

Jan. 5, 1971

M. H. JENKINS  
PACKAGING MACHINES

3,552,092

Filed June 3, 1968

11 Sheets-Sheet 1

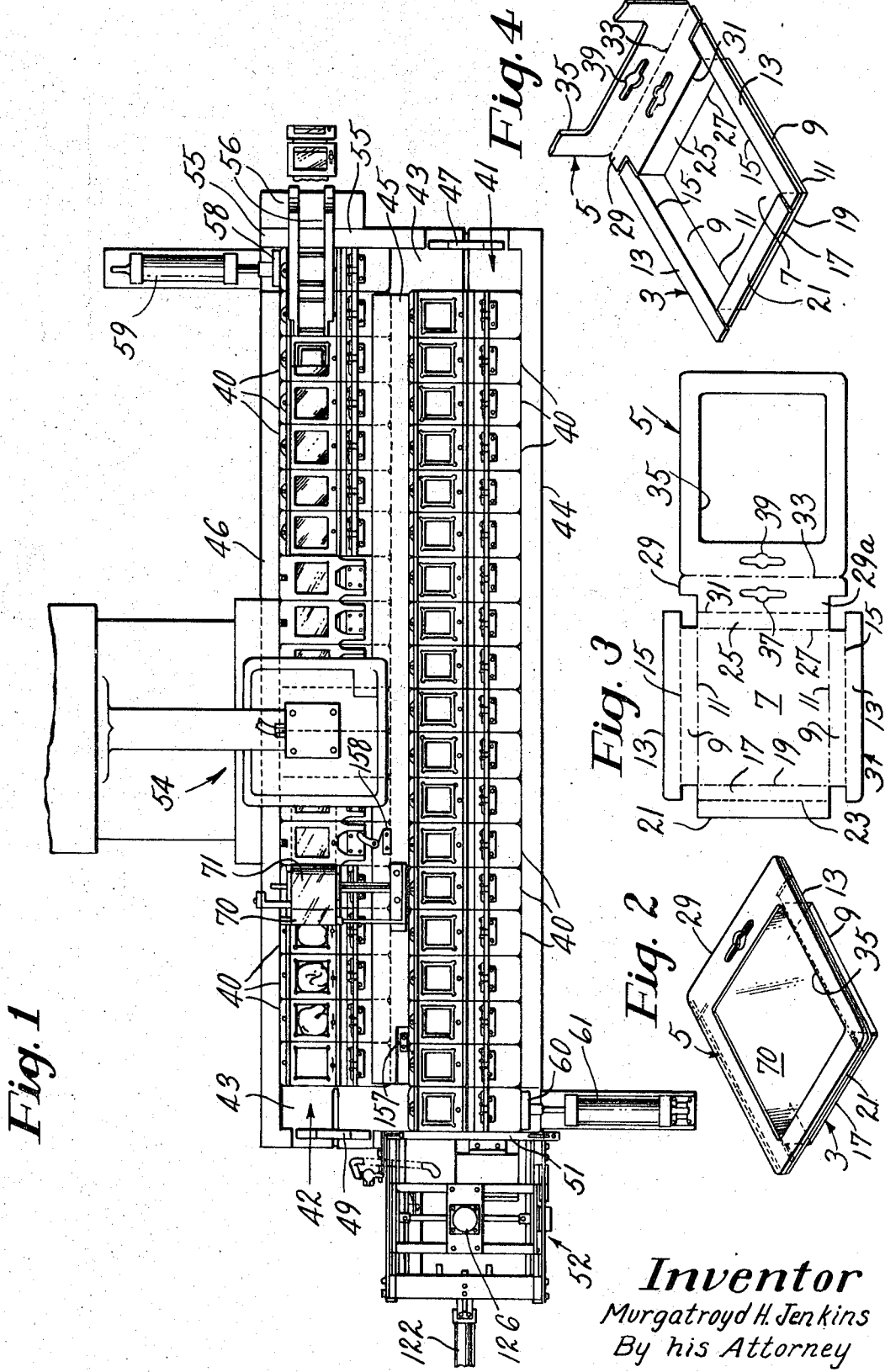


Fig. 1

Fig. 4

Fig. 3

Fig. 2

*Inventor*  
Murgatroyd H. Jenkins  
By his Attorney  
Vincent A. White

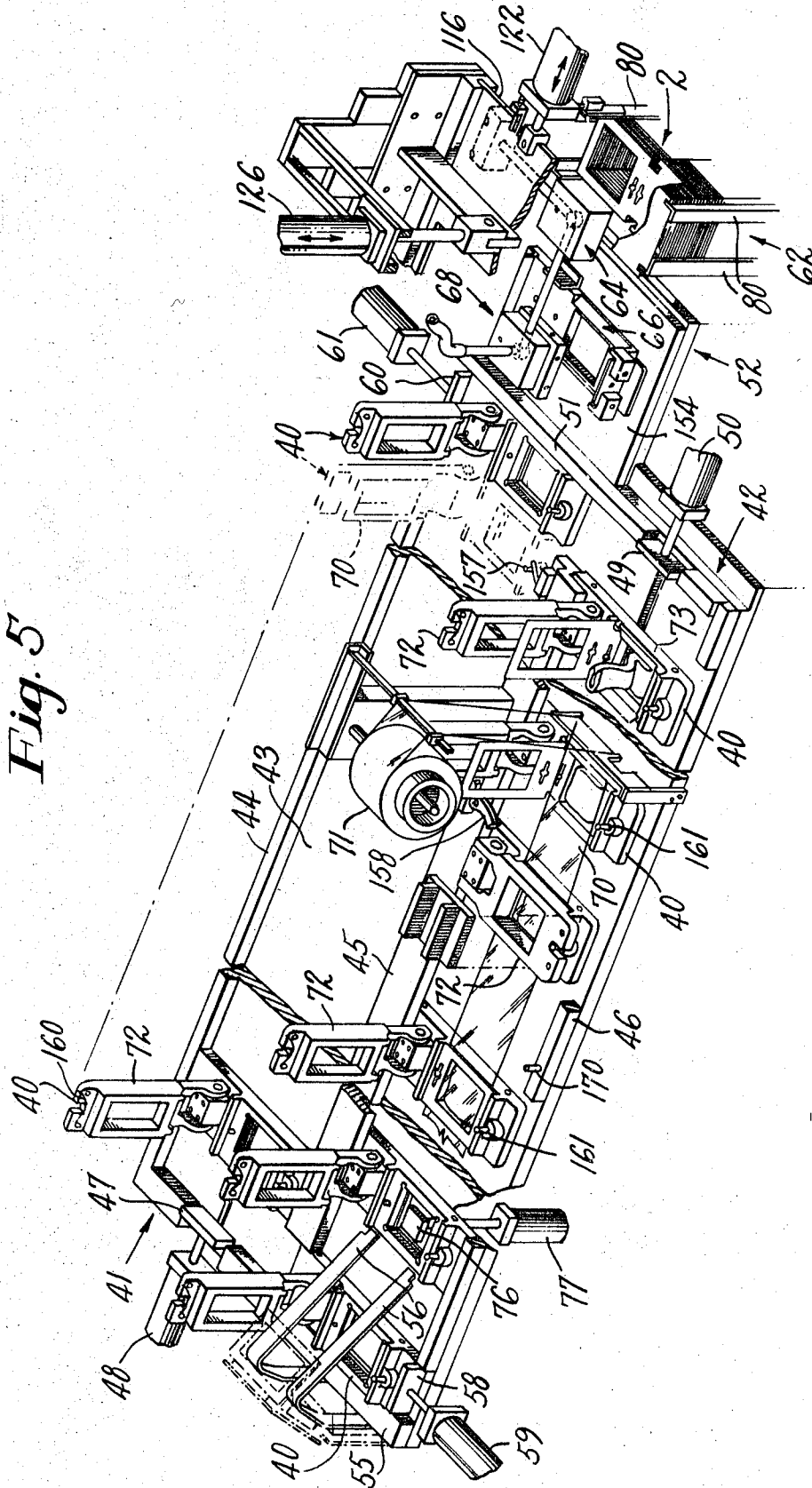
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Fig. 7

