Aug. 26, 1958 R. A. BROCK 2,848,856

LID FORMING MACHINE

Filed June 3, 1957 3 Sheets-Sheet 1

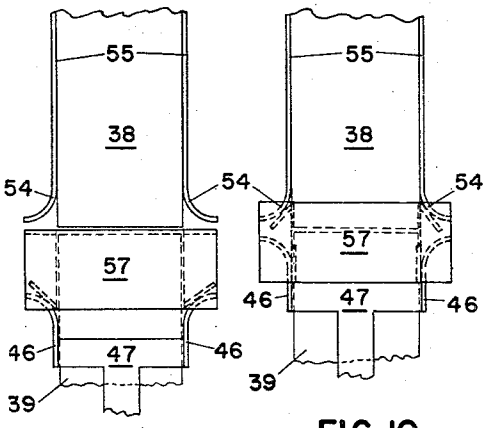


FIG. 9

FIG. 10

FIG. 1

FIG. 12

INVENTOR
RICHARD A. BROCK

BY
Lamont Johnston
ATTORNEY

Aug. 26, 1958 R. A. BROCK 2,848,856

LID FORMING MACHINE

Filed June 3, 1957 3 Sheets-Sheet 2

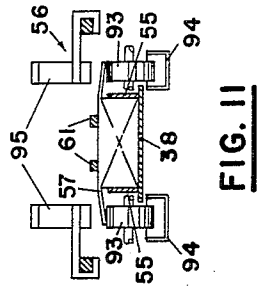


FIG. 11

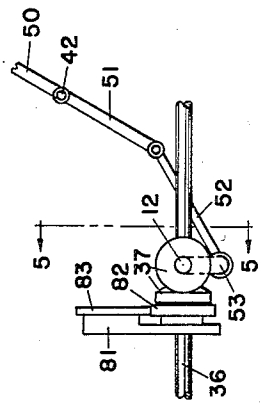


FIG. 4

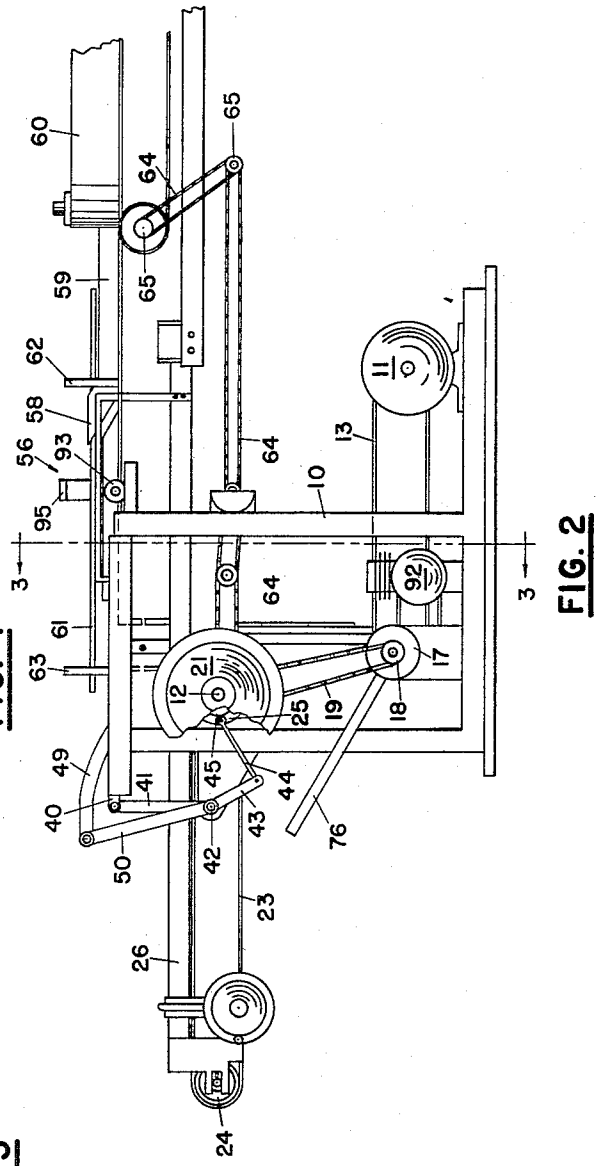


FIG. 2

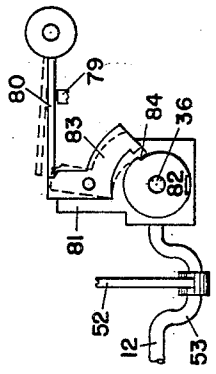


FIG. 5

INVENTOR
