May 10, 1966 F. SCHAFER, JR 3,250,055

APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

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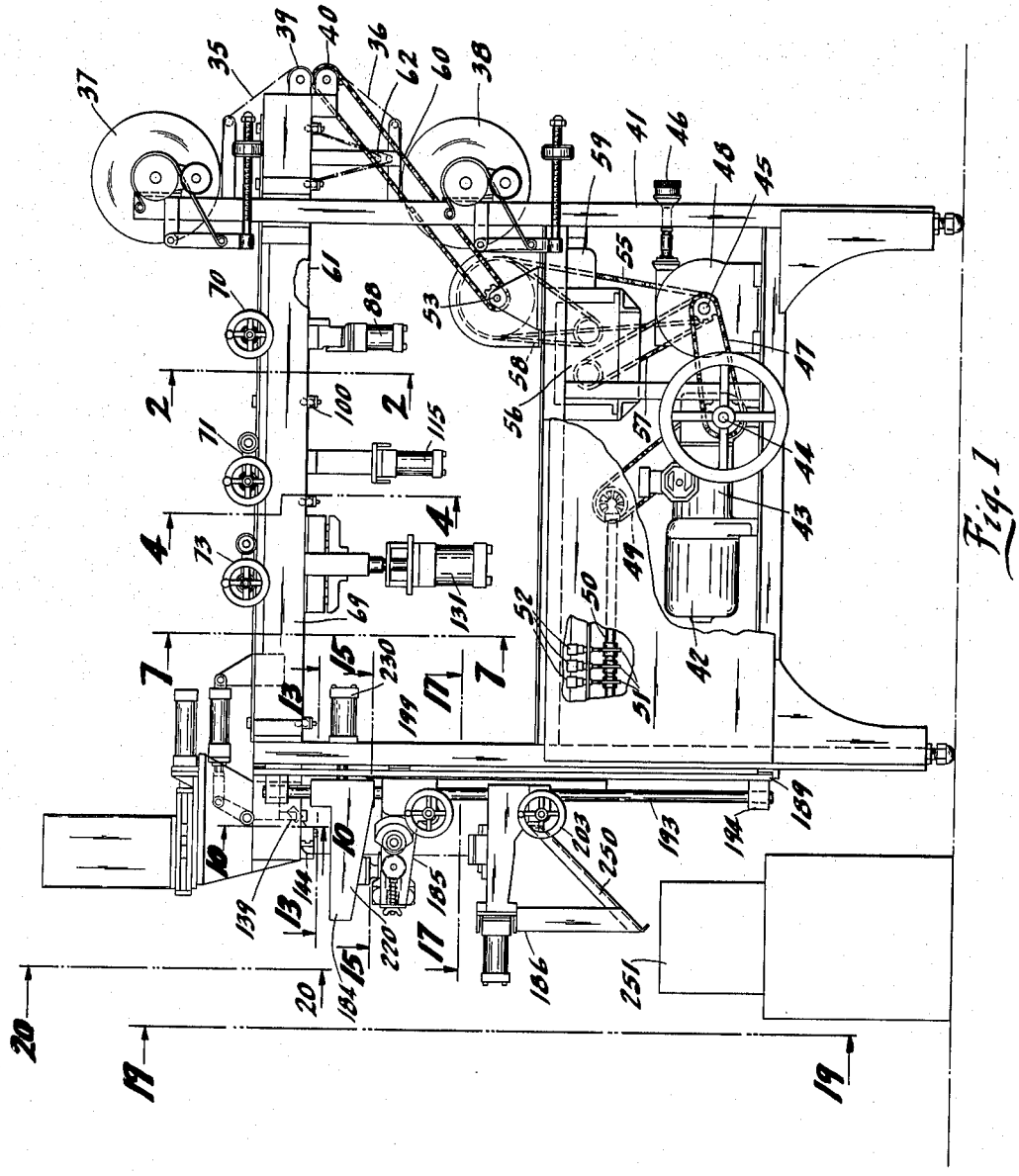


Fig. 1

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APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

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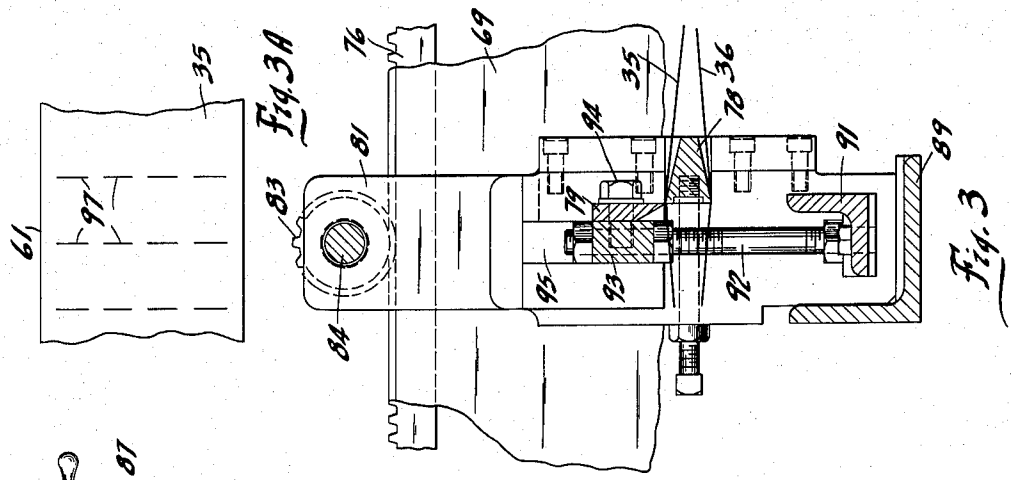


Fig. 3A

Fig. 3

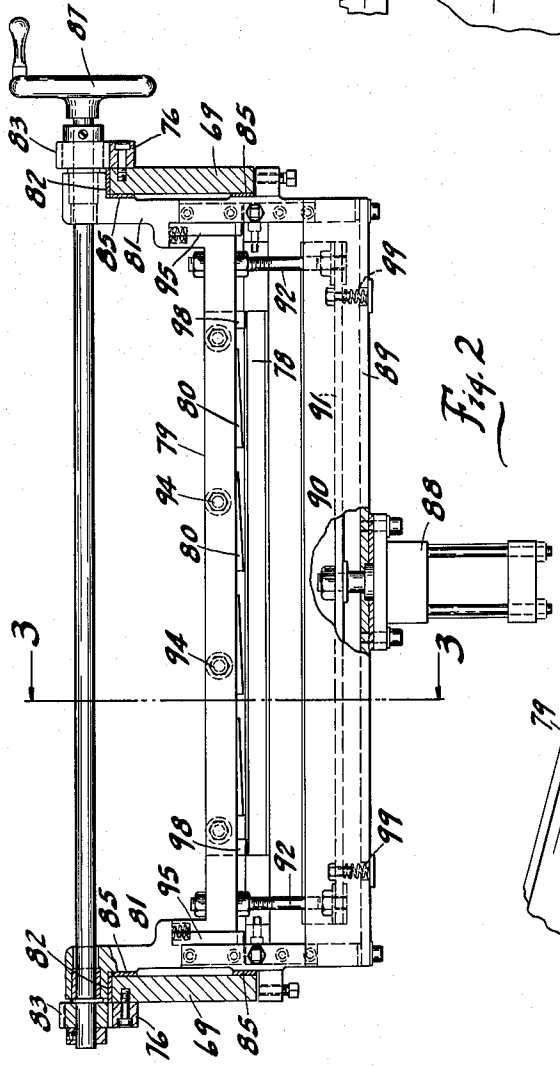


Fig. 2

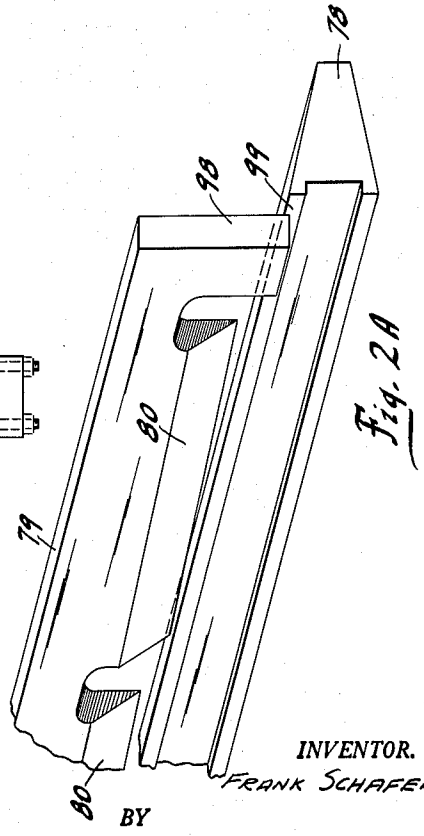


Fig. 2A

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APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

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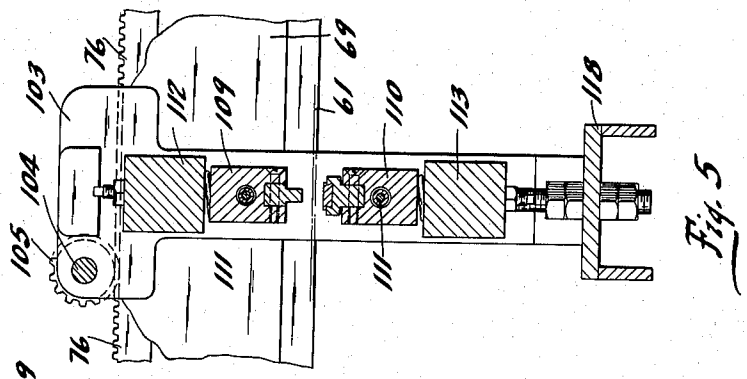