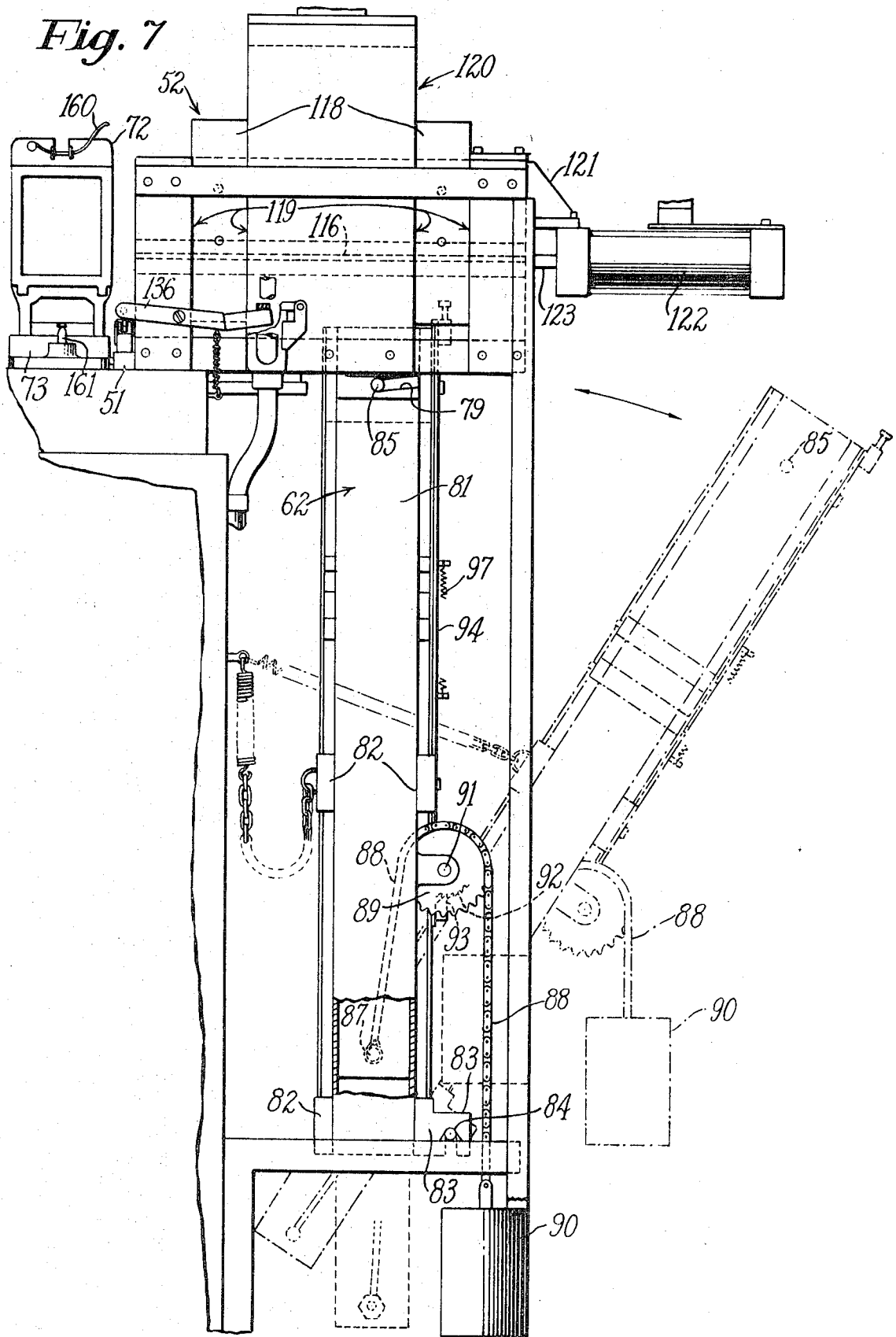


Fig. 8

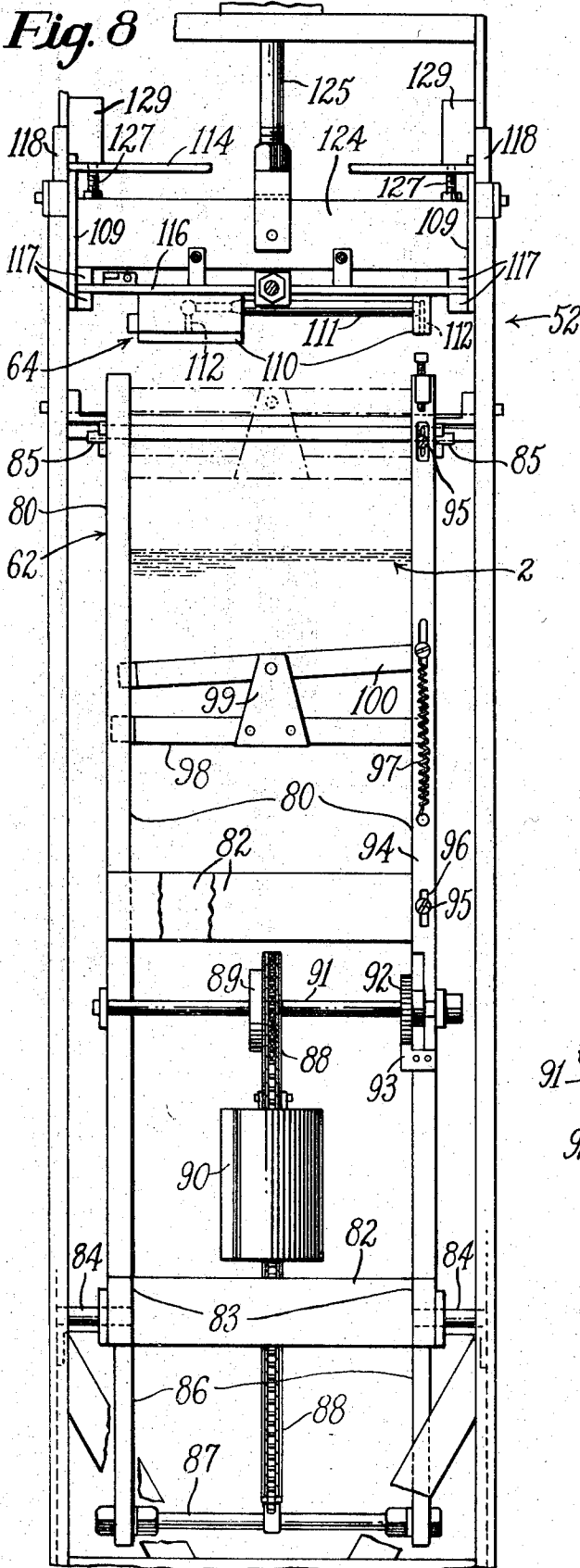


Fig. 9

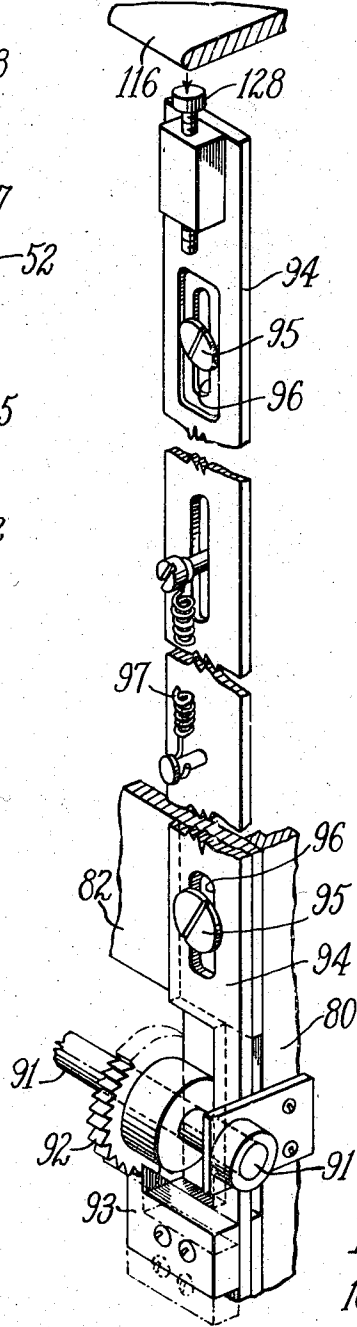
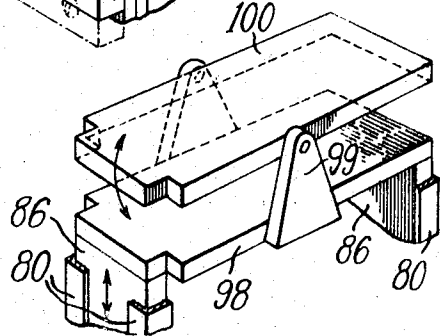