RICHARD A. BROCK
BY
Lamont Johnston
ATTORNEY

Aug. 26, 1958 R. A. BROCK 2,848,856

LID FORMING MACHINE

Filed June 3, 1957 3 Sheets-Sheet 3

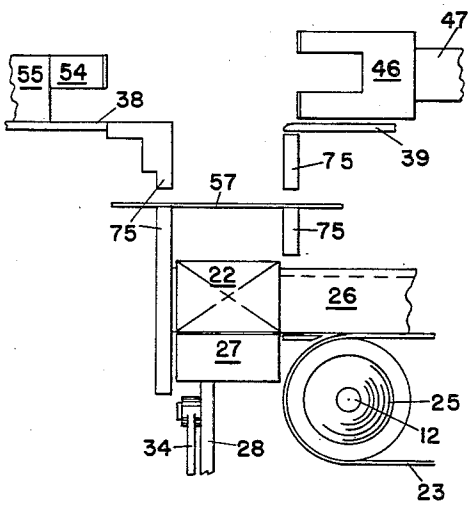


FIG. 6

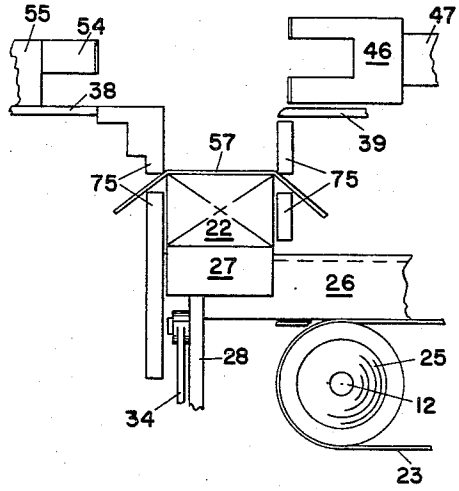


FIG. 7

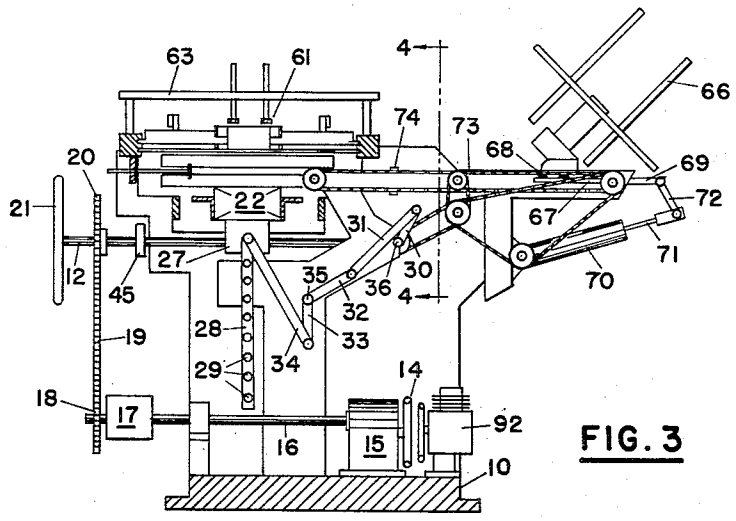


FIG. 3

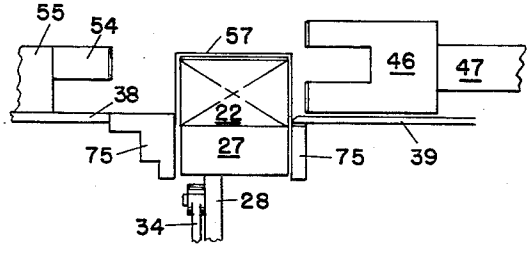


FIG. 8

INVENTOR
RICHARD A. BROCK
BY Lamont Johnston
ATTORNEY

United States Patent Office 2,848,856 Patented Aug. 26, 1958

2,848,856

LID FORMING MACHINE

Richard A. Brock, Chattanooga, Tenn.

