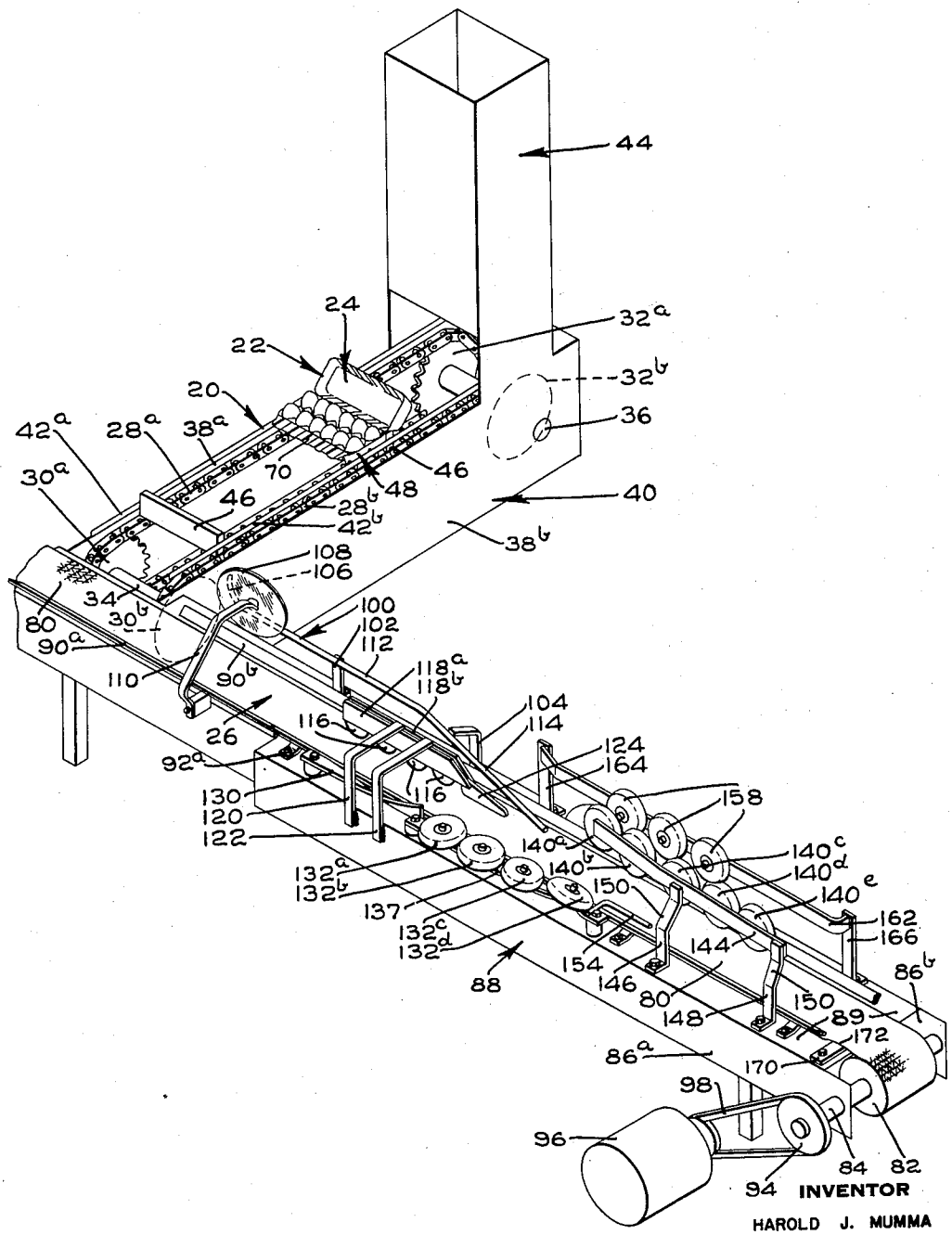
Oct. 27, 1959 H. J. MUMMA 2,909,880

CARTON CLOSING MACHINE

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FIG_1



INVENTOR
HAROLD J. MUMMA

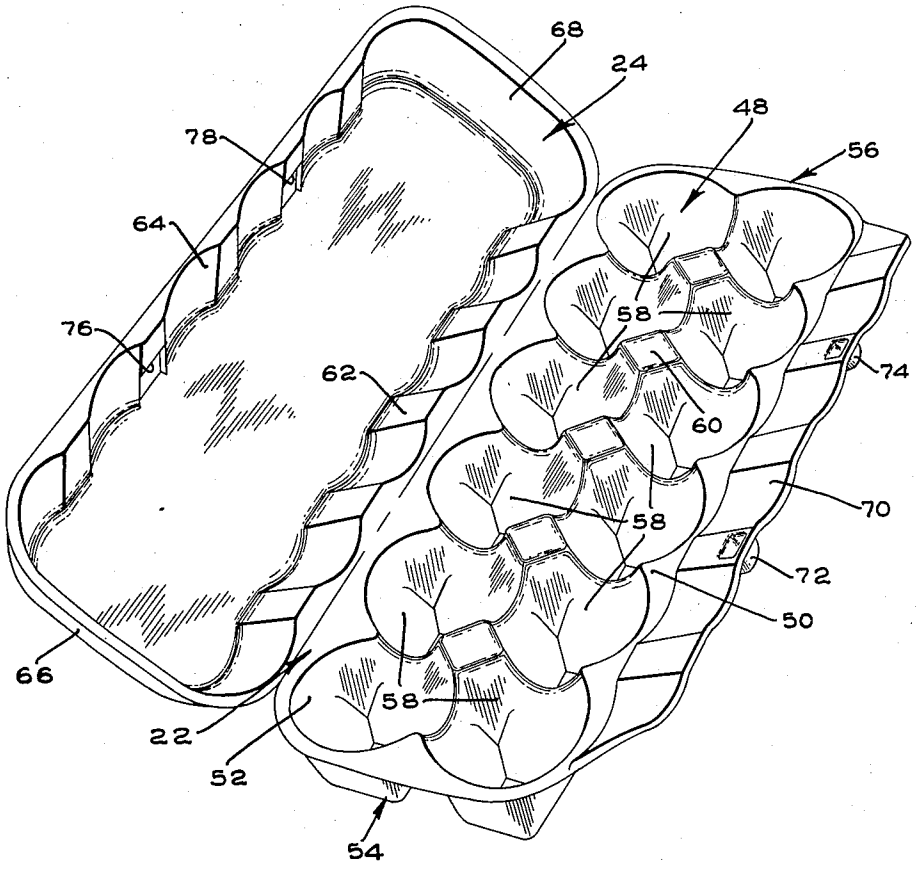
BY Hans G. Hoffmeister
ATTORNEY

Oct. 27, 1959 H. J. MUMMA 2,909,880

CARTON CLOSING MACHINE

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FIG_2



INVENTOR
HAROLD J. MUMMA