Fig. 10



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Fig. 11

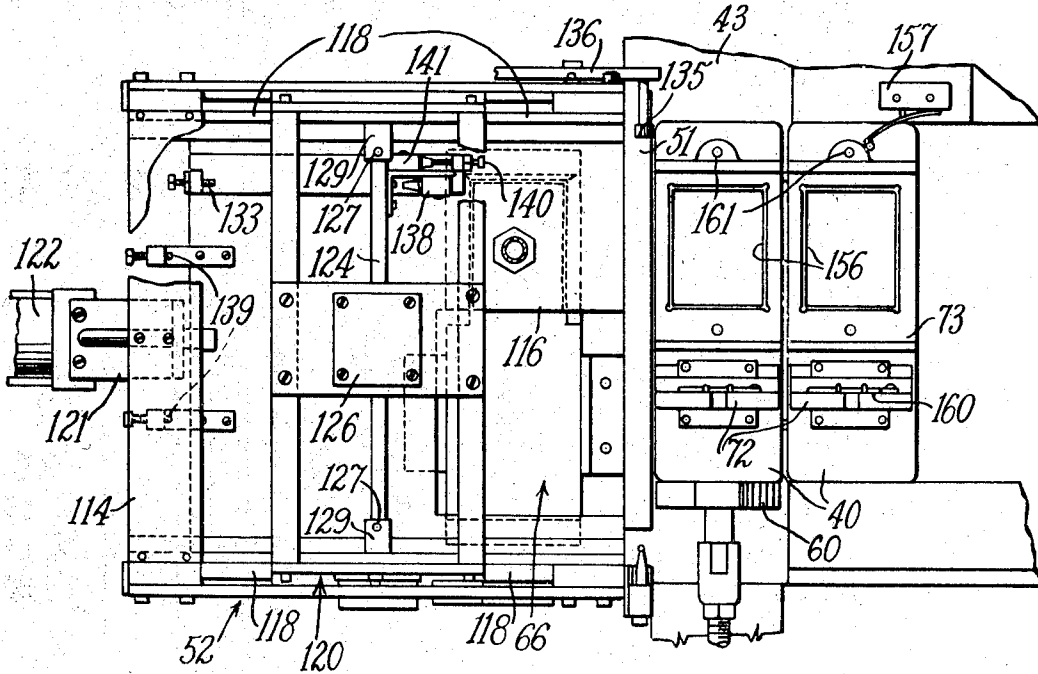


Fig. 12

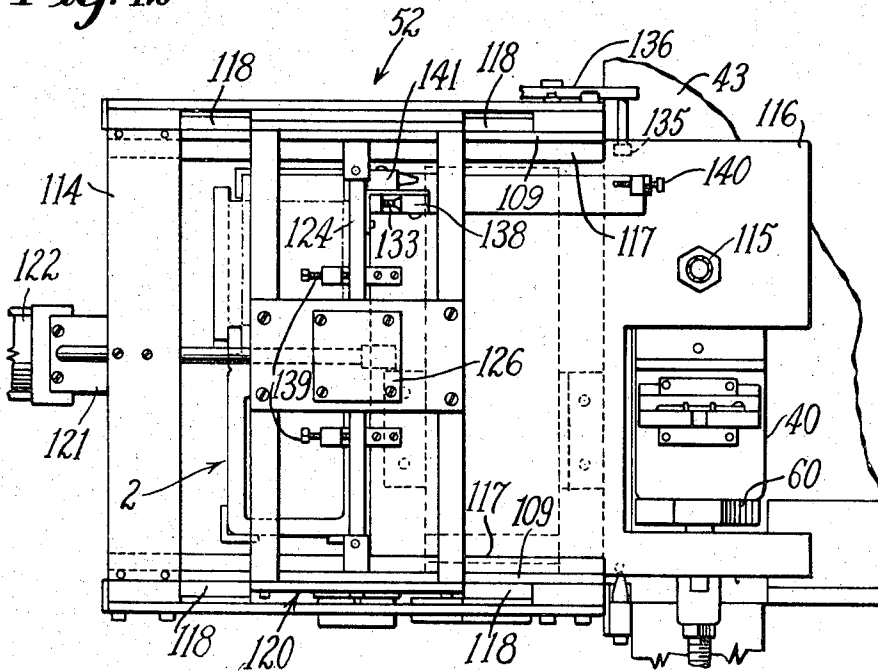






Fig. 19