Fig. 5

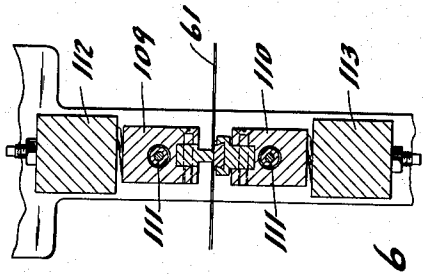


Fig. 6

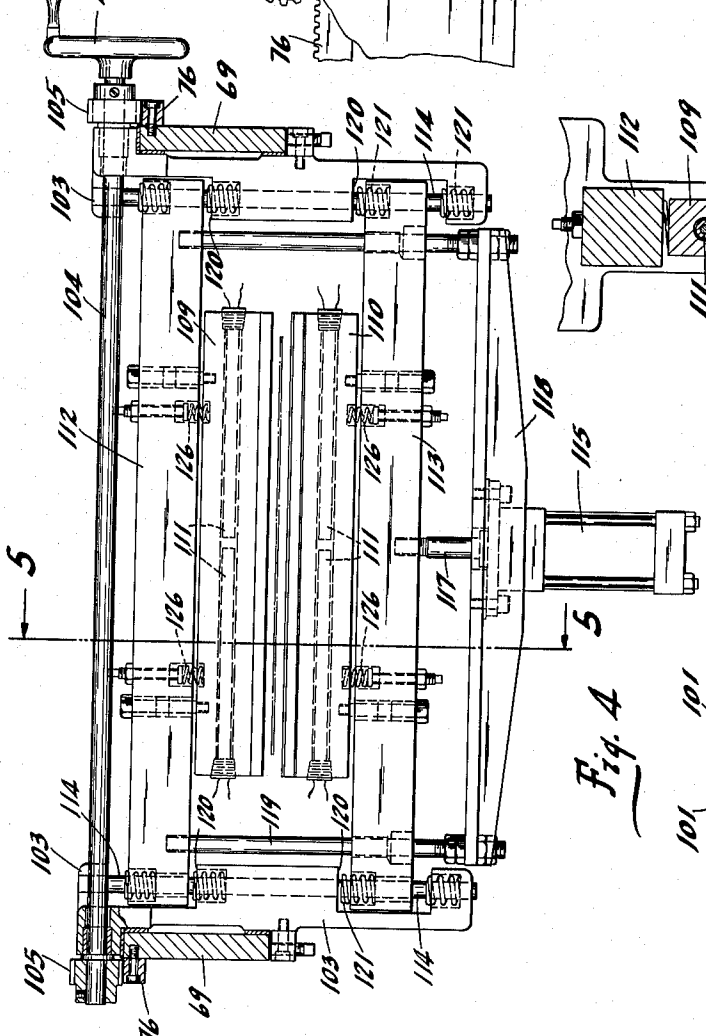


Fig. 4

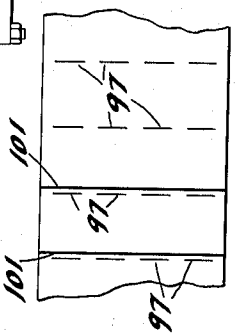


Fig. 6A

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APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

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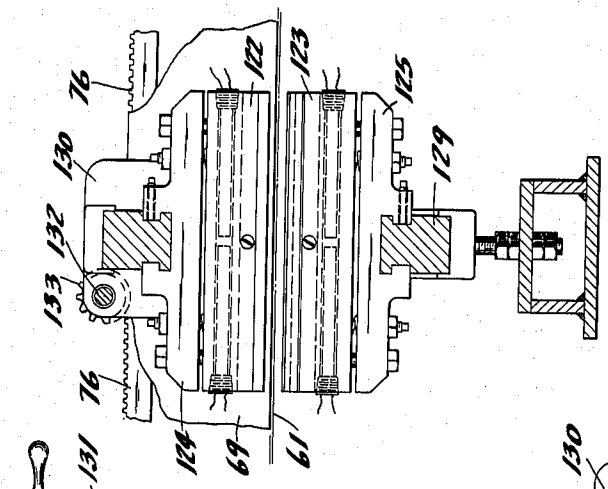


Fig. 8

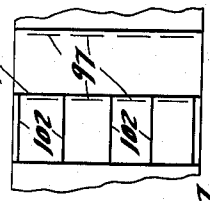


Fig. 9A

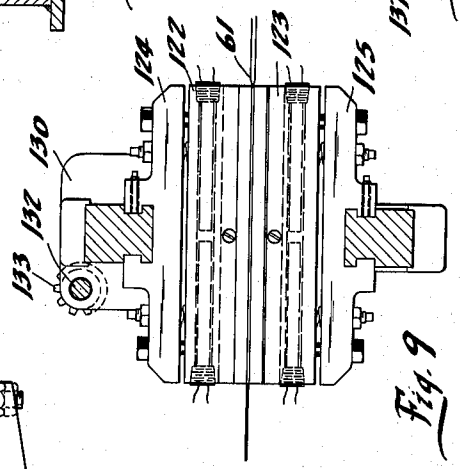


Fig. 9

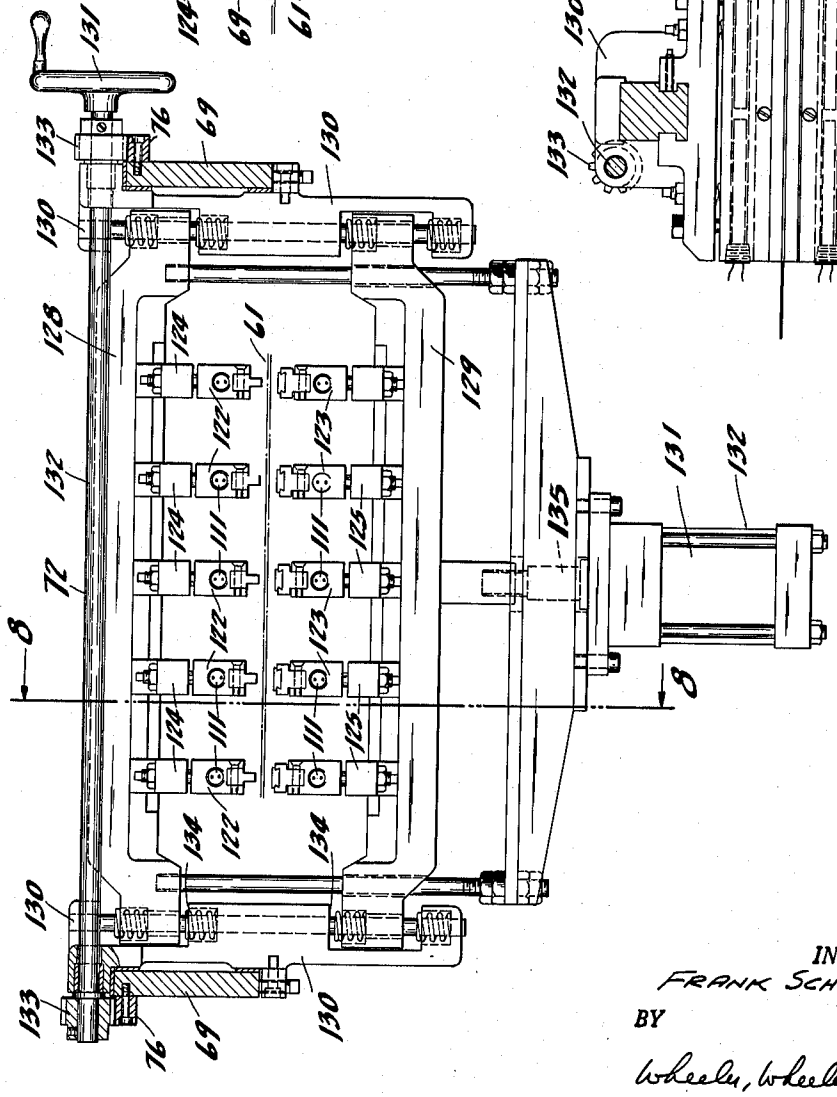


Fig. 7

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APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

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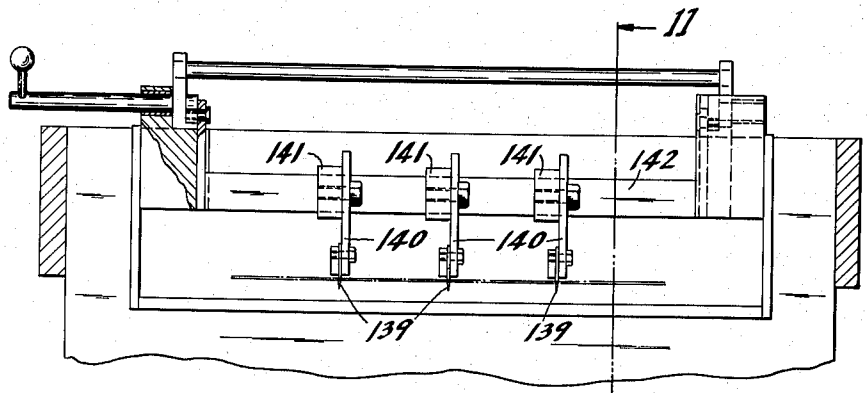