Application June 3, 1957, Serial No. 663,047

5 Claims. (Cl. 53—287)

This invention relates to a lid-forming machine and more particularly to a machine for forming a lid having a top and four side walls from a paperboard blank around a material-fillled box tray having a bottom and four side walls. The paperboard lid blank has a top wall, front and rear walls having tabs extending from each end thereof, and side walls.

Heretofore, in the candy industry, the lid and the tray of a candy box have been formed from paperboard blanks in two separate operations. Both the tray and the lid have been formed in separate machines upon mandrels, and when completed the tray has been manually filled with candy, and the lid manually fitted over the tray. The closed box filled with candy has then been wrapped and processed by conventional means.

It is therefore an object of this invention to simplify the packaging of candy or other materials in boxes by combining a plurality of old operations in a single machine.

A further object of this invention is to employ a tray filled with material, such as candy, as a mandrel for forming the lid.

Another object of this invention is to eliminate the extra step of closing the lid over the tray, by forming a lid directly on the material-filled tray.

A further object of this invention is to custom fit the lid over a tray for each material-filled box.

Another object of this invention is to provide a more economical method of packaging candy in boxes by saving the labor of approximately five operators and requiring a minimum of floor space.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the drawings, wherein:

Fig. 1 is top plan view of the invention;

Fig. 2 is a side elevation looking from the right side of Fig. 1;

Fig. 3 is a section, with some parts omitted for clarity of illustration, taken along the line 3—3 of Fig. 2;

Fig. 4 is a section taken along the line 4—4 of Fig. 3;

Fig. 5 is a section taken along the line 5—5 of Fig. 4;

Figs. 6–8 are diagrammatic elevational views showing the elevator in various positions;

Fig. 9 is a diagrammatic top plan view showing the operation of folding the front flaps of the lid blank;

Fig. 10 is a diagrammatic top plan view showing the operation of folding the rear flaps of the lid blank;

Fig. 11 is a diagrammatic end elevation disclosing the application of glue to the inner sides of the lid side walls; and

Fig. 12 is a diagrammatic top plan view disclosing the folding of the lid side walls.

Referring to the drawings in more detail, Figs. 2 and 3, the machine is supported on a frame **10**. Mounted on the frame **10** is a motor **11** which drives the main drive shaft **12** through a belt **13**, pulley **14**, gear box **15**, rotary shaft **16**, clutch **17**, sprocket **18**, chain **19** and main drive shaft sprocket **20**. Mounted on the end of the drive shaft **12** is a hand wheel **21**.

The mechanism for feeding trays **22** full of material, such as candy, into the machine comprises a conveyor belt **23**, supported at its front end by a roller **24** and at its rear end by a drive roller **25** mounted on the main drive shaft **12**. Mounted on opposite sides of the conveyor belt **23** are laterally adjustable guide plates **26** for box trays **22** of different lengths.

At the rear end of the conveyor belt **23** is a tray elevator **27** (Fig. 3) mounted for vertical reciprocation upon the rod **28**, provided with lightening holes **29**. The elevator rod **28** is reciprocated by a crank arm **30** through links **31**, **32**, **33** and **34**, the ends of which are pivoted successively to each other. The links **32** and **33** are keyed to each other and are pivoted to a stationary part of the frame **10** at **35**. The crank arm **30** is driven by the elevator shaft **36**, which in turn is driven by the main drive shaft **12** through the miter gears **37** (Fig. 4).

The elevator **27** reciprocates between its lowermost loading position at the end of the conveyor belt **23**, as illustrated in Fig. 6, and its uppermost position in which the top of the elevator **27** is flush with the floor of the folding channel **38**, as illustrated in Fig. 8, Fig. 7, being an intermediate position.

Mounted above the conveyor belt **23** is a reciprocable horizontal floor plate **39** in the same plane as the floor of the folding channel **38**, and adapted to slide beneath a tray **22**, when elevated to its uppermost position, at approximately the same time as the elevator **27** begins its descent. The floor plate **39** is reciprocated by arms **40** (Figs. 1 and 2) pivoted to arms **41**, the opposite ends of which are journaled for independent rotary motion on a rotatable shaft **42**. The right arm **41** is given a rotary motion through a link arm **43** fixed to the right arm **41** and pivoted to a cam follower **44** engaging a cam **45** mounted on the main drive shaft **12**.