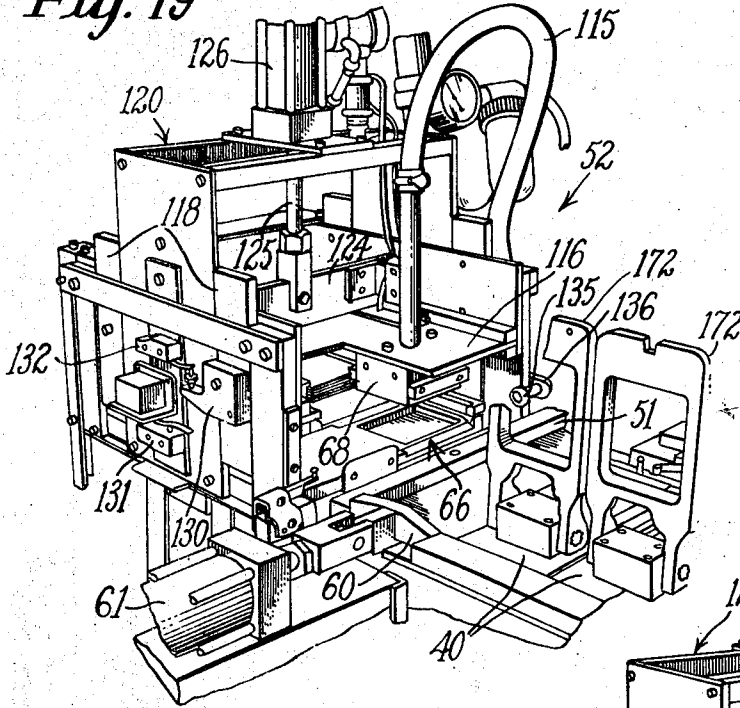


Fig. 20

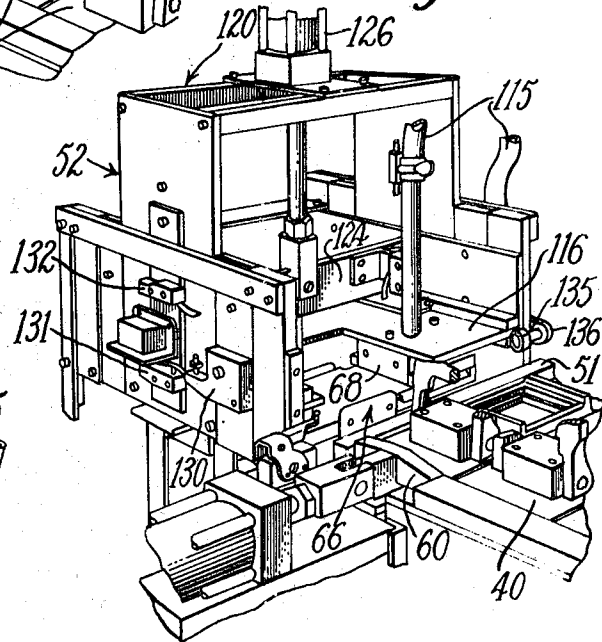
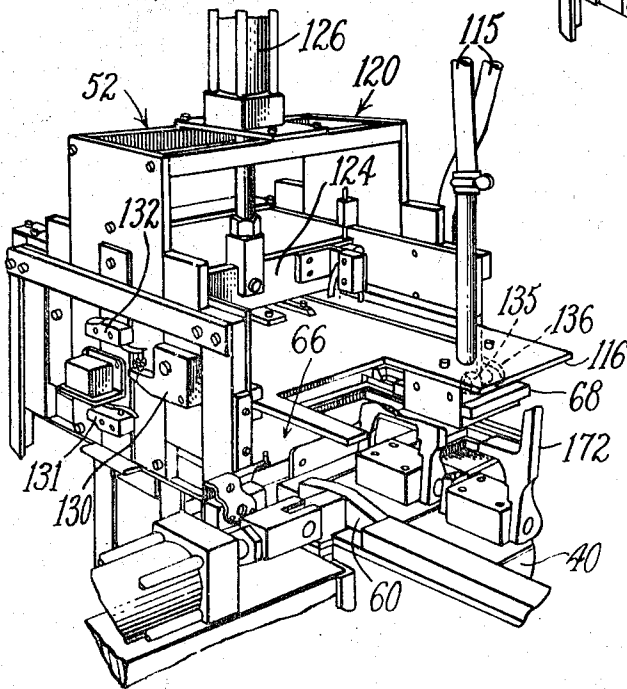
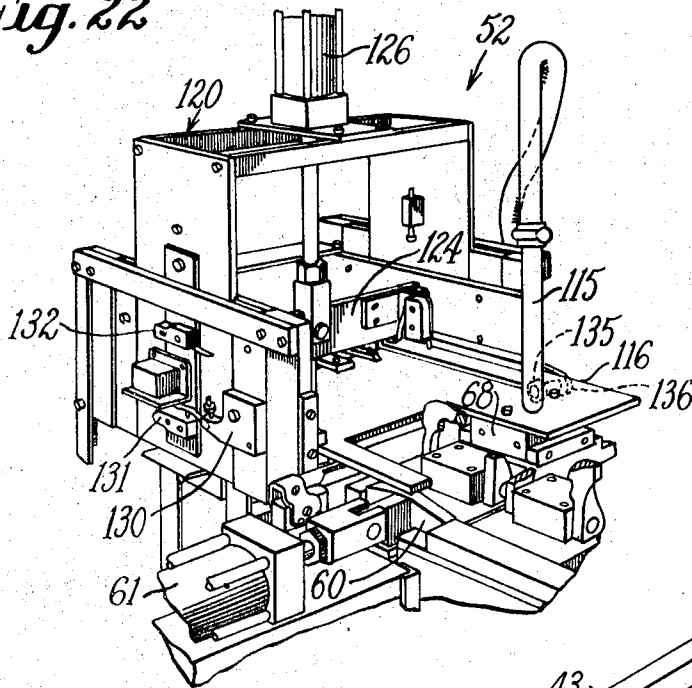