Fig. 10

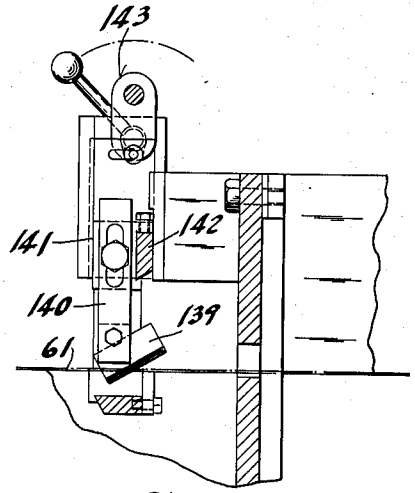


Fig. 11

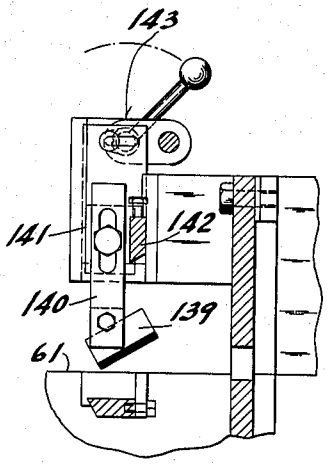


Fig. 12

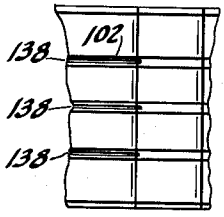


Fig. 12A

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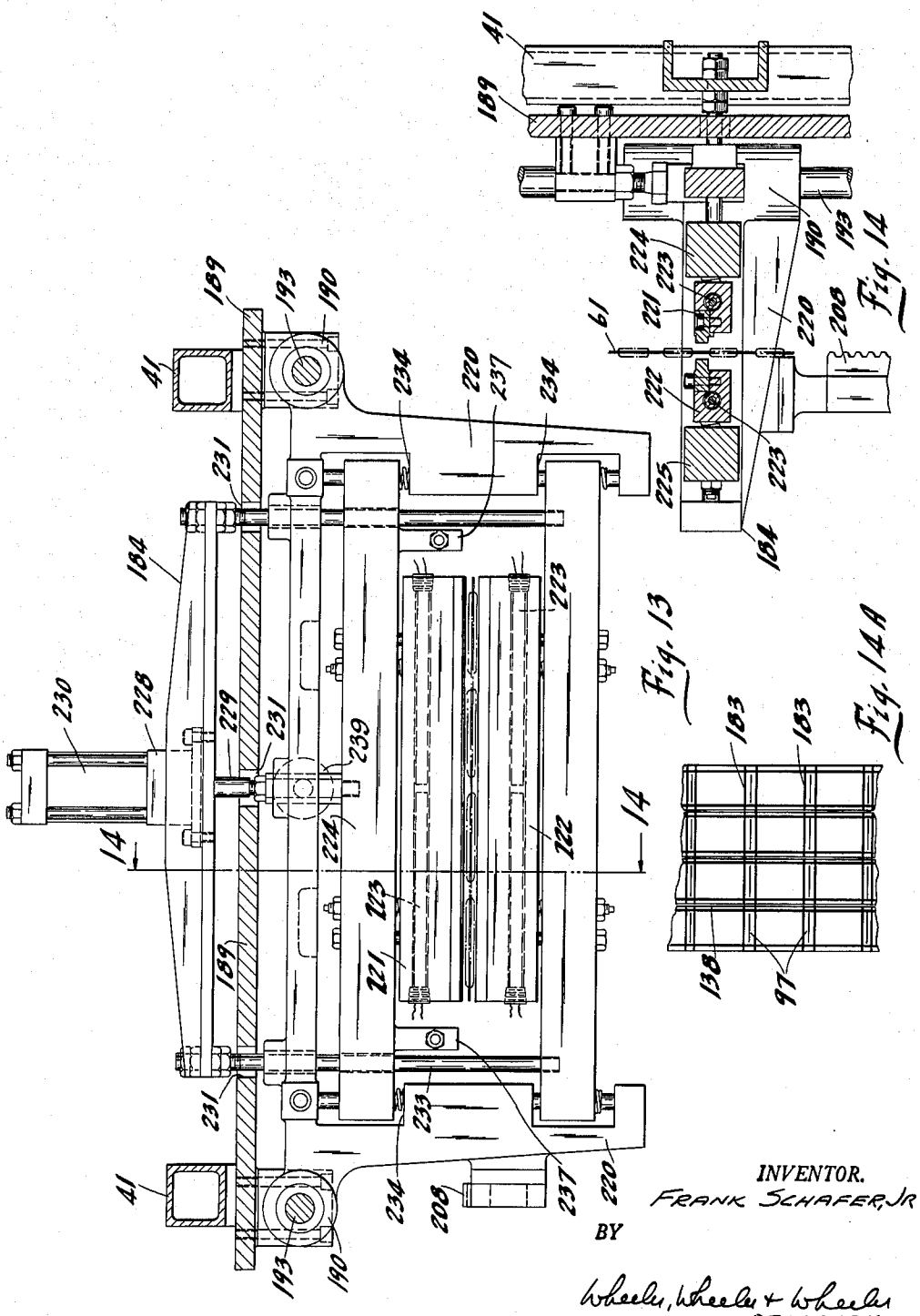
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APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

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APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

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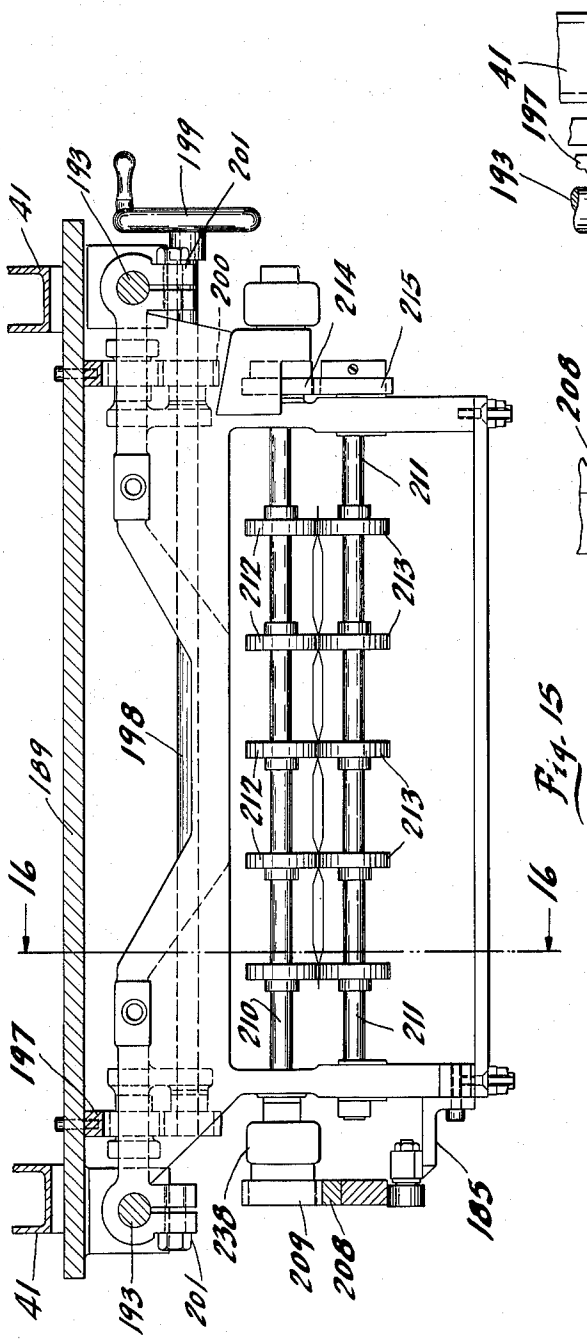


Fig. 15

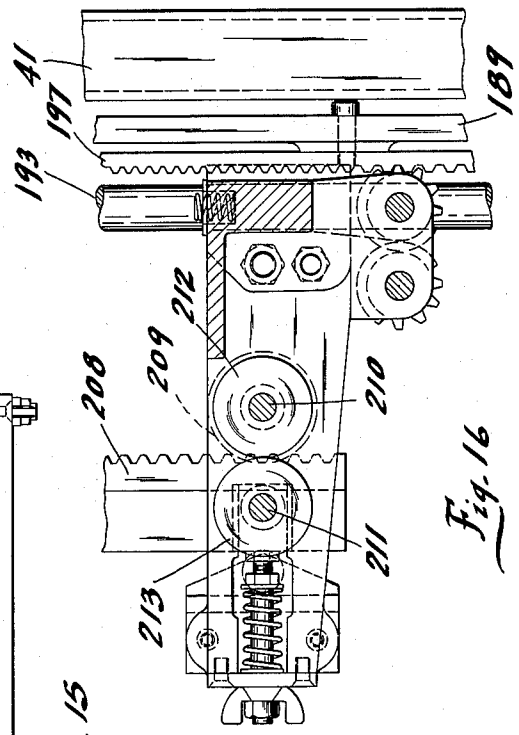


Fig. 16

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APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

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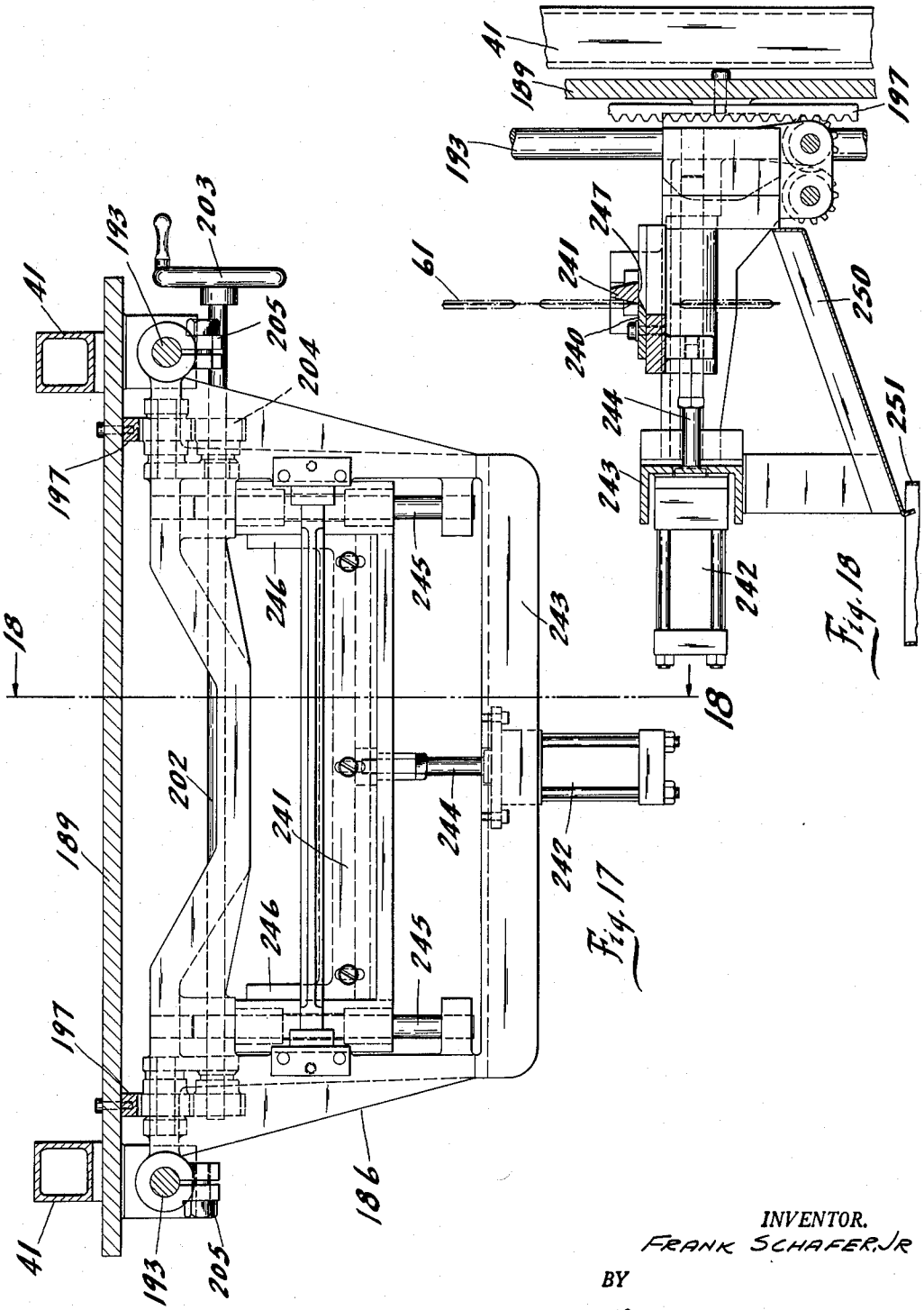