As illustrated in Figs. 1, 8 and 9, a pair of flap folding guides **46** are adapted to reciprocate over the floor plate **39** and the folding channel **38**. The folding guides **46** are mounted on a guide frame **47** having lightening holes **48**. The frame **47** is reciprocated by means of the link arms **49**, the ends of which are pivoted to link arms **50** (Figs. 2, 4 and 5). The bottom ends of the link arms **50** are fixed on the rotatable shaft **42**. The left link arm **50** is provided with an extension **51** pivoted to link arm **52**, which is reciprocated by a crank arm **53** driven by the main drive shaft **12**.

Near the front end of the folding channel **38** are a pair of stationary flap guides **54**, which are curved outward and to the front. In alignment with the stationary flap guides **54** are the side guide walls **55** of the folding channel **38**. Mounted on the outside of the side guide walls **55** are mechanisms **56** (Figs. 1, 2 and 11) for applying adhesive to the walls of a lid blank **57**.

Mounted to the rear of and in substantial alignment with the side guide walls **55** are a pair of stationary lid side wall folding guides **58** (Figs. 1 and 12) which are in alignment with rear channel walls **59**. Beyond and substantially in alignment with the channel walls **59** are a pair of conveyor belts **60** adapted to rotate about vertical axes and adapted to provide movable walls for conveying a box covered with a completed lid. The conveyor belts **60** are long enough to afford ample time for the adhesive to adhere to the folded parts of the lid, and (Fig. 2) are driven through a plurality of chains **64** and sprockets **65** from the main drive shaft **12**.

A pair of top guide bars **61** (Figs. 1, 2, 3 and 11) are yieldingly suspended from frame bars **62** and **63** to retain the lid blank **57** on top of the tray **22**, as the entire box is processed from the elevator **27** to the conveyor belts **60**.

The mechanism for feeding the lid blanks **57** into the path of the elevator **27** is best disclosed in Figs. 1 and 3. A lid blank magazine **66** supports an inclined stack of lid blanks **57**. Dispensing arms **67** having suction cups **68** on one end are pivoted at their opposite ends **69** to the base of the magazine **66**. Pneumatic cylinders **70** having pistons **71** are connected through link arms **72** to the dispensing arms **67**. When the pneumatic cylinders **70** are activated, the dispensing arms **67** rotate about their pivoted ends **69** to release one lid blank at a time from the magazine **66**. On every rotation of the dispensing arms **67**, the suction cups **68** adhere to the bottom lid blank and pull the lid blanks down, one at a time, to a horizontal position on a conveyor chain **73**. The conveyor chain **73** is provided with lugs **74** for carrying the lid blanks to a position within the path of the elevator where the blanks are held by stationary guides **75** (Figs. 6–8).

The operation of the machine is such that when the clutch **17** is engaged by means of the clutch handle **76**, the parts set in motion are the feed belt **23**, the reciprocable floor plate **39**, the reciprocable flap folding guides **46** and the vertical rotating conveyor belts **60**.

When the switch **77** is activated by the passage of trays **22** over the feed belt **23**, the operation of the elevator **27**, the lid blank dispensing arms **67** and the conveyor chain **73** is begun. When the switch **77** is tripped, it activates an electromagnet **78** which pulls a rod **79** toward the front, camming a cutout knockout pin **80**, disclosed in Figs. 4 and 5, up to trip an over-riding clutch **81** and permit rotation of the elevator shaft **36**. The over-riding clutch may be of any particular structure but, as disclosed in Figs. 4 and 5, when the main drive shaft **12** is idling, the miter gears **37** rotate and carry with them cam **82**. When the machine is idling, the cutout knockout pin **80** is depressed, engaging the upper portion of the latch **83** to disengage the lower portion of the latch from a recess **84** in the cam **82**. As previously explained, when the cutout knockout pin **80** is raised, the latch **83** is disengaged from the knockout pin **80** and is permitted to engage the recess **84** to permit the cam **82** to carry the over-riding clutch **81**. As shown in Fig. 1, the forward end of the elevator shaft **36** drives a sprocket **85**, chain **86**, sprocket **87**, and a feed chain drive shaft **88**, which in turn drives the lid-blank conveyor chain **73** by means of the sprocket **89**, chain **90** and sprocket **91**.