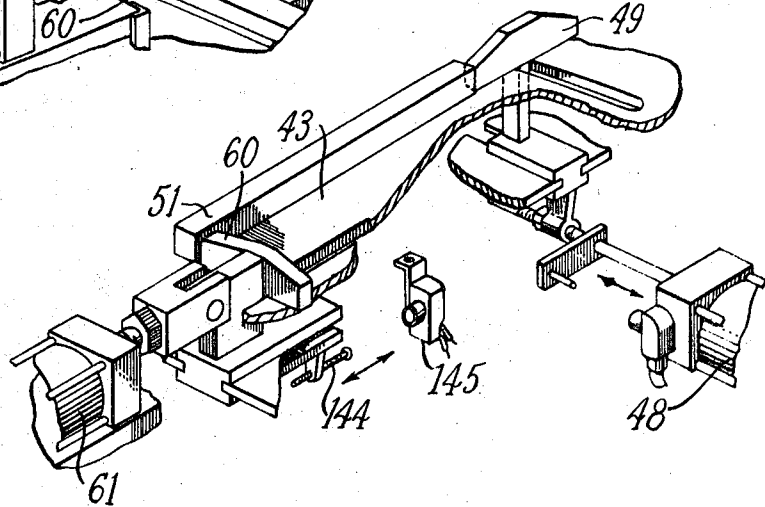
Fig. 21



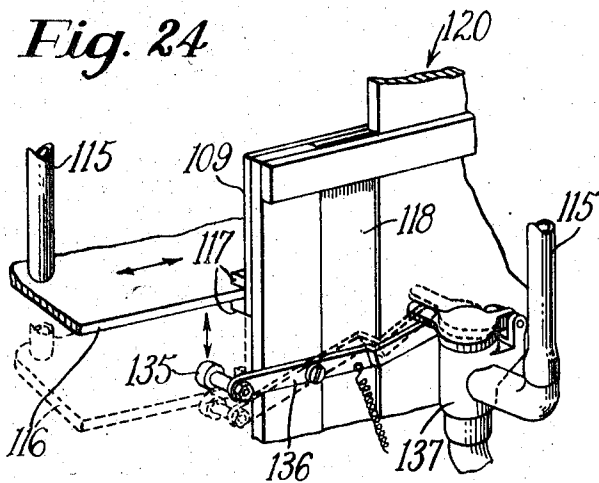
*Fig. 22*



*Fig. 23*



*Fig. 24*



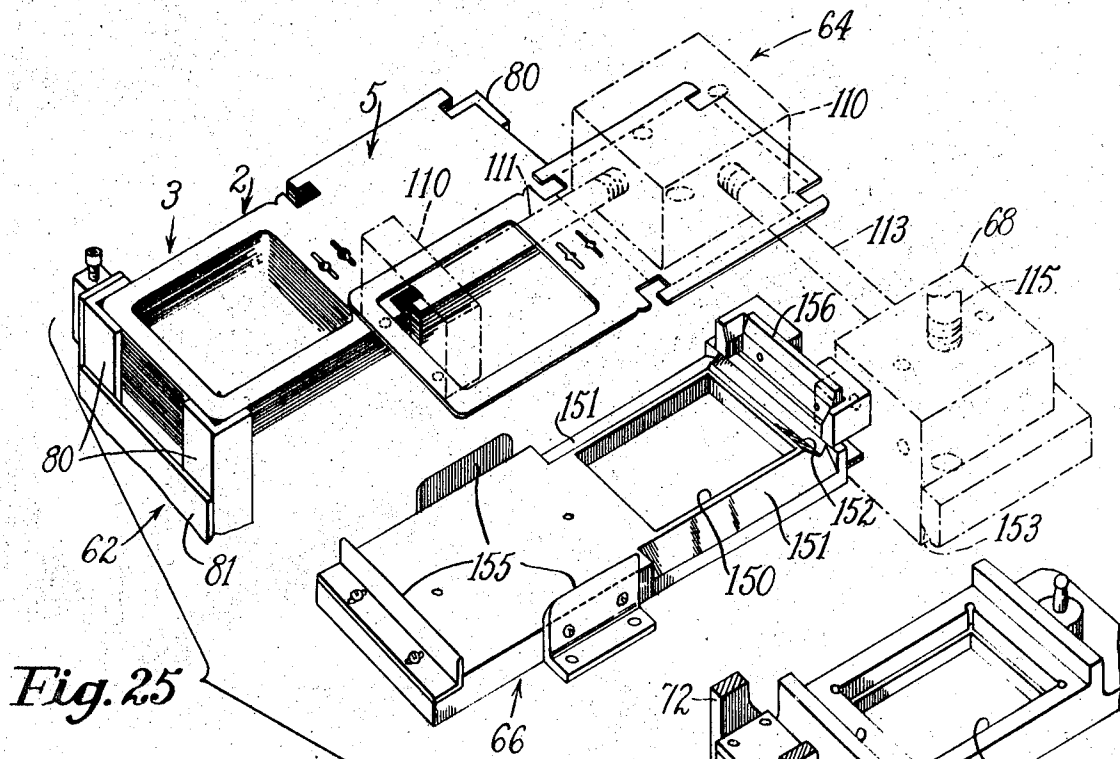


Fig. 25

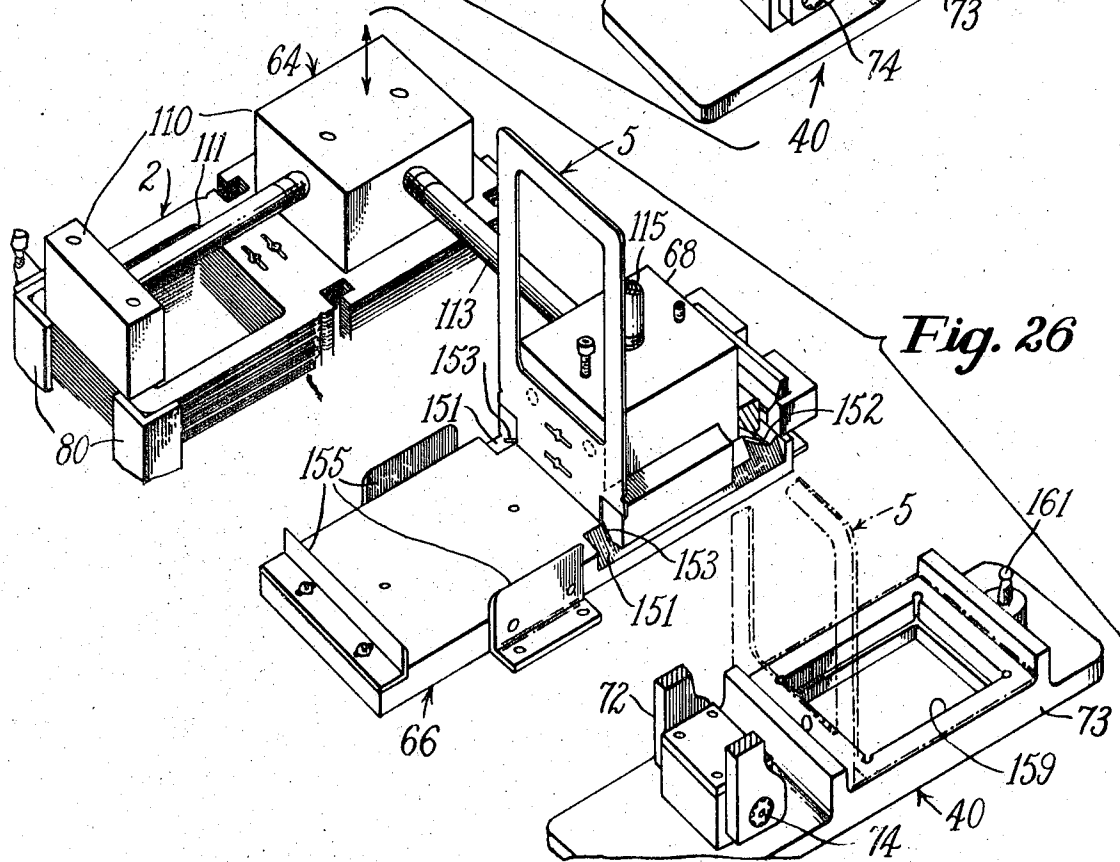


Fig. 26

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**PACKAGING MACHINES**

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 Beltz Corporation, St. Louis, Mo.  
 Filed June 3, 1968, Ser. No. 734,173  
 Int. Cl. B65b 47/04

U.S. Cl. 53—183

19 Claims

**ABSTRACT OF THE DISCLOSURE**

A packaging machine having a plunger forming from a flat blank an open sided box with outspread flanges and a jig in which the formed blank is held together while a film placed over the open side of the box is sealed to the flanges at a sealing station.

**BACKGROUND OF THE INVENTION**

Field of the invention

The invention relates to a machine for forming packages having a box-like portion with outspread flanges and a film which seals a cover to the flanges. A typical package which may be formed on the machine is disclosed and claimed in an application for U.S. Pat. Ser. No. 613,258, filed Feb. 1, 1967, now Pat. No. 3,486,615, in the name of Irvin S. De Woskin.