Fig. 17

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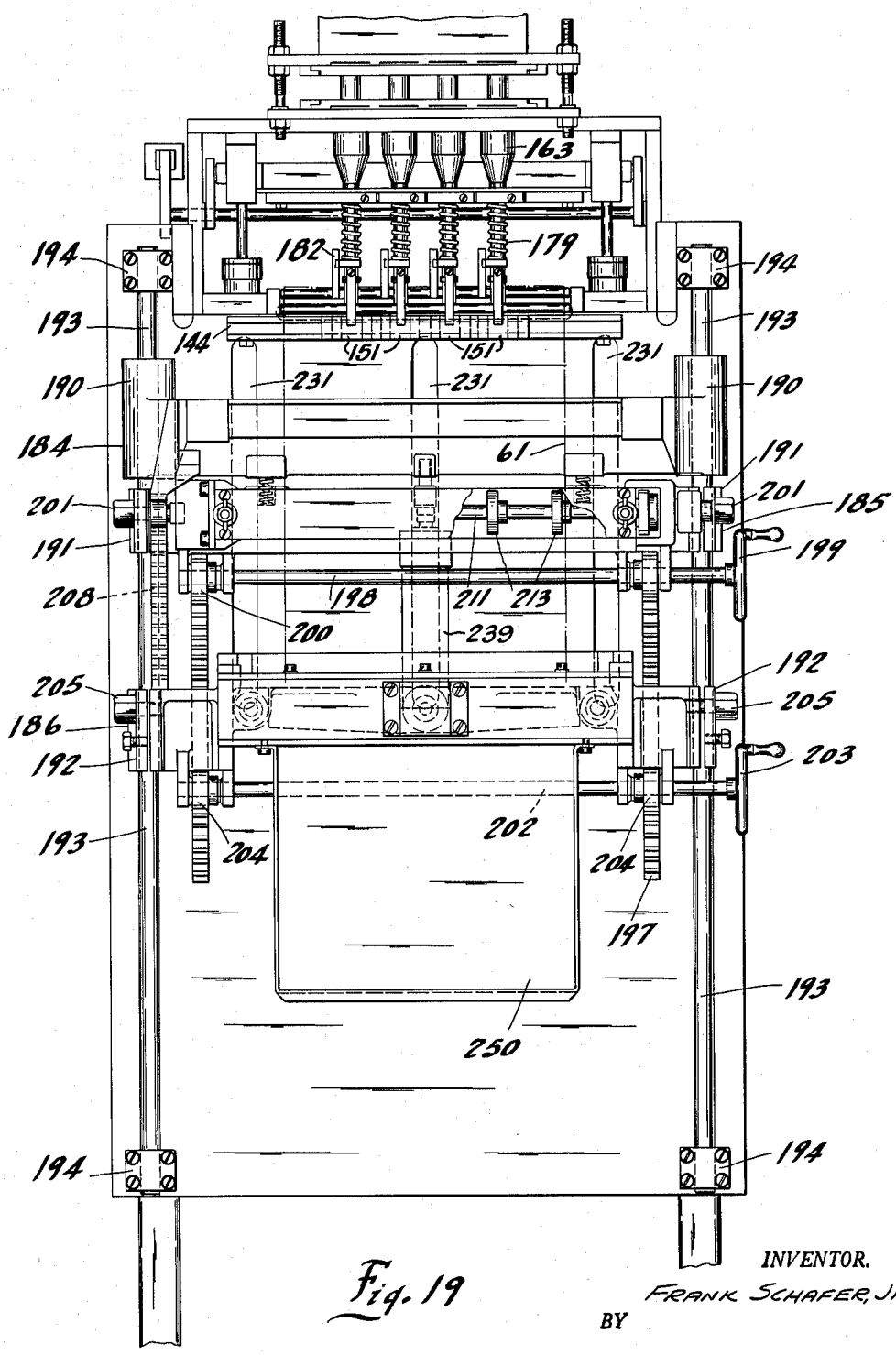


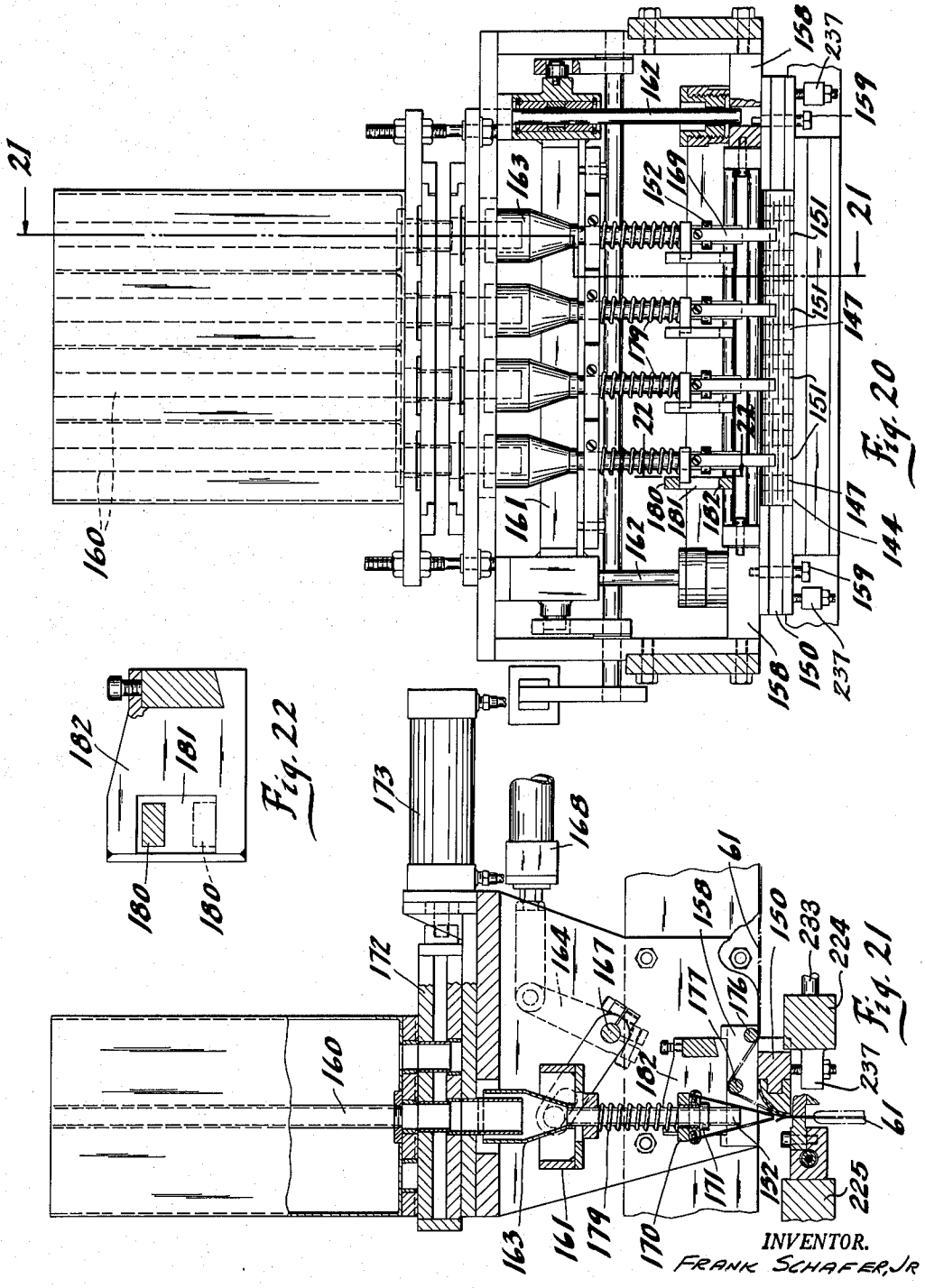
Fig. 19

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APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

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APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

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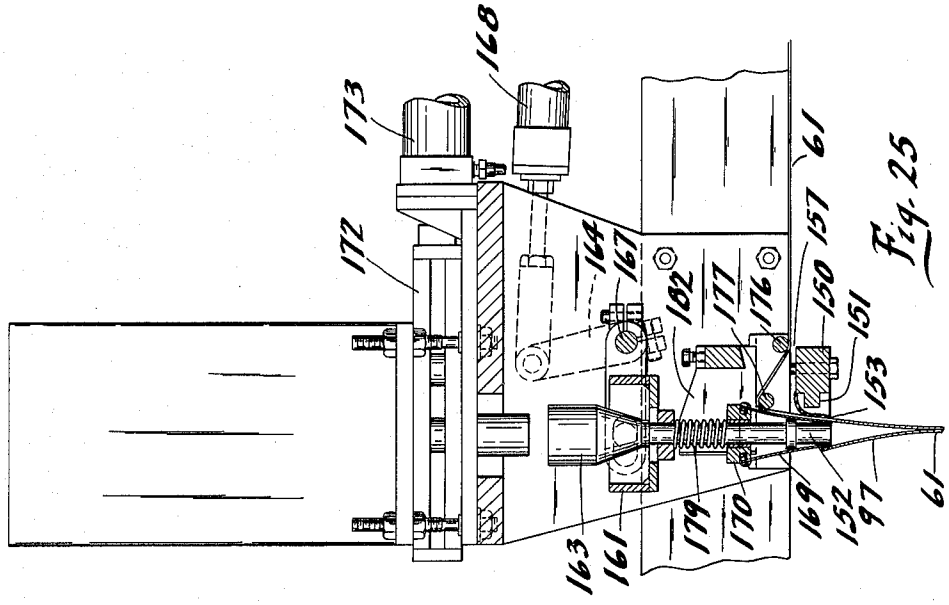


Fig. 25

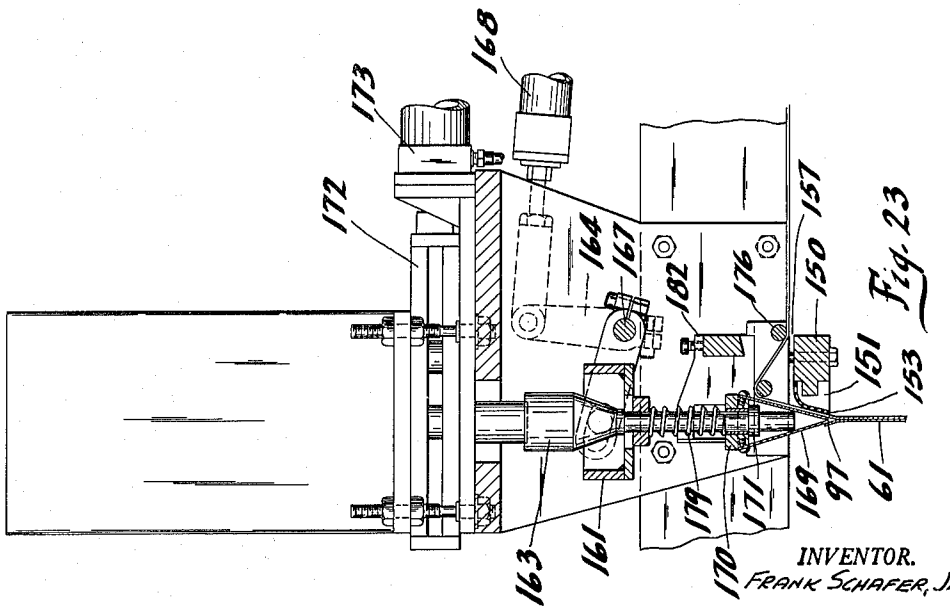


Fig. 23

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APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