The switch **77** activates a timing means, not shown, to begin the reciprocation of the piston **71** within the pneumatic cylinder **70**. An air compressor **92** (Fig. 3) is mounted on the frame **10** to supply air to the pneumatic cylinder **70**.

The operation of the machine is as follows: box trays filled with materials such as candy are placed on the front end of the conveyor **23**. The magazine **66** is filled with a stack of lid blanks **57**. The clutch handle **76** is operated to start the rotation of the main drive shaft **12**, which causes the operation of the feed conveyor belt **23**, the reciprocable floor plate **39**, the flap folding guides **46** and the vertical rotating conveyor belts **60**.

As the trays **22** are advanced by the conveyor belt **23**, they engage the switch **77** to start the operation of the remaining parts of the machine, as previously described. All the elements of the machine are synchronized to carry out the operations disclosed in Figs. 6–12. Fig. 6 discloses a box **22** which has been fed by the conveyor belt **23** onto the top of the elevator **27** in its lowermost loading position. A lid blank **57** has been positioned in the stationary lid blank guides **75** in the path of the movement of the elevator **27**. The floor plate **39** and the flap folding guides **46** have been reciprocated toward the front of the machine and out of the path of the elevator. Fig. 7 discloses the next operational movement, in which the elevator rod **28** is urged upward until the tray **22** engages the lid blank **57** to carry the top wall of the lid blank upward with the tray and to permit the stationary guides **75** to fold the front and rear walls of the blank

downward against the front and rear walls of the tray **22**.

Fig. 8 discloses the next operational movement, in which the elevator has attained its uppermost position and its top is flush with the floor of the folding channel **38**. As best disclosed in Fig. 9, as soon as the elevator has attained its uppermost position, the floor plate **39** is moved beneath the bottom of the tray **22** as the elevator **27** begins its descent, and the flap folding guides **46** are also urged rearwardly to fold the front end tabs hinged to the front wall of the lid blank against the side walls of the tray **22**. In the same movement, as shown in Fig. 10, the floor plate **39** and the flap folding guides **46** carry the tray and lid between the stationary flap guides **54**, which fold the rear end tabs hinged to the rear wall of the lid blank against the side walls of the tray **22**. Continuous motion of the floor plate **39** and the flap folding guides **46** carries the tray **22** and the partially folded lid blank **57** between the side guide walls **55**, where the tray and lid come to rest until they are moved rearward by another tray and lid on the next operational movement of the floor plate **39** and the flap folding guides **46**. For each cycle of movement of the elevator **27**, another lid blank **57** is fed to the guides **75** by the dispensing arm **67** and the conveyor chain **73**.

As the tray and lid are moved along the folding channel **38** between the side guide walls **55**, glue or other adhesive is applied to the inner sides of the unfolded side walls of the lid blank **57** by the adhesive applicator mechanism **56**. As best disclosed in Fig. 11, the mechanism **56** comprises a pair of rollers **93** rotating in glue pots or other adhesive receptacles **94**. The rollers are adapted to spread glue on the inner sides of the side walls when the outer sides of the side walls are urged downwardly by plungers **95**, operated pneumatically by a mechanism not shown. Continued advance of the boxes will cause the stationary guides **58** (Figs. 1, 2 and 12) to engage and fold the side walls of the lid down against the front and rear end tabs of the lid. The side walls will be held in position by the rear channel walls **59** and subsequently by the rotating conveyor belts **60** for a sufficient length of time to permit adhesive on the inner sides of the side walls to adhere to the front and rear end tabs of the lid blank. The material-filled tray **22** with the lid blank **57** completely folded and secured to custom fit the tray may then be wrapped by conventional wrapping machines.

In summary, therefore, the machine contemplated by this invention starts with a tray **22** full of material such as candy and a lid blank **57**, scored for folding into a lid having a top and side walls, and folds and custom fits the lid blank **57** about the tray **22**, which functions as a mandrel, and completes the box for further wrapping or processing, if desired.