Description of the prior art

There is disclosed in U.S. Pat. No. 3,030,752 a machine of the general type described herein. Such a machine is adapted to feed a succession of jigs carrying flat blanks under a web of film. A portion of the blank underlying the film has an opening forming a window and an article to be packaged is placed on the film. The other portion of the blank which is solid is folded over the article and clamped by the jig against the film and the windowed portion of the blank. The assembly is then sealed together by activating the film. Such a machine, while suitable for forming the package shown in the patent, would not be suitable for forming the packages disclosed in said application in an economical manner since there is no provision for forming and holding the box-like portion of the package before loading and sealing. Furthermore, the machine of the patent contemplates placement of an article to be packaged on the film rather than under it and in a box-like portion.

**SUMMARY OF THE INVENTION**

It is an object of the invention to provide, in a packaging machine, blank forming means including a plunger which cooperates with a form to fold a flat blank of relatively stiff foldable material, such as paper board or the like, into an open sided box having outspread flanges. The plunger is adapted not only to form the blank, but also to place the formed blank in a jig which maintains the blank in box form so an article to be packaged may be loaded therein and enclosed by a film spanning the open side of the box and overlying the outspread flanges. The package assembly thereafter is passed through a sealing station where the film is activated and sealed to the box flanges to hold the box together and complete the package.

According to one feature of the invention, the machine feeds a succession of jigs past the plunger for placement of formed blanks and thereafter through the sealing station for forming a succession of completed packages for efficiency and reduced individual package cost.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a plan view of one form of machine embodying the invention;

FIG. 2 is a perspective view showing a completed display package which may be formed on the machine of FIG. 1;

FIG. 3 is a plan view of a blank from which the display package of FIG. 2 may be formed;

FIG. 4 is a perspective view showing the body portion of the blank of FIG. 3 formed into an open-sided box-like shape for receiving an article to be packaged;

FIG. 5 is a schematic view in perspective showing the progressive formation of packages in the machine;

FIG. 6 is a perspective end view of the machine showing the blank feeding and forming mechanism;

FIG. 7 is a front elevation of the mechanism shown in FIG. 6;

FIG. 8 is an end elevation of the mechanism shown in FIG. 7;

FIG. 9 is a perspective view on an enlarged scale of a portion of FIG. 8;

FIG. 10 is a perspective view of the support for a stack of blanks to be formed;

FIGS. 11 and 12 are plan views of the blank feeding and forming mechanism with the parts in different positions;

FIGS. 13-17 are front elevations of the blank feeding and forming mechanism with parts broken away to show the progressive formation of a package;

FIG. 18 is a perspective view of a portion of the blank feeding mechanism;

FIGS. 19-22 are perspective views taken from the back of the machine and illustrating the same progressive steps shown in FIGS. 13-16 respectively;

FIG. 23 is a perspective view showing a mechanism for transferring jigs in which the packages are formed;

FIG. 24 is a perspective view of a vacuum release valve associated with the blank feeding and forming mechanism; and

FIGS. 25 and 26 are schematic views in perspective illustrating the progressive feeding and formation of blanks into partially formed packages.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring to FIG. 2, there is shown a completed package which the machine embodying the present invention is adapted to produce. The package comprises a box-like body portion 3 and a windowed cover portion 5 which are formed from a flat blank shown in FIG. 3. The body portion of the blank has a rectangular center panel 7, walls 9 connected to the center panel along fold lines 11, a wall 17 connected to the center panel at a fold line 19, and another wall 25 connected to the center panel along a fold line 27. The walls 9 have flanges 13 connected thereto along fold lines 15, the wall 17 has a flange 21 connected by a fold line 23 and the wall 25 is provided with a flange 29 connected by a fold line 31. The cover 5 is connected to the flange 29 along a fold line 33 and is provided with a cutout portion 35. The package also has a sheet of film seen through the window 35 as spanning the open side of the box-like body 3 and interposed between the cover and the flanges. FIG. 4 shows the location of the various parts of the blank after the body portion has been erected into a box-like shape and before an article has been placed in the body portion and covered by the film which is also used to seal the cover to the flanges.

Referring to FIG. 1, there is shown a packaging machine of the general type shown in said Pat. No. 3,030,752, but which, according to the invention, is particularly adapted to produce the package shown in FIG. 2. The machine is provided with a series of separate jigs 40 which are arranged to be fed in one direction along a back guideway 41 as well as in another direction along a

front guideway 42, there being provided means for indexing individual jigs from one guideway to the other. Both guideways comprise a flat table 43 with appropriate guide rails 44, 45 and 46. The jigs are fed along the back guideway 41 by a pusher 47 which is operated by a cylinder 48 not seen in FIG. 1, but shown schematically in FIG. 5, and are also fed along the front guideway 42 by a pusher 49 operated by a cylinder 50 (see also FIG. 23). The jigs 40 are moved along the back guideway 41 to the left as seen in FIG. 1 to a loading position against a stop 51 at a card feeding and forming station 52, while the jigs are moved along the front guideway 42 by the pusher 49 through a sealing station 54, under ramps 56 and against a stop 55. At the right end of the front guideway 42 each jig 40 (which is then empty) is transferred to the back guideway 41 along the stop 55 by a pusher 58 operated by a cylinder 59. Each jig, after being loaded with a formed blank at the feed and form station 52 is transferred along the stop 51 to the front guideway 42 by a pusher 60 operated by a cylinder 61.

The sequence of operations of the machine in forming packages is generally illustrated in FIG. 5. In general, a flat blank is fed from a stack 2 in a hopper 62 by a feeding device 64 to a form 66. A plunger 68 forces the blank into a cavity in the form to make the box-like shape as seen in FIG. 4 and then transfers the formed blank to a jig 40 in the loading position against stop 51. The jig with the formed blank therein is then transferred to the front guideway 42 by the pusher 60. At the same time an empty jig is transferred from the left end of the front guideway 42, as seen in FIG. 5, to the back guideway by the pusher 58. Thereafter the front row of jigs which are loaded with formed blanks are moved to the left along guideway 42 by the pusher 49 while the back row of empty jigs are moved to the right along the guideway 41 by the pusher 47. At this point in the machine operation the front row of jigs is loaded with formed blanks which have the shape shown in FIG. 4, held together by the jig. An article to be packaged is placed in the open sided box-like portion 3 of the blank and during successive operations of the machine the jigs are moved to the left along guideway 42 and under a continuous web of film 70 which is fed from a roll 71. Thereafter a cover 72 hinged on each jig is swung down and clamped to a body portion 73 of the jig which holds the body portion 3 of the package. The parts 72 and 73 of the jig are electrically isolated from each other by a non-conductive hinge 74 (FIGS. 25 and 26) and form a pair of electrodes through which high frequency electrical energy is applied at the sealing station 54 to activate the film between the flanges 13, 21 and 29 of the blank and the cover 5 to seal the two parts of the blank together to form a completed package. Subsequent cycles of the machine feed the jigs from the sealing station to positions where the jigs are opened and the completed packages are lifted from the jigs by the ramps 56. To assist in removal of the packages from the jigs the machine is provided with an ejector 76 operated by a cylinder 77, the body 73 of the jig having an opening to accommodate passage of the ejector.