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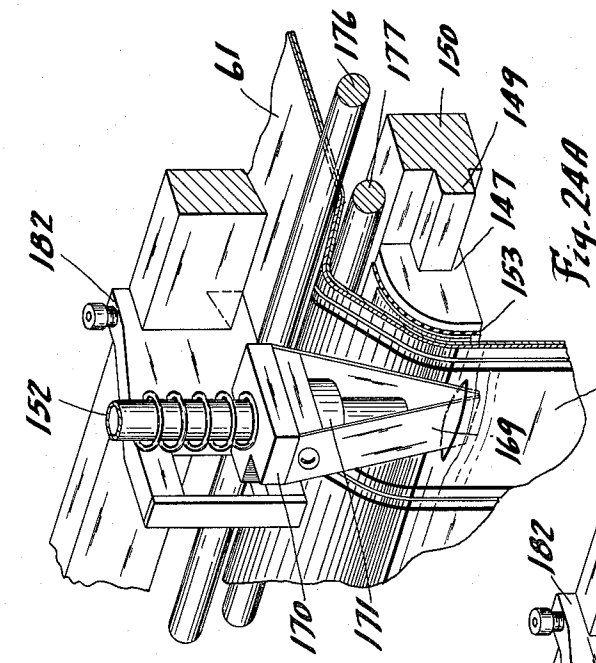


Fig. 24A

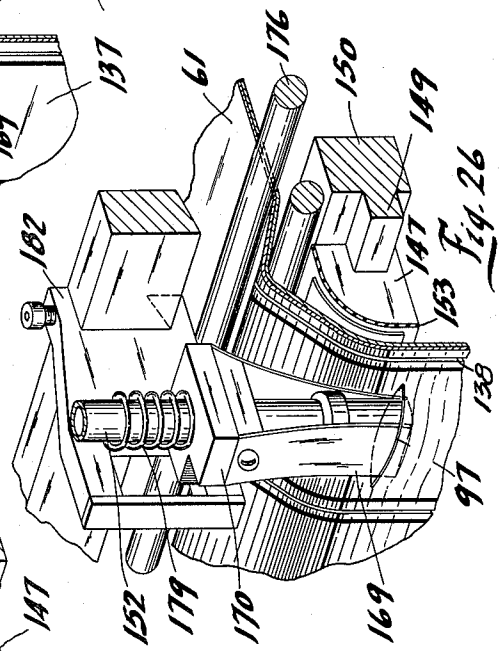


Fig. 26

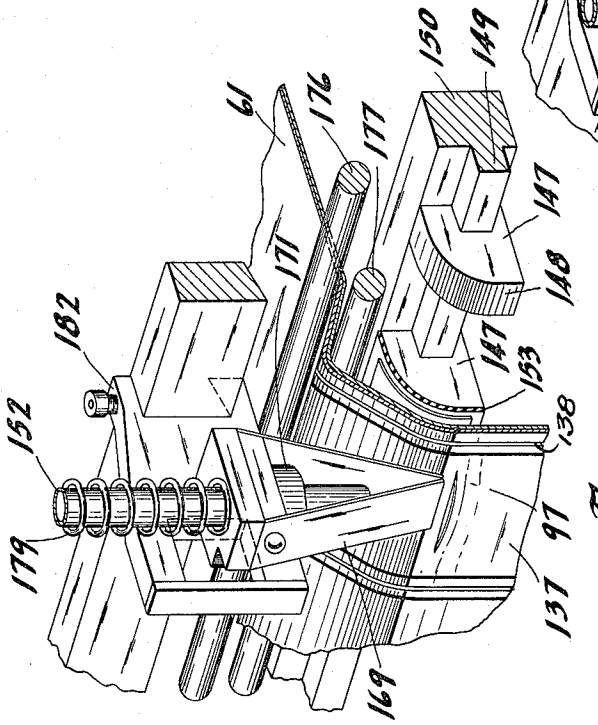


Fig. 24

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APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

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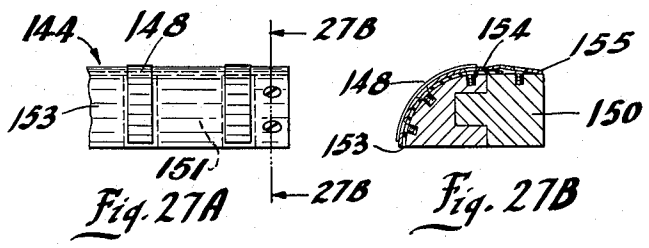


Fig. 27A Fig. 27B

Fig. 27C

Fig. 27

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APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

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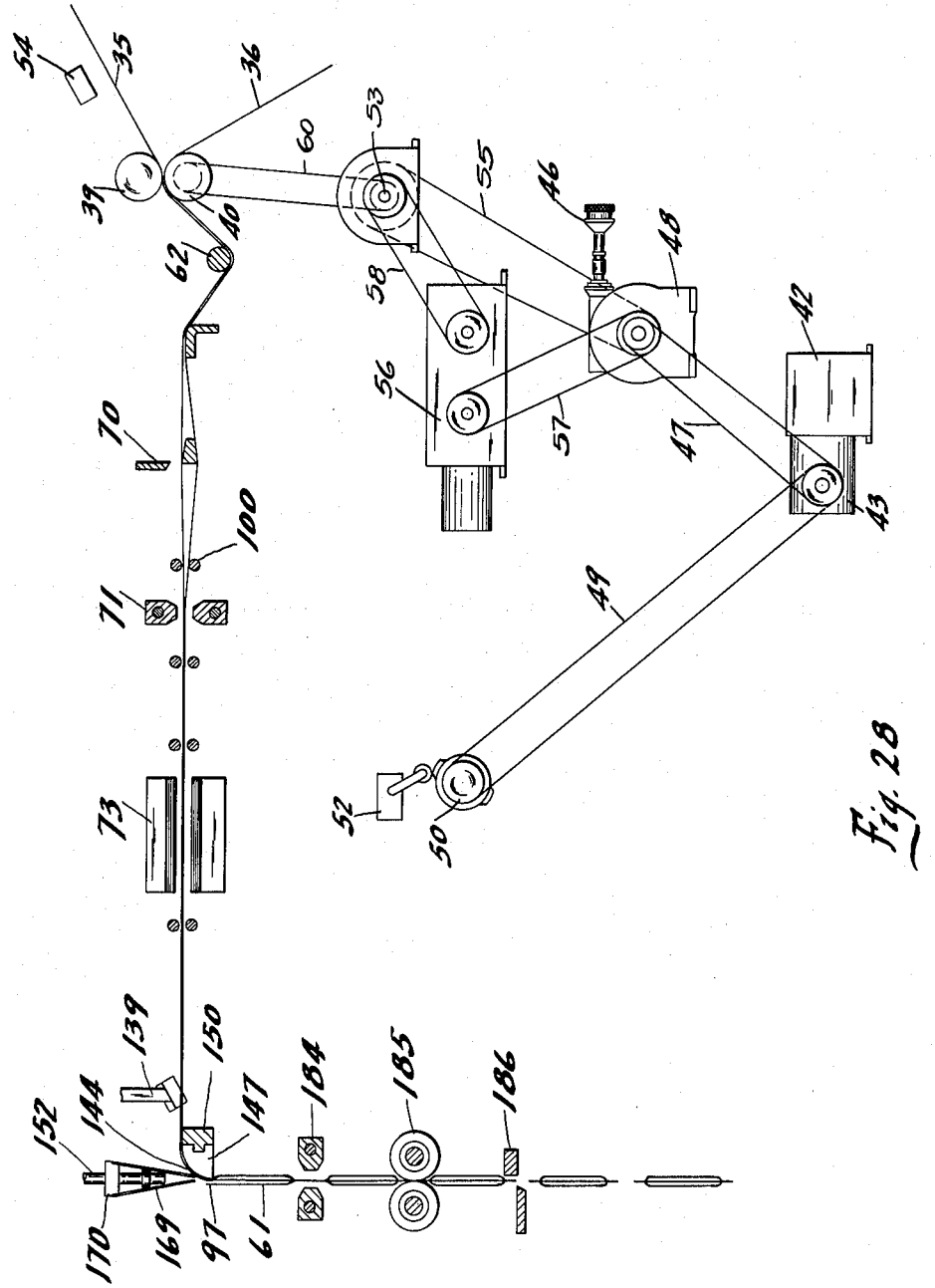


Fig. 28

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United States Patent Office 3,250,055 Patented May 10, 1966

3,250,055

APPARATUS FOR MAKING AND FILLING PACKAGES IN A CONTINUOUS OPERATION

Frank Schafer, Jr., Oshkosh, Wis., assignor to J. M. Nash Company, Oshkosh, Wis., a corporation of Wisconsin

Filed Mar. 12, 1962, Ser. No. 178,935
19 Claims. (Cl. 53—180)

This invention relates to apparatus for making and filling packages in a continuous operation.

According to the present invention, fluent substances, such as powders, granules, paste, or liquid, and even solid objects, can be packaged in a continuous operation concurrent with the fabrication of individual packages or bags from a moving film of package forming material. For use in preferred embodiments of the invention, the packaging material desirably consists of two plies of material which are heat sealed in bands, both longitudinally and transversely of the film, to form individual pockets which are subsequently cut apart into discrete packages. Pocket openings are formed in at least one ply of the film to admit the spout of filling mechanism which deposits package contents into the respective pockets in the course of package fabrication.

Important features of the present invention relate to the filling apron, over which the partially formed package film is drawn and which provides a yieldable support for the film during the package filling operation.

The various heat sealing steps by which the film pockets are formed are completed prior to the package filling operation. Accordingly, the package material is cold during the filling operation and heat sensitive package contents are unaffected. This is unlike certain prior art machines in which the heat sealing of the package occurs substantially concurrently with the filling thereof.

Apparatus embodying the present invention is also very versatile with respect to forming packages of different lengths and widths and machine elements are readily adjustable for this purpose. A great variety of different types of film can be processed on the machine. Both supported and unsupported films can be used.

Various products having different characteristics, such as a solid and a liquid, can be packaged simultaneously, for example related products such as popcorn and its accompanying oil can be packaged in a twin pack in various volumes, as required.

Other objects, features and advantages of the invention will appear from the following disclosure in which:

FIG. 1 is a side elevation of a machine embodying the invention.

FIG. 2 is a cross section taken along the line 2—2 of FIG. 1.

FIG. 2A is an enlarged fragmentary perspective view of the coacting severing and anvil blades in the slitter mechanism of FIG. 2.

FIG. 3 is a cross section taken along the line 3—3 of FIG. 2.

FIG. 3A is a diagrammatic view showing the pattern of slits formed in a film web or ply by the slitter of FIG. 2 and FIG. 3.

FIG. 4 is a cross section taken along the line 4—4 of FIG. 1 and showing the first transverse heat sealing unit.

FIG. 5 is a cross section taken along the line 5—5 of FIG. 4 and showing the heat sealing bars in open position.

FIG. 6 is a similar cross section, but showing the heat sealing bars in closed position.

FIG. 6A is a fragmentary plan of a web of film material showing the pattern of cross seal produced by the sealing unit of FIGS. 4, 5 and 6.

FIG. 7 is a cross section taken along the line 7—7 of FIG. 1 and showing the longitudinal heat sealer.

FIG. 8 is a cross section taken along the line 8—8 of FIG. 7 and showing the open position of the heat sealing bars thereof.