It will be apparent to those skilled in the art that various changes may be made in the invention, without departing from the spirit and scope thereof, and therefore the invention is not limited by that which is shown in the drawings and described in the specification, but only as indicated in the appended claims.

What is claimed is:

1. A machine for forming a lid from a paperboard blank, having side walls and front and rear walls with front and rear tabs thereon, upon a material-filled paperboard box tray comprising a folding channel, an elevator movable from a tray receiving position to a position in line with the floor of said channel, means for feeding a lid blank across a tray when said elevator is in tray receiving position, means for moving said elevator upward, stationary guide means for folding the front and rear walls of said lid blank down against the front and rear tray walls as said elevator moves upward, guide means operative to fold the front end tabs of said lid blank against the opposite sides of said tray, means for moving said tray and lid rearwardly through said folding channel, stationary guides adapted to fold the rear end tabs of the rear walls against opposite side walls

of said tray, means for applying glue to the inner sides of said unfolded side walls, and stationary guide means for folding said side walls down against the tray side walls and into adhesive engagement with said front and rear end tabs as said boxes move rearwardly.

2. A machine for forming a lid about a material-filled box tray from a lid blank comprising a top wall, front, rear and side walls hinged to said top wall, and end tabs hinged to the extremities of said front and rear walls, comprising a folding channel, a tray loading station below said folding channel, an elevator movable between said loading station and said folding channel, conveyor means for feeding material-filled trays to said loading station and to said elevator in loading position, stationary guide means for receiving the lid blank in a position between the loading station and said folding channel in a plane perpendicular to the direction of the elevator, means for feeding lid blanks to said lid guide means, means for moving said elevator carrying a material-filled tray upward against a lid causing said lid guide means to fold said front and rear walls down against the front and rear walls of said tray until said elevator is in alignment with said folding channel, end tab folding plates movable rearwardly to fold said front end tabs against the side walls of said tray, means for moving said box rearwardly through said folding channel, stationary end tab folding guides for folding said rear end tabs against the side wall of said tray when said trays move rearwardly, stationary adhesive means on opposite sides for applying adhesive to the inner sides of said unfolded side walls, stationary side wall guide means for folding said lid side walls against and into adhesive engagement with said front and rear end tabs when said tray moves rearwardly, and conveyor means for moving said tray and lid rearwardly to a discharge point and for holding said side walls against said end tabs to permit the solidification of said adhesive.

3. A machine for forming a lid about a tray from a lid blank comprising a top wall, front, rear and side walls hinged to said top wall, and end tabs hinged to the extremities of said front and rear walls, comprising a folding channel, a tray loading station below said folding

channel, an elevator movable between said loading station and said folding channel, means for feeding a tray upon said elevator at said loading station, means for feeding a lid blank to a position in the path of said elevator and between said loading station and said folding channel, means for folding said front and rear walls of said lid blank against the walls of said tray when said elevator is moved upwardly, means operative to fold the front tabs against the side walls of said tray and simultaneously move said tray and lid from the elevator into said folding channel, stationary guide means on said folding channel for folding the rear tabs of said lid against the side walls of said tray, means for applying adhesive to the inner sides of said unfolded lid side walls, and stationary guide means associated with said folding channel for folding said lid side walls against and into adhesive engagement with the tabs of said lid blank.

4. The invention according to claim 3 in which the means for folding the front and rear walls of said lid comprise slotted stationary guide means for positioning said lid in the path of said elevator, in such a manner that when a tray carried by said elevator is moved upwardly the top of the tray will engage and carry upward the top wall of the lid blank causing the slotted stationary guide means to fold the front and rear walls of the lid against the front and rear walls of the tray.

5. The invention according to claim 4 in which a lid blank feeding mechanism is provided, said feeding mechanism comprising a lid blank magazine, arms pivoted below said magazine, suction cups on the ends of said arms, means for reciprocating said pivoted arms to engage and discharge a lid blank from said magazine, and a continuous conveyor chain for conveying a lid blank from said magazine to said slotted guide means, the elevator and the pivoted arms having the same cyclical movement.

References Cited in the file of this patent

UNITED STATES PATENTS

2,281,005	Nicodemus et al.	Apr. 28, 1942
2,623,338	Riemer	Dec. 30, 1952