### CARD FEEDING MECHANISM

The machine is provided with a hopper 62 which includes four vertical guides 80 which, as best seen in FIGS. 25 and 26, hold and guide the stack of blanks 2 for vertical movement. The bars 80 are held together to form an assembly by end plates 81 and cross bars 82, (FIGS. 6-8) the lower end of the assembly being provided with lugs 83 which are pivoted at 84 to enable the assembly to be swung outwardly to the position shown in dotted lines in FIG. 7 for loading of blanks. The upper end of the assembly is provided with a pin 85 which is received in a curved slot 79 in the machine frame to locate the hopper assembly in its vertical operative position as seen in FIG. 7. The blank guides 80 also form vertical guides for slides 86 (see also FIG. 10). The upper ends of the slides

carry a crossplate 98 having upstanding lugs 99 on which is pivoted a self-leveling support plate 100. As best seen in FIGS. 6 and 8, the plate 100 supports the stack of blanks 2 in the hopper. At their lower ends the slides 86 are secured together by a rod 87 to which is attached one end of a chain 88. The chain passes over a sprocket 89 and at the other end is secured to a counterweight 90 which acts to urge the slides 86 and the stack of blanks heightwise. The sprocket 89 is fixed on a shaft 91 mounted for rotation in a portion of the machine frame and adjacent one end is provided with a ratchet 92 engaged by a pawl 93. The pawl is mounted on the lower end of a bar 94 which is guided for heightwise reciprocation on one of the guides 80 by screws 95 and slots 96, as best seen in FIGS. 8 and 9. A spring 97, extending between the bar and a screw in the guide, urges the bar heightwise so the pawl 93 normally engages the ratchet to prevent rotation of the shaft 91 and sprocket 89 and thus also to determine the uppermost position of the plate 100 and the stack of blanks.

As best seen schematically in FIGS. 25 and 26, blanks are removed one at a time from the top of the stack 2 and deposited on a form 66. To this end, the feeding device 64 comprises two blocks 110 connected by a tube 111 and having ports 112 (FIG. 8) on their undersides which communicate through a tube 113, passages in the plunger 68 and a tube 115 to a source of suction. Referring to FIGS. 8 and 13 through 17, it may be seen that the blocks 110 are mounted on a plate 116 for horizontal sliding movement as well as vertical movement toward and away from the stack of blanks 2. The plate is guided for horizontal reciprocation between bars 117 which are part of an assembly including side plates 109, a crossplate 114, and vertically disposed guide bars 118 (see also FIG. 18). The bars 118 are mounted for heightwise reciprocation in guideways 119 (FIG. 7) in a frame 120. The assembly also includes a bracket 121 which supports a cylinder 122 having a piston rod 123 connected to the plate 116, the assembly also having a crossplate 124 connected to a piston rod 125 of a cylinder 126 (FIG. 6) secured to the frame 120.

In their initial positions the blocks 110 of the feeding device are located above the stack of blanks 2 as shown in FIG. 13. By admission of air to the top end of cylinder 126 the blocks are moved down to the position shown in FIG. 14 in engagement with the top blank in the stack 2. Prior to engagement of the blocks with the stack of blanks, the plate 116 during its downward movement engages a screw 128 mounted in the upper end of the bar 94 so that continued movement of the plate depresses the pawl 93 out of engagement with the ratchet 92 (see also FIG. 9). In this manner, continued downward movement of the blocks 110 as they engage the stack of blanks causes the blocks to be firmly seated on the uppermost blank and to move the stack downwardly against the action of the counterweight 90. When the blocks 110 reach their lowermost position, a lug 130 (FIGS. 19 and 20) on one of the bars 118 actuates a switch 131 which causes reversal of the air connections to the cylinder 126 to raise the plate 116 to its initial position as determined by engagement of crossplate 124 (FIG. 8) with stop screws 127 in lugs 129 on frame 120. At this time suction is applied through ports 112 so the blocks 110 lift the top blank from the stack. When the plate reaches its uppermost position the lug 130 actuates a switch 132 (as best seen by a comparison of FIGS. 19 and 20) which (through controls not shown) causes flow of air to the outer end of the cylinder 122. The cylinder 122 then moves the plate 116 to the left from the position shown in FIG. 14 to that shown in FIG. 15 as determined by engagement of stop screws 139 in lugs carried by plate 116 with crossplate 124. At this time a screw 133 mounted in a lug also upstanding from the plate 116 actuates a switch 138 (FIG. 18) mounted on the crossplate 124. This causes reversal of air connections to the cylinder 126 to move the plate 116 down to deposit the

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blank on the form 66. The lug 130 once again actuates the switch 131 (FIG. 22) to cause the plate 116 to rise again to its initial position. During the downward movement of the plate 116, while in the forward position (see FIGS. 21 and 22), the plate engages a roll 135 on a lever 136. The lever 136 thus is moved counterclockwise as seen in FIGS. 7 and 24, opening a valve 137 which releases the suction which up to now has been applied to the ports 112 in blocks 110. The blank card is thus released from blocks 110 and deposited on the form 66. The lug 130 in its uppermost position (FIG. 21) again actuates the switch 132 to cause reversal of air connections to the cylinder 122 with resultant return of the plate 116 to its initial position shown in FIGS. 13 and 19. At this time a screw 140 on a lug upstanding from the plate 116 actuates a switch 141 which conditions control circuits of the machine to repeat the foregoing cycle of operations.

### BLANK FORMING MECHANISM

The blank forming mechanism includes the plunger 68 which is carried by the plate 116 and has a lower surface corresponding in outline to the center panel 7 of the blank. At the time that the blocks 110 are positioned over the stack of blanks in the hopper, as seen in FIG. 13, the plunger 68 is aligned with a cavity 150 of the form 66 (FIGS. 25 and 26) which corresponds in dimension to the outer surfaces of the box-like portion 3 of the blank. The form is further provided with surfaces 151, 152 which diverge downwardly from the cavity while the plunger is provided with shoulders 153 complementary to these surfaces. The form is secured to an extension 154 of the table 43 and is provided with upstanding ledges 155, 156 to position the blank accurately on the form. When the blocks 110 move to engage the top blank on the stack 2 the plunger 68 moves down against a blank located on the form 66 forcing the portion 7 of the blank into the cavity 150. The side walls 9, 17 and 25 of the blank are bent upwardly around the plunger 68 and the flanges 13 and 21 are bent downwardly from their connected side walls over the surfaces 151, 152 of the form by the shoulders 153 of the plunger. The flanges are bent beyond the horizontal plane to avoid undesirable springing back of the flanges. At this time the blank has been formed into the shape shown in FIG. 4. As the blocks 110 move up, suction ports (not shown) in the under surface of the plunger 68, also communicating with the tube 115, grip the center panel 7 of the blank causing the plunger during its upward movement to lift the formed blank from the form cavity. As a new blank is transferred from the stack to the form the formed blank is transferred by the plunger 68 to the body portion 73 of the jig positioned against the stop 51 adjacent the mechanism, with the body portion 3 of the formed blank being inserted in a cavity 159 of the jig. To ensure that the formed blank will be retained in the jig cavity the plunger 68 is also provided with further ports (not shown) through which at this time compressed air is blown while the suction ports are open to atmosphere.