FIG. 9 is a view similar to FIG. 8, but showing the closed position of the heat sealing bars.

FIG. 9A is a fragmentary plan view of the strip of film material showing the pattern of longitudinal seals made by the heat sealer of FIGS. 7, 8 and 9.

FIG. 10 is a cross section taken along the line 10—10 of FIG. 1 and showing the slitter knife assembly.

FIG. 11 is a cross section taken along the line 11—11 of FIG. 10, showing the slitting knives of FIG. 10 in film cutting position.

FIG. 12 is a view similar to FIG. 11, which shows the slitting knives in elevated position.

FIG. 12A is a plan view of a strip of film material showing the longitudinal slits made therein by the slitting knives of FIGS. 10–12.

FIG. 13 is a cross section taken along the line 13—13 of FIG. 1 and showing the heat sealing mechanism which closes the slits through which the material has been filled into the pockets.

FIG. 14 is a cross section taken along the line 14—14 of FIG. 13, the filling apron being also shown in this view.

FIG. 14A is a plan view of a strip of film material showing the pattern of seals produced by the sealing apparatus of FIGS. 13 and 14.

FIG. 15 is a cross section taken along the line 15—15 of FIG. 1 and showing the feed wheels which intermittently advance the strip of film material.

FIG. 16 is a cross section taken along the line 16—16 of FIG. 15.

FIG. 17 is a cross section taken along the line 17—17 of FIG. 1 and showing the final cut-off knife assembly by which the individual packages are severed from the web.

FIG. 18 is a cross section taken along the line 18—18 of FIG. 17.

FIG. 19 is an end elevation of apparatus embodying the invention, as viewed along the line 19—19 of FIG. 1.

FIG. 20 is a fragmentary end elevation showing in enlarged detail the filling mechanism, this view being taken along the line 20—20 of FIG. 1.

FIG. 21 is a cross section taken along the line 21—21 of FIG. 20.

FIG. 22 is a fragmentary cross section taken along the line 22—22 of FIG. 20.

FIG. 23 is a view similar to FIG. 21, but showing the filling spout in an intermediate position in which it is advancing towards package filling position.

FIG. 24 is a fragmentary perspective view showing the parts in their position just before the spout advances toward entry into the film pocket.

FIG. 24A is a fragmentary perspective view showing the parts in an intermediate position, similar to that shown in FIG. 23, just after the spreading blades of the spout have entered the pocket.

FIG. 25 is a cross section similar to FIG. 23, but showing the spout in its fully advanced position.

FIG. 26 is a fragmentary perspective view showing the parts in their FIG. 25 position.

FIG. 27 is an enlarged detail of FIG. 25.

FIG. 27A is a fragmentary elevation of the filling apron.

FIG. 27B is a cross section along the line 27B—27B of FIG. 27A.

FIG. 27C is a diagrammatic perspective view showing the film as it appears after the various slitting and sealing operations have been performed thereon.

FIG. 28 is a schematic drawing showing diagrammatically the various machine elements which perform the slitting and sealing operations indicated in FIG. 27C.

Any conventional packaging material or film may be used. The material is desirably thin, flexible and heat sealable, for example rubber hydrochloride, known as "Pliofilm," and polyvinyl chloride, known as "Koroseal." The film may be transparent or opaque and may have labels printed directly thereon. With reference particularly to FIGS. 1, 27C and 28, two webs or plies **35**, **36** of film material are typically fed into the machine by drawing them from the supply rolls **37**, **38** under the power of power-actuated feed rolls **39**, **40**.

The machine is provided with a frame, indicated generally by reference character **41**, the details of which are broadly immaterial. Frame **41** supports an electric motor **42** which powers the continuously driven feed rolls **39**, **40** and cam shaft **50** which times the intermittent actuation of other parts of the machine, as hereinafter explained. Motor **42** drives a suitable speed reducer **43** which has output shaft **44** which drives chain **47** which drives the input sprocket of a variable speed drive **48**, and a chain **49** which drives cam shaft **50**. Cam shaft **50** carries a series of cams **51** by which a series of switches **52** are actuated to control the various functions of the machine, as hereinafter described. The three cams **51** and switches **52** shown in the drawing FIG. 1 are typical of a larger number of like cams and switches needed for control of the various machine functions.

The variable speed transmission **48** is controlled manually through crank **46** and has an output shaft **45** which drives jack shaft **53** either directly through the chain **55** or through a conventional photocell controlled synchronizing drive unit **56** through the chains **57**, **58**. Synchronizing unit **56** has its own electric motor **59** and is subject to photocell **54**, as is conventional. This unit times the drive rolls **39**, **40** with imprinted labels on the webs **35**, **36**.

Jack shaft **53** drives the chain **60**, which in turn drives continuously the feed rolls **39**, **40**, which draw the webs of film **35**, **36** from supply rolls **37**, **38**. The two plies or webs of film **35**, **36** merge in face relation to form a composite strip **61** which is trained over a dancer roll **62** which is gravity or otherwise biased to take up any slack in the web **61** resulting from its continuous feed under power of the rolls **39**, **40** and its intermittent advance thereafter, as will hereinafter be described.

While but a single longitudinal row of packages could be fabricated and filled on the machine of the present invention, greatly increased production results from the use of a relatively wide film strip and the formation therein of a plurality of laterally adjacent rows, each formed and filled concurrently. For purposes of exemplification, the described machine will form and fill several laterally adjacent rows **63**, **64**, **65** and **66** as is illustrated in FIG. 27C.

The machine frame **41** includes laterally spaced longitudinally extending side beams **69** which define the top bed of the machine and on which the transverse pocket opening slitter **70**, first cross heat sealer **71**, and longitudinal side and row sealer **73** are mounted for longitudinal adjustment. As shown in FIGS. 2–9, the beams **69** are provided along their top edges with racks **76** which cooperate with pinions, with which the various slitters and sealers are provided, for ready longitudinal adjustment thereof. Accordingly, each such unit can be positioned to produce in the film **61** seals and slits which will be spaced properly to produce packages of proper length and width, depending on package requirements.

In the typical machine embodiment shown in the drawings, the multi-ply film strip **61** will pass over a guide bar or roller **77** after passing the dancer roll **62** and its respective plies **35**, **36** will be separated by the divider bar **78**, which desirably also constitutes the anvil knife for the slitter knife assembly **70**, details of which are shown in FIGS. 2 and 3. The strip plies **35**, **36** are separated ahead of or upstream of the slitter knife assembly **70** so that the knife is effective only upon the uppermost ply **35**, the lowermost ply remaining unslit thereby.

Where a plurality of rows of packages are to be produced, as in the disclosed embodiment, the severing knife **79** of the slitter assembly **70** consists of a plurality of laterally spaced knife edges **80** which are desirably each inclined, as best shown in FIGS. 2 and 2A, to develop a shearing action against the edge of anvil knife **78**.

As aforesaid, the knife assembly **70** is adjustable as a unit along the rack **76**. For this purpose, the knife unit **70** consists of hanger brackets **81**, which are slidable along the wear plates **82** on the top edges of the support beams **69** and wear plates **85** on the facing sides of the support beams **69**. Pinions **83** on cross shaft **84** mesh with the teeth of the rack **76** so that upon rotation of the crank wheel **87**, the slitter unit **70** can be shifted longitudinally of the machine.

The severing blade **79** of the knife is actuated by a fluid motor **88** which has its cylinder fixed to the cross bar **89** fixed to the brackets **81**. The piston **90** of the fluid motor **88** is connected to cross head angle strap **91** which has at its respective ends thrust stems **92** which are interconnected to the cross head bracket **93** to which the severing blade **79** is connected by a series of bolts **94**.

The cross head bracket **93** is vertically slidable in ways **95** provided in the facing edges of hanger brackets **81**. Accordingly, when fluid pressure is applied to the motor **88**, under control of a suitable set of cams **51** and switches **52**, the severing blade **79** is drawn downwardly, as viewed in FIGS. 2, 2A and 3, to produce slits **97** in the top ply **35** of the film strip or sleeve **61**, these being shown both in FIGS. 3A and 27C.

The multi-ply film strip or sleeve **61** is stopped during the interaction therewith of the slitter unit **70**. For this purpose, the drive units **184**, **185** for the film are intermittently actuated, as hereinafter explained, in order to provide a dwell period within which the slitter unit is actuated. During such dwell the dancer roll **62** takes up the slack in the film **61** caused by continuous rotation of the feed rolls **39**, **40** and keeps the film taut.

Note from FIG. 2A that the severing blade **79** is provided at its respective ends with guide fingers **98** which are long enough to remain continuously in contact with the machined surface **99** of the anvil blade **78**, even when the knife blade **79** has been retracted to disengage all of its knife edges **80** therefrom. Accordingly, on the closing stroke of the knife blade unit, the shearing edges **80** are positively guided for proper shearing action with the anvil knife **78**.

After completion of the slits **97**, the appropriate cam actuated switch **52** depressurizes the fluid motor **88** and the movable blade **79** of the knife is retracted under pressure of the return springs **99**.

The respective plies **35**, **36** of sleeve strip **61** will now return to face relation by passing between guide rollers **100** preliminary to the concurrent action on both of said plies by the cross heat sealing unit **71**, which is also shown in FIGURES 4 through 6. It is the function of the cross sealer **71** to seal together the respective plies **35**, **36** along cross bands **101** shown in FIGS. 6A and 27. Note that these bands are formed in the strip **61** proximate to the slits **97**, but slightly at one side thereof so that the slits **97** provide side openings to pockets which will subsequently be formed in the strip **61** by the cross seals **101** and by longitudinal seals **102** which are thereafter formed by the longitudinal sealers **72**.

The cross sealer **71** is also adjustable longitudinally of the machine on its support brackets **103** which journal the cross shaft **104** having pinions **105** which mesh with the rack **76**. Adjustment of the hand wheel **108** on shaft **104** will establish the desired spacing of the sealing unit **71** from the slitting unit **70** to properly place the cross seals **101** with respect to the previously formed slits **97**.

Note that the seals **101** desirably are unbroken from one margin to the other of the strip **61**. These are produced by conventional heat seal bars **109**, **110**, which are

provided with electrical heating elements **111**. These may either be continuously heated or intermittently heated in time with the advance of the strip **61**.

The respective heat sealing bars **109, 110** are spring mounted on the cross head rails **112, 113**, which are guided for movement toward and away from each other on the guide pins **114** mounted in brackets **103**. A fluid-operated motor **115** has its cylinder connected to cross head **118** having its ends connected by stems **119** to the uppermost head rail **112**. The piston rod **117** of the motor **115** is directly connected to cross head rail **113**. Accordingly, actuation of the motor **115** will bring the heat seal bars **109, 110** toward one another and against the intervening strip **61**.

The hanger brackets **103** are provided with positive stop shoulders **120**, against which the rails **112, 113** will positively abut in their closed position to align accurately the closed bite of the bars **109, 110** on the path of the strip **61**. Cushioning springs **121, 126** may optionally be provided.

