags in upright position, a fixed stand mounted at a tucking station along said conveyor, a bag top tucking device on said stand, said tucking device comprising a pair of outer tucking fingers swingably mounted intermediate their top and bottom ends on a supporting bracket, two pairs of inner folding fingers adapted to cooperate with the outer tucking fingers, said inner folding fingers being pivotally mounted on two supporting members, said supporting members being pivotally mounted on the supporting bracket below the mounting for the tucking fingers, said supporting bracket being attached to a vertical slide plate, said vertical slide plate being mounted on a horizontal track plate, said track plate being mounted for horizontal sliding movement on said stand, means to move said slide plate vertically and said track plate horizontally in timed relation to the movement of the conveyor to position said tucking fingers and said folding fingers for engagement with the top marginal portions of the walls of each successive bag and to advance the same with each bag during a predetermined portion of its movement, means operative upon downward vertical movement of said supporting bracket to pivot the tucking fingers toward each other and to pivot the pairs of folding fingers away from each other whereby to infold the top portions of the end walls and to bring the opposed side wall top portions into flat folded relation.

4. In a bag closing machine wherein the filled bags are supported in upright position on a continuously traveling conveyor, a bag top tucking device mounted for vertical adjustment on a fixed stand, said device comprising a pair of outer tucking fingers swingably mounted on spaced pivots on a supporting bracket, two pairs of inner folding fingers pivotally mounted on two supporting members, said supporting members being pivotally mounted on the supporting bracket, said supporting bracket being attached to a vertical slide plate, said vertical slide plate being slidably mounted on a horizontal track plate, said track plate being mounted for horizontal sliding movement on said stand, means to reciprocate said slide plate and said track plate in timed relation to the movement of the conveyor to lower said folding fingers into the open top of each successive bag and to advance the same with each bag during a predetermined portion of its movement, means to pivot the tucking fingers toward each other when the supporting bracket is moved downwardly, and cooperating means on the tucking and folding fingers to pivot the folding fingers away from each other as the tucking fingers are moved toward each other whereby to infold end wall portions of the bag top and bring the opposed side wall portions thereof into flat folded relation.

5. In a bag closing machine as recited in claim 4, a bag top pressing device mounted adjacent said bag top tucking device which pressing device comprises a pair of vertically extending pressing plates, a pair of pivotally mounted supporting arms for said plates, means for normally holding said pressing plates in laterally swung relation, and cooperating means for swinging said plates toward each other into pressing engagement with the folded wall portions of the bag top while said tucking device is positioned to engage the tucking and folding fingers with said wall portions, and to hold said wall portions in folded relation while said tucking and folding fingers are withdrawn from the top of the bag by upward movement of said supporting bracket.

6. In a bag closing and sealing machine having a continuously traveling endless horizontal conveyor on which the bags are carried in spaced relation in an upright position, mechanism for cross sealing the flattened tops of filled and closed bags carried on said conveyor comprising a vertically adjustable frame extending along said conveyor, a carriage mounted for horizontal reciprocating movement on said frame, two pairs of heat sealing and pressing devices mounted on said carriage and a fold forming device mounted on said carriage between said pairs of sealing and pressing devices, each of said sealing and pressing devices having cooperating bag top engaging members which are mounted for pivotal movement toward and from clamping engagement with the tops of bags carried on the conveyor beneath said carriage, means for horizontally reciprocating said carriage in timed relation to the movement of the conveyor so that said carriage advances with the conveyor for a predetermined portion of the travel of the conveyor and at the same speed, and means for simultaneously operating said sealing and pressing devices whereby to move said bag top engaging members into clamping engagement with the bag tops while the carriage is advancing with the conveyor and thereafter to move said members out of engagement with the bag tops for return movement of said carriage.

7. A bag closing and sealing machine having a continuosuly traveling endless horizontal conveyor with supporting pockets for a plurality of bags which are carried in spaced relation in an upright position, mechanism for cross sealing the flattened tops of filled and closed bags carried in said pockets, said mechanism comprising an adjustable frame extending along said conveyor, a movable carriage mounted for horizontal reciprocating movement on said frame, heat sealing and pressing devices mounted on said carriage and a fold forming device mounted on said carriage between said sealing and pressing devices, said sealing and pressing devices having cooperating sealing and pressing irons which are mounted on pivotally connected brackets for clamping engagement with the tops of said bags in said pockets, means for moving said carriage in a closed path and in timed relation to the movement of the conveyor so that said carriage advances with the conveyor for a predetermined portion of the travel of the conveyor, and means for simultaneously pivoting said sealing and pressing devices whereby to move said sealing and pressing irons into clamping engagement with the bag tops positioned on the conveyor beneath the same while the carriage is advancing with the conveyor and to move said members out of engagement with the bag tops and return said carriage.

8. In a bag closing and sealing machine, an upright supporting frame, a continuously traveling endless horizontal conveyor mounted on said frame and having pockets in which bags are carried in spaced relation in an upright position, mechanism for filling the bags and for folding top wall portions into flattened relation, and mechanism for cross sealing the closed bag tops, said sealing mechanism comprising a vertically adjustable upright subframe extending along said conveyor on said supporting frame, a carriage mounted for horizontal reciprocating movement on said subframe, two pairs of heat sealing and pressing devices mounted on said carriage and a fold forming device mounted on said carriage between said pairs of sealing and pressing devices, each of said sealing and pressing devices having cooperating bag top engaging members which are mounted for pivotal movement relative to each other and toward and from clamping engagement with the bag tops advanced beneath said carriage, means for horizontally reciprocating said carriage in timed relation to the movement of the conveyor so that said carriage advances with the conveyor for a predetermined portion of the travel of the conveyor and at the same speed, and means for simultaneously operating said sealing and pressing devices whereby to pivot said bag top engaging members into clamping engagement with said bag tops while the carriage is advancing with the conveyor and thereafter to move said members out of engagement with the bag tops for return movement of said carriage.