### JIG FEEDING

Before another blank feeding and forming cycle can occur, however, the jig that has just been loaded with a formed blank must first be transferred to the front guideway 42 and a new jig located against the stop 51 adjacent the feeding and forming station. To this end actuation of the switch 141 when the plate 116 is returned to its initial position causes the cylinder 61 through the pusher 60 to transfer the loaded jig to the front guideway 42, as well as the cylinder 59 and the pusher 58 to transfer an empty jig from the other end of the guideway 42 to the back guideway 41. Referring to FIG. 23 there is shown a screw 144 on the under carriage of the pusher 60 which actuates a switch 145 when the jig arrives at the front

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guideway. This switch causes reversal of cylinders 61 and 59 and return of pushers 60 and 58 to their initial positions. As the jigs are advanced to the left, as seen in FIG. 5, along the guideway 42 they pass under the web of film 70. The open cover 72 of each jig thereafter engages and opens a switch 158. As long as the switch 158 remains open the machine will remain stopped after a loaded jig has been transferred from the station 52 to the front guideway 42. When the cover 72 of the jig, at the switch 158, is closed either manually or automatically to clamp the windowed cover against the film and flanges in the jig, the switch 158 is closed. This causes the control circuits of the machine to be reactivated causing the pusher 49 to advance the jigs another step along the guideway 42 whereupon the switch 158 is once again opened. Simultaneously, the pusher 47 also advances the empty jigs along the guideway 41, the foremost jig actuating a switch 157 as it is moved against the stop 51. This causes the blank feeding and forming mechanism to operate again, feeding a new blank to the form 66 and inserting a formed blank from the form to the empty jig. The entire machine cycle will be repeated each time the cover 72 of a jig is closed and actuates switch 158. The above control circuits have been described only in general terms since many types of electrical, fluid and mechanical devices could be used without departing from the scope of the invention.

### SEALING STATION

During successive cycles of the machine the cover 72 of each jig is closed holding the windowed cover 5 of the blank over the film and outspread flanges 13, 21 and 29 of the blank. The cover 72 of each jig is held in its closed position by a spring latch 160 (FIGS. 11 and 13) which engages an upstanding pin 161 on the lower portion 73 of the jig. The closed jigs are fed in succession through the sealing station 54 which in general is similar to that described in U.S. Pat. No. 3,030,752 and need not be described in detail herein. In general, however, it may be said that the body portion 73 and cover portion 72 of each jig comprise separate electrodes which are electrically isolated from each other through the insulated hinge pin 74 of each jig. The sealing station includes a press which acts through the two portions of the jig to press the cover portion 5 of the blank tightly against the film and the outspread flanges 13, 21 and 29 of the blank. The sealing station also includes a radio frequency generator for converting a low frequency electric power supply to high frequency electrical energy. This high frequency energy is applied to the portions 72, 73 of the jig which act as electrodes to establish an electrostatic field, which is alternated to activate the film and seal the cover and flange portions of the package together.

### PACKAGE REMOVAL

The jigs are fed from the sealing station along the guideway 42 and past an upstanding pin 170 which releases the spring latch 160 on the cover 72 of each jig. The jig cover is spring biased toward the open position, as seen in FIG. 5. The open jigs finally are fed under a pair of ramps 56 which lift the completed packages from the jigs with the body portion of each package being assisted from its jig cavity by the ejector 76, which is moved up through an opening in each jig by the cylinder 77 when the jig is stopped. The empty jig is thereafter moved to the final position against the stop 55 where the pusher 60 transfers it to the back guideway 41.

The machine, jigs and package blanks described are merely illustrative of one form that the invention may take and it should be obvious that many changes in the machine, jigs, as well as the package blanks to be operated upon, may be made without departing from the scope of the invention. For example, and not by way of limitation, it is within the inventive concept of the machine to form packages from two-piece blanks rather than the one-piece folded blank is illustrated since a separate blank

cover could be placed over the open box-like portion of the formed blank either manually or by automatic means. Furthermore, the invention contemplates utilizing jigs with separate body and cover parts rather than use one with the cover hinged to the body of the jig is illustrated. Such a separate jig cover could be applied either manually or automatically and in fact could be omitted entirely if suitable electrodes were used in the sealing station. Furthermore, many types of pick-up devices could be used to handle the package blanks.

Having thus described my invention, what I claim as novel and desire to secure by Letters Patent of the United States is:

1. A machine for forming packages from flat blanks comprising a form having a box-like cavity, a plunger complementary to and movable into said cavity for forming a blank into an open sided box having outspread flanges, a jig into which the formed blank is transferred by the plunger for maintaining the blank in its formed shape, means for placing a film over the open side of the box and outspread flanges in the jig and a sealing station at which the film is activated and sealed to the outspread flanges.

2. A machine according to claim 1 in which the plunger is movable between the form and the jig for transferring the formed blank to the jig.

3. A machine according to claim 2 in which the plunger is provided with a suction pickup device operable to grip the formed blank for removal from the form and transfer to the jig.

4. A machine according to claim 3 in which the plunger is also provided with ports through which pressurized air is blown for removal of the blank from the plunger and disposition in the jig.

5. A machine according to claim 2 in which a feeder is provided for transferring individual blanks from a stack to the form while the plunger is transferring formed blanks to the jig.

6. A machine according to claim 1 in which means are provided for feeding a succession of jigs past the plunger in timed relation for holding a succession of blanks formed by the plunger in said form and transferred by the plunger to said jigs.

7. A machine according to claim 1 in which is provided means for applying a blank cover over the film and outspread flanges, and a cover is provided for the jig for clamping the blank cover against said film before the film is activated at the sealing station.

8. A machine according to claim 1 in which the blank operated upon is provided with a body portion which is formed into the open sided box with a cover portion hinged to the body portion, and a cover is provided for the jig for clamping the cover portion of the blank to the film and outspread flanges of the body portion before the film is activated at the sealing station.

9. A machine according to claim 8 in which the jig and the jig cover comprise electrodes to which high frequency electrical energy is applied at the sealing station to activate the film between the body and cover portions of the blank.

10. A machine according to claim 2 in which the

plunger moving means includes a plate which is reciprocable between the form and jig and bodily movable toward and away from the form and jig when the plunger is alternately registered with the form or jig.

11. A machine according to claim 10 in which the plate is also provided with a suction pickup device which is operable to transfer individual blanks from a stack to the form while the plunger transfers formed blanks from the form to the jig.

12. A machine according to claim 6 in which is provided means responsive to the operation of the plunger forming a blank for controlling the operation of the jig feeding means.

13. A machine according to claim 7 in which is provided means responsive to the operation of the cover applying means for controlling the operation of the plunger.

14. A machine for forming packages from flat blanks comprising a form having a box-like cavity over which a blank is located, a plunger complementary to and movable into and out of the form cavity for first forming the blank into an open box-like shape having outspread flanges and then removing the formed blank from the form cavity, a jig having a cavity, means moving the plunger between the form and the jig for depositing the formed blank in the jig cavity to maintain the blank in its box-like shape, means for locating a cover over an article placed in the formed blank, and a station where the cover is sealed to the outspread flanges of the blank.

15. A machine according to claim 14 in which means is provided for locating a film over the outspread flanges of the blank and spanning the open side of the box before the cover is located.

16. A machine according to claim 14 in which the plunger is located at a station separated from the sealing station and means is provided for feeding a succession of jigs between the stations.

17. A machine according to claim 16 in which means responsive to operation of the plunger controls operation of the jig feeding means.

18. A machine according to claim 16 in which means responsive to operation of the cover locating means controls operation of the plunger moving means.

19. A machine according to claim 15 in which the jig comprises an electrode and the sealing station includes means for applying high frequency electrical energy to the electrode to activate the film to seal the cover to the flanges of the blank.

#### References Cited

##### UNITED STATES PATENTS

3,030,752	4/1962	De Woskin	53—266
3,387,427	6/1968	Perdue	53—27

THERON E. CONDON, Primary Examiner

E. F. DESMOND, Assistant Examiner

U.S. Cl. X.R.

53—282, 373