The motor **115** is desirably double acting under control of a suitable one of the cam operated switches **52** to act during the dwell in the intermittent movement of the film strip **61** and to open the jaws **109, 110** after the heat seal **101** has been formed. Completion of the operation of the cross heat sealer **71** will produce in the film **61** the condition illustrated in FIGURE 6A in which the cross seals **101** have been formed on transverse lines closely proximate the previously formed slits **97**.

The next operation is to form the longitudinal seals **102**, which define the rows **63, 64, 65** and **66** of packages or pockets in the strip **61**. Further movement of the strip **61** will bring it between the series of sets of longitudinal heat sealing bars **122, 123** of the sealer unit **72**. The sets of bars **122, 123** have electric heat elements **111**, as in the sealer unit **71**. The paired heat sealing bars in each set are longitudinally aligned and spaced laterally an appropriate distance to produce heat seal bands **102** laterally spaced to define packages of appropriate width. For this purpose, the respective bars are mounted on upper and lower sets of rails **124, 125** having T-slide adjustable coupling connection with the transverse headers **128, 129**. The respective headers **128, 129** are interconnected respectively with the piston rod **135** and cylinder **131** of the fluid-operated motor **132**, which is subject to a suitable one of the cam-operated switches **52** to be actuated in time with the dwell period of the strip **61** to clamp the respective bars **122, 123** against the intervening film strip **61** to produce the longitudinal seals **102**.

As in the case of the sealing unit **71**, the sealing unit **72** is suspended on hanger brackets **130** adjustable longitudinally on the rack **76** by rotating hand wheel **131** connected to shaft **132** having pinions **133** which mesh with the teeth of the rack **76**.

The brackets **130** have positive stop abutment shoulders **134** against which the headers **128, 129** abut when the bars come together, thus to accurately align the bite of the bars on the path of the strip **61**.

Accordingly, as shown in FIGURES 9A and 27C, individual pockets **137** have now been formed in the rectangular grid pattern shown in these figures so that if cut apart through the seals, separate discrete packages or packets would result. Each such pocket **137** has a pocket opening or slit **97** at one end thereof and through which package contents are admitted thereto, as will hereinafter be explained.

The next step in the sequence is to slit the sleeve strip **61** longitudinally through those seals **102** which are remote from the strip margins. The slits to be formed are shown at **138** in FIGURE 12A and are produced by the longitudinal slitting knives **139**, which are mounted near the end of the machine in the adjustable mechanism best shown in FIGS. 10–12. In the disclosed embodiment, three such slitting knives are required, each knife being mounted on an arm **140** which has an adjustable connection to its mounting block **141**. Accordingly, each knife **139** is individually adjustable to be raised or lowered somewhat for proper slitting action on the film strip **61**.

The respective blocks **141** are mounted on a cross head bracket **142** which may be raised and lowered on the cam adjuster **143** between its respective position shown in FIGS. 11 and 12. In normal operating position, the knives **139** will be in their position shown in FIG. 11 and will sever the web **61** into discrete strips of packets **137** aligned in rows **63, 66**, inclusive.

As best shown in FIGS. 20–27, the strip **61** is now drawn around a curved filling apron indicated generally by reference character **144**. The apron over which the strip **61** is drawn somewhat in the manner of a "waterfall" desirably consists of laterally aligned spaced blocks **147**, each having a curved smooth surface **148** and a coacting tongue and groove slip connection **149** with mounting bar **150**. Accordingly, the blocks **147** can be shifted longitudinally along bar **150** and secured in desired spaced relation thereto by means of the set screws **151**.

The blocks **147** are so aligned on the rail or bar **150** that there are recesses or voids **151** therebetween, the said recesses or voids **151** being aligned with the filling spouts **152**. The spacing of the blocks **147** and spouts **152** is such that each row **63–66** in the strip **61** is aligned with an apron recess **151** and a spout **152**.

Over the curved faces **148** of the blocks **147** is stretched under slight tension a rubber or like flexible flap or covering **153**, which is secured at its end margins by the bands **154** and along its rear margin by the band **155**. Accordingly, the rubber flap **153** covers the recesses **151** and provides a continuous surface to provide support continuously for the strip **61**. The rubber flap **153** is adapted to yield rearwardly into the recesses **151** when the filling spouts **152** are advanced to pocket filling position, as shown in FIGS. 23–27.

The filling apron **144** is guided for slight vertical movement with respect to the fixed brackets **158** on which it is mounted on the machine frame by depending bolts **159**. (FIGS. 20, 23, 25.) The heads of bolts **159** are spaced from brackets **158** a distance slightly greater than the thickness of the apron mounting bar **150**, thus to provide slight clearance **157** between the top of bar **150** and the brackets **158** when the filling apron rests by gravity on the bolt heads **159**. When the second cross sealing unit **184** is elevated to seize strip **61** in the vicinity of pocket openings **97**, it will lift the filling apron on its bolts **159** to its topmost position shown in FIG. 21.

The filling apron **144** provides a corner or edge around which the film strip **61** is bent to tend to open the slits **97** through which the individual strip pockets **137** are to be filled. (FIG. 24.) By reason of this arrangement, extraneous pocket opening mechanism such as vacuum nozzles, adhesive tape, etc., is avoided. The rubber flap **153** guides the strip for alignment of the partially opened slits **97** with the path of advance of the filling spouts **152**. The recesses **151** behind the flap **153** permit the flexible flap **153** to yield rearwardly as the filling spouts **152** enter the pockets **137** through the slits **97**.

The respective filling spouts **152** are connected through ducts **160** with package contents, for example liquid detergent, granular material, etc., which may flow by gravity or be forced under pressure through the ducts **160** and through spouts **152** into the pockets **137**. The specific size, shape and dimension of the respective spouts **152** will vary, depending on the nature of the material which is to be injected therethrough into the pockets. Those shown in the drawings are typical for a liquid.

All spouts **152** are mounted on transport mechanism including a vertically movable cross head rail **161**, guided for vertical movement on the guide stems **162** near the ends thereof. (FIGS. 20, 21.) The upper ends of the spouts **152** may have funnel-shaped receptacles **163** to receive package contents from the ducts **160**. The vertically operated cross head rail **161** is actuated by bell

crank 164 oscillatable on fixed pivot pin 167 under pressure of the fluid motor 168, the action of which is timed and controlled by a suitable one of the cam operated switches 52 to insert the spouts into the pockets during the dwell period of strip advance.

The spouts 152 are also provided with spring fingers or plow blades 169 by which the slits 97 in the respective pockets 137 will be spread apart in the course of downward movement of the spouts 152 to open the pockets. The plow blades 169 are mounted on a collar 170, through which the spout 152 extends. The blades 169 converge towards each other beyond the end of the spout 152, but the spout has a spreading cam 171 which will engage the plow blades 169 in the course of its downward movement to open the same when the spout is advanced from its position shown in FIG. 24 to its final position shown in FIG. 27.

Plow blades 169 are first advanced concurrently with the spout 152 in order to insert the blades into the slit 97 before the plow blades are spread. At this point, further advance of the plow blades is interrupted while the spout continues to advance, thus spreading the plow blades after they have entered the slits to admit the spout into the pocket and to enlarge the pocket to receive its contents.

The collar 170 on which the spreading blades 169 are mounted is positioned axially on the spout 152 by the coil spring 179. The collar 170 has a laterally projecting tab 180 which rides in a vertically elongated slot 181 in the laterally adjustable guide bracket 182 mounted alongside each spout 152. (See FIGS. 20, 22, 24, 26.) During the first increment of downward movement of the spout 152 under pressure of the fluid motor 168, tab 180 moves freely in the slot 181 so that the plows 169 move downwardly and at the same rate and enter the slits 97. However, when the parts reach their position shown in FIGS. 23 and 24A, tab 180 reaches the end of its slot 181, as shown in dotted lines in FIG. 22, thus arresting further downward movement of the spreader blades 169. Continued downward movement of the spout 152 will then open or spread the blades 169, as shown in FIGS. 25 and 26, and the springs 179 will contract, as shown in FIGS. 25 and 27, to accommodate for this lost motion.

As indicated in FIGS. 25 and 27, spreading of the plow blades 169 is permitted without dislocation of the strip 61 by the yielding of the rubber flap 153 and the rear wall 36 of the pocket into the recess 151 formed in the filling apron 144. The slit 97 is yieldingly supported by the rubber flap 153 during the entry of the plow blades and spout to preclude tearing of the film 61.

The flow of material discharged from the spout into the pocket may be controlled by the slide valve 172 actuated by fluid motor 173 which is subjected to a suitable one of the cam operated switches 52. When the pockets are filled, motor 168 is actuated to withdraw the spouts from the pockets 137, thus freeing the strip 61 for further movement.

Guide rods 176 and 177 are provided to properly guide the film strip 61 over the filling apron 144. Bands 178 of Fiberglas or other smooth tape may be applied over those portions of the rubber flap 153 which overlie the blocks 147 to lubricate the movement of the film over the apron.

The individual packets 137 are now filled and in readiness for heat sealing in a second continuous band 183 across the strip 61, which band 183 will intersect the slits 97, and heat seal the same to complete closure of the pockets 137.

The second cross seal unit 184 which makes the heat seal bands 183 is shown in FIGS. 13 and 14. Its action is coordinated with the film strip drawing unit 185, details of which are shown in FIGS. 15 and 16. Final cutoff is accomplished by the knife unit 186, details of which are shown in FIGS. 17 and 18.

The respective units 184, 185, 186 are adjustably mounted on a front panel 189 of the machine, the respective units being provided with suitable bearing blocks 190, 191, 192, on which the respective units are adjustable vertically on the guide rods 193 mounted on the front panel 189 by corner brackets 194.

For purposes of adjusting the units, the panel 189 is provided on its front face with fixed racks 197. Strip propelling or driving unit 185 is provided with a cross shaft 198 having a hand crank wheel 199 and pinions 200 meshing with the rack 197. Accordingly, the exact vertical position of the propelling unit 185 is adjusted by manipulation of the hand crank 199, whereupon the bearing blocks 191 can be locked to the guide rods 193 by manipulation of the screw clamps 201. This fixes the position of the drive unit 185 and also the heat seal unit 184 which cooperates with the drive unit in drawing down the strip 61.

The final cutoff knife unit 186 (FIGS. 17, 18) is provided with a cross shaft 202, with a hand crank wheel 203 and pinions 204 meshing with the rack 197. Final adjustment of the cutoff knife unit 186 pursuant to manipulation of the hand crank wheel 203 is fixed by turning down the screw clamps 205 on the slide bearings 192.