9. In a bag filling and closing machine, a continuously traveling endless conveyor mounted for movement in a horizontal plane, a series of upwardly opening pocket forming mandrels on the conveyor for receiving bags therein which are delivered thereto by a bag delivery mechanism at a first work station and for supporting the bags in upright position while conveying the same past mechanism at successive work stations along the conveyor for filing the bags with the product, for closing, cross-sealing, folding, and finally sealing the top portion of the bag walls, said mandrels each having a pivoted bottom portion for discharging a bag downwardly therethrough, mechanism for supporting the pivoted bottom portions of said mandrels against opening movement between the bag receiving station and a bag discharge station, and a belt conveyor mounted beneath the bag supporting conveyor at the bag discharge station for receiving bags discharged through the pivoted bottom portions of said mandrels.

10. In a bag filling and closing machine, a traveling endless conveyor mounted for movement on a horizontal plane, a series of upwardly opening pocket forming members on the conveyor for receiving bags therein which are delivered thereto by bag delivery mechanism at a first work station and for supporting the bags in upright position while conveying the same past mechanism at successive work stations along the conveyor, for filling the bags with the product, for closing, cross-sealing, folding, and finally sealing the top portions of the bag walls, said pocket forming members each having a bottom opening and a pivoted plate mounted therein, a support member mounted beneath the path of the conveyor for holding the pivoted bottom plates of said pocket forming members against opening movement between the bag receiving station and a bag discharge station, and an endless conveyor mounted beneath the bag supporting conveyor at the bag discharge station for receiving bags discharged through the bottom openings in the pocket forming members.

11. In a bag filling and closing machine having a traveling endless conveyor mounted on a supporting frame for movement in a horizontal plane and a series of upwardly opening pocket forming members on the conveyor for supporting bags therein as the conveyor moves in a path having a series of successive work stations along the same with mechanism at the work stations for delivering empty bags in opened up condition into the pocket forming members, for filling the bags with the product, for closing, cross-sealing, folding, and finally sealing the top portion of the bag walls, said pocket forming members each having a bottom portion pivoted for downward swinging movement, a supporting rail beneath the path of travel of said pocket forming members for holding the pivoted bottom portions thereof against opening movement as they are advanced from the bag receiving stations to the discharge station, a bag discharge device comprising a conveyor mounted in transversely extending relation beneath the bag supporting conveyor at the discharge station, and an air jet arranged above the discharge station to direct a stream of air downwardly into each successive pocket forming member on the conveyor.

12. A bag filling and closing machine having a continuously traveling endless conveyor mounted for movement in a horizontal plane, a plurality of upwardly opening pocket forming members on the conveyor for supporting bags therein at a series of successive work stations along said conveyor, means at said work stations for supporting mechanism for delivering empty bags which are in opened up condition into the pocket forming members, mechanism for filling the bags with the product, mechanism for tucking the bag tops, and mechanism for cross-sealing, folding and finally sealing the top portions of the bag walls, said pocket forming members having open bottoms and pivoted closure members therefor, and a rail extending beneath the pivoted closure members of the pocket members on the conveyor for holding the same against opening movement between the bag receiving station and the discharge station, said rail terminating at the discharge station and permitting said pivoted closure member to swing open for discharge of bags from the pocket forming members.

13. A bag closing and sealing machine having a continuously traveling endless horizontal conveyor with supporting pockets for a plurality of bags which are carried therein in spaced relation and in upright position, mechanism for cross sealing the flattened tops of filled and closed bags carried in said pockets, said mechanism comprising an adjustable frame extending along said conveyor, a movable carriage mounted for horizontal reciprocating movement upon said frame, two pairs of spaced sealing and pressing devices mounted on said carriage and a fold forming device mounted on said carriage between said spaced pairs of sealing and pressing devices, the first pair of said sealing and pressing devices having cooperating sealing irons which are mounted on pivotally connected brackets and positioned for clamping engagement with the closed and flattened tops of bags in adjoining conveyor pockets, said fold forming device having cooperating fixed and pivotally movable plates for folding the flattened and sealed top of each bag upon itself, the second pair of sealing and pressing devices having cooperating sealing and pressing irons which are mounted on pivotally connected brackets for clamping engagement with the tops of said bags in said pockets, means for moving said carriage in a closed path in timed relation to the movement of the conveyor so that said carriage advances with the conveyor for a predetermined portion of the travel of the conveyor, and means for simultaneously pivoting said sealing and pressing devices and said fold forming plate whereby to move said sealing and pressing irons into clamping engagement and said fold plate into folding engagement with the bag tops positioned on the conveyor beneath the same while the carriage is advancing with the conveyor and thereafter to move said members out of engagement with the bag tops and return said carriage.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,952,959 September 20, 1960

Thomas E. Piazze

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 30, for "91'" read -- 90' --; column 14, line 55, after "tucking" insert -- fingers --; column 17, line 9, for "filing" read -- filling --.

Signed and sealed this 11th day of April 1961.

(SEAL)
Attest:
ERNEST W. SWIDER

Attesting Officer

ARTHUR W. CROCKER
Acting Commissioner of Patents