The second cross seal unit 184 (FIGS. 13, 14) is reciprocated vertically as guided on the rods 193 by the double acting fluid motor 239, the actuation of which is controlled by a suitable one of the cam operated switches 52. This motion also drives the wheels 213 of propelling unit 185 (FIG. 15) by reason of the engagement of rack 208 which depends from cross seal unit 184 with wheel drive pinion 209 mounted on the shaft 210 of the propelling unit 185. Propelling unit 185 has another shaft 211 which receives power from shaft 210 through meshing gears 214, 215. Both shafts 210, 211 have a series of mating strip drive wheels 212, 213, which are adjustably fixed to the shafts 210, 211 so that they coact with the film strip 61 along the sealed longitudinal bands 102 formed therein by the longitudinal heat sealers 72.

There is an overrunning clutch 238 between drive pinion 209 and wheel shaft 210. Accordingly, shaft 210 is driven only when the rack 208 moves downwardly. The clutch 238 disengages when the rack moves upwardly. Pinion 209 has the same diameter as the wheels 212.

Accordingly, when motor 239 is actuated to pull down on the heat seal unit 184 (its heat seal bars will then be clamped on the strip 61 as will hereinafter appear), the rack 208 will concurrently rotate wheels 212, 213 so that the strip 61 will be propelled by the joint action of the rotating wheels and the downwardly moving heat seal unit 184. At the conclusion of the down stroke of motor 239 as controlled by one of the cam actuated switches 52 (adjusted to advance the strip one package length), the motor 239 will be reversed to raise the heat seal unit 184. Concurrently motor 230 on the heat seal unit 184 opens the jaws of the heat seal bars. Clutch 238 overruns and the strip 61 is held in its dwell position.

Heat seal unit 184 (FIG. 13) consists of a frame 220, which includes the brackets 190 which are slidable on guide rods 193. The frame carries a pair of heat seal bars 221, 222, each heated electrically by the heating elements 223. The bars are mounted on respective cross head rails 224, 225, respectively connected to the cylinder 228 and piston rod 229 of a fluid motor 230. In the embodiment illustrated, motor 230 is on the rear side of the mounting panel 189, the panel being provided with vertical slots 231, through which connections are made from the motor to the cross head rails 224, 225. Cylinder 228 is connected to the header 232, which is in turn connected by paired stems 233 to the rail 225. Piston rod 229 is directly connected to the cross head rail 224.

Frame 220 is provided with positive abutment stops 234 against which the cross head rails 224, 225 will be drawn when the motor 230 is actuated to close bars 221, 222 on

the strip **61**. Accordingly, the bite of the bars **221, 222** is accurately aligned with the path of the strip **61**. In the course of machine operations and under control of the appropriate cam operated switches **52**, feed of the strip **61** will stop when the slits **97** reach their positions shown in FIG. 21. At this point the filling spouts **152** will descend for entrance into the pockets **137** as aforestated.

At this point in the cycle, the filling apron **144** is at its lowermost position on the bolts **159** as shown in FIG. 21 to provide a yieldable backing for the strip **61** behind the slits **97**. In the course of filling the pockets, motor **239** elevates the heat seal unit **184** with its jaws open. At the point in the cycle where the pockets **137** are filled and the appropriate cam operated switch **52** is actuated to energize motor **168** to lift the filling spouts **152** out of the pocket openings or slits **97**, the blades **237** on frame **220** will contact the ends of the loosely hanging apron **144** and lift the apron **144** through its clearance space **157** until it contacts its mounting bracket **158**, thus to expose slits **97** beneath its lower edge. See FIG. 21. The upper surfaces of the heat seal bars **221, 222** are then flush with the undersurface of apron **144**.

At this point in the cycle, the appropriate cam-operated switch **52** is actuated to energize the fluid operated motor **230** to close bars **221, 222** on the strip **61** and across the slits **97** to seal the slits on the cross heat seal bands **183** shown in FIGS. 14A and 27. As soon as the heat seal bars **221, 222** clamp against the film **61**, the appropriate cam-operated switch **52** operates motor **239** to draw down on the heat seal unit **184** and concurrently through rack **208** the propelling unit **185** to rotate the wheels **212, 213** and to draw the strip **61** downwardly, as aforestated. This maintains the heat sealing bars **221, 222** in contact with the strip **61** during the course of its intermittent downward movement.

When the strip **61** has been drawn downwardly for a full package length, appropriate cam-operated switch **52** stops the motor **239**, and motor **230** is actuated to unclamp heat seal bars **221, 222** from engagement with the strip **61**. Thereafter motor **239** is actuated to lift heat seal unit **184** upwardly. Within the time required to lift heat seal unit **184** upwardly, the next series of packets **137** are being filled over the filling apron **144**. When this filling is completed, the heat sealing unit **184** has reached its uppermost position, where it will again lift filling apron **144** and expose the slits **97** to the heat sealing bars **221, 222**.

Final package cut-off knife unit **186** (FIG. 17) is provided with an anvil blade **240** and shearing blade **241**. These blades are actuated by the fluid motor **242**, which has its cylinder connected to the fixed cross head **243** and its piston rod **244** connected directly to the shearing blade **240**.

Anvil blade **241** is fixed to the fixed cross head **243**, only the shearing blade **240** being movable. Movement of the blade **240** is guided on the rods **245**. The movable blade **241** has finger or leg extensions **246**, which are guided on ground surfaces **247** of the anvil blade **241** for proper shearing action of the blades. Motor **242** is controlled by a suitable one of the cam-operated switches **52** to actuate the cut-off knife unit **186** to shear through the transverse heat seal bands **183** in the dwell period of the movement of the sleeve **61**, thus to cut off the individual packets, as shown in FIG. 27. These may fall onto a chute **250** to be collected in a bin **251**, or the like.

I claim:

1. A machine for forming a plurality of packet pockets of selected predetermined length in a continuous sleeve forming film having opposed plies, comprising:

(a) a frame having a track,

(b) a transverse film slitter on the track to cut a pocket opening in at least one of said plies,

(c) a transverse sealer on the track to seal said plies together at the end of each pocket opposite said pocket opening, and

(d) means for selectively moving said slitter and sealer along the track to adjust the spacing thereof according to the selected predetermined length of the pocket.

2. The machine of claim **1** in further combination with means upstream of the film slitter for separating the opposed plies of the film and for exposing only one of said plies to the slitter, whereby the other ply remains unslit.

3. The machine of claim **1** in further combination with

(e) a filling apron beyond the transverse sleeve sealer,

(f) means for drawing the sleeve over the apron and to a position in which its pocket opening overlies the apron,

(g) a pocket filling spout,

(h) transport means for the spout on which the spout is timed to enter the pocket through its opening to fill the pocket with package contents while the pocket opening overlies the apron.

4. The machine of claim **3** in which said apron has a recess aligned longitudinally with the pocket and within which sleeve material may be received in the course of filling the pocket.

5. The machine of claim **3** in which said apron has a recess aligned longitudinally with the pocket and within which sleeve material may be received in the course of filling the pocket, said apron having a flexible covering spanning across said recess to align the pocket opening with the spout and yieldable into said recess under pressure of the spout.

6. The machine of claim **3** in which said spout has pocket spreading fingers and means to actuate said fingers when the spout is in the pocket.

7. The machine of claim **3** in further combination with a transverse sleeve sealer beyond the apron to seal said sleeve plies together across said pocket opening to seal the filled package.

8. The machine of claim **7** in further combination with a transverse cutter beyond the last mentioned transverse sleeve sealer to sever the sleeve into discrete filled packages.

9. The machine of claim **7** in which said transverse film slitter comprises a plurality of knives spaced transversely of the machine to produce in the sleeve a plurality of transversely spaced pocket openings with unsevered connecting links therebetween, said machine further comprising mans for longitudinally sealing said film plies together in bands aligned with the said links to provide a plurality of rows of package pockets, and additional pocket filling spots aligned with the respective rows.

10. The machine of claim **7** in which said transverse sleeve sealer comprises a frame, spaced apart heat sealing bars at opposite sides of the sleeve, transport means on which said bars are mounted for movement both transversely and longitudinally of the sleeve, a fluid motor for advancing said bars toward each other transversely of the sleeve and against the intervening sleeve, said motor comprising cylinder and piston members respectively connected to said bars, said frame having positive stops defining the closed position of the bars in which their bite is aligned with the path of longitudinal sleeve movement.

11. In a machine of the character described, heat sealing mechanism comprising a frame, a plurality of sets of spaced apart heat sealing bars between which heat sealable material is fed, transport means on which the bars in each set are mounted for lateral movement on said frame to change the lateral spacing between sets, a fluid motor for advancing the bars of respective sets toward each other and against intervening heat sealable material, said motor comprising cylinder and piston members respectively connected to the bars of respective sets.

12. The device of claim **11** in which said transport means comprises rails parallel to said bars and on which said bars are mounted, said frame having positive stops against which said rails abut under pressure of the fluid motor.

13. In a machine of the character described, mechanism for filling packages through a side opening in a sleeve pocket, said mechanism comprising:

(a) a filling apron,

(b) means for drawing a sleeve with a side opening over the apron and to a position in which its side opening overlies the apron,

(c) a pocket filling spout,

(d) transport means for the spout on which it is timed to enter the pocket through its side opening to fill the pocket with package contents while the side opening overlies the apron.

14. In a machine of the character described, mechanism for filling packages through a side opening in a sleeve pocket, said mechanism comprising a filling apron, means for drawing a sleeve with a side opening past the apron to overlay its side opening thereagainst, a pocket filling spout, transport means for the spout on which it is advanced to enter the pocket through its side opening to fill the pocket with package contents, said apron having a recess aligned longitudinally with the pocket and within which sleeve material may be received in the course of filling the pocket.

15. In a machine of the character described, mechanism for filling packages through a side opening in a sleeve pocket, said mechanism comprising a filling apron, means for drawing a sleeve with a side opening past the apron to overlay its side opening thereagainst, a pocket filling spout, transport means for the spout on which it is advanced to enter the pocket through its side opening to fill the pocket with package contents, said apron having a recess aligned longitudinally with the pocket and within which sleeve material may be received in the course of filling the pocket, said apron having a flexible covering spanning across said recess to align the pocket opening with the spout and yieldable into said recess under pressure of the spout.

16. The machine of claim 13 in which said spout has pocket spreading fingers and means to actuate said fingers when the spout is in the pocket.

17. The machine of claim 13 in further combination with a transverse sleeve sealer beyond the apron to seal said sleeve plies together across said pocket opening to seal the filled package.

18. The machine of claim 13 in further combination with a transverse cutter beyond the last mentioned transverse sleeve sealer to sever the sleeve into discrete filled packages.

19. In a machine of the character described, mechanism for filling packages through a side opening in a sleeve pocket, said mechanism comprising:

(a) a filling apron,

(b) means for drawing a sleeve with a side opening past the apron to overlay its side opening thereagainst,

(c) a pocket filling spout,

(d) transport means for the spout on which it is advanced to enter the pocket through its side opening to fill the pocket with package contents,

(e) a heat sealer,

(f) means for engaging said heat sealer with said sleeve and over said side opening to seal said side opening after the pocket has been filled, and

(g) mounting means for said apron on which the apron is moveable to expose said sleeve opening to said heat sealer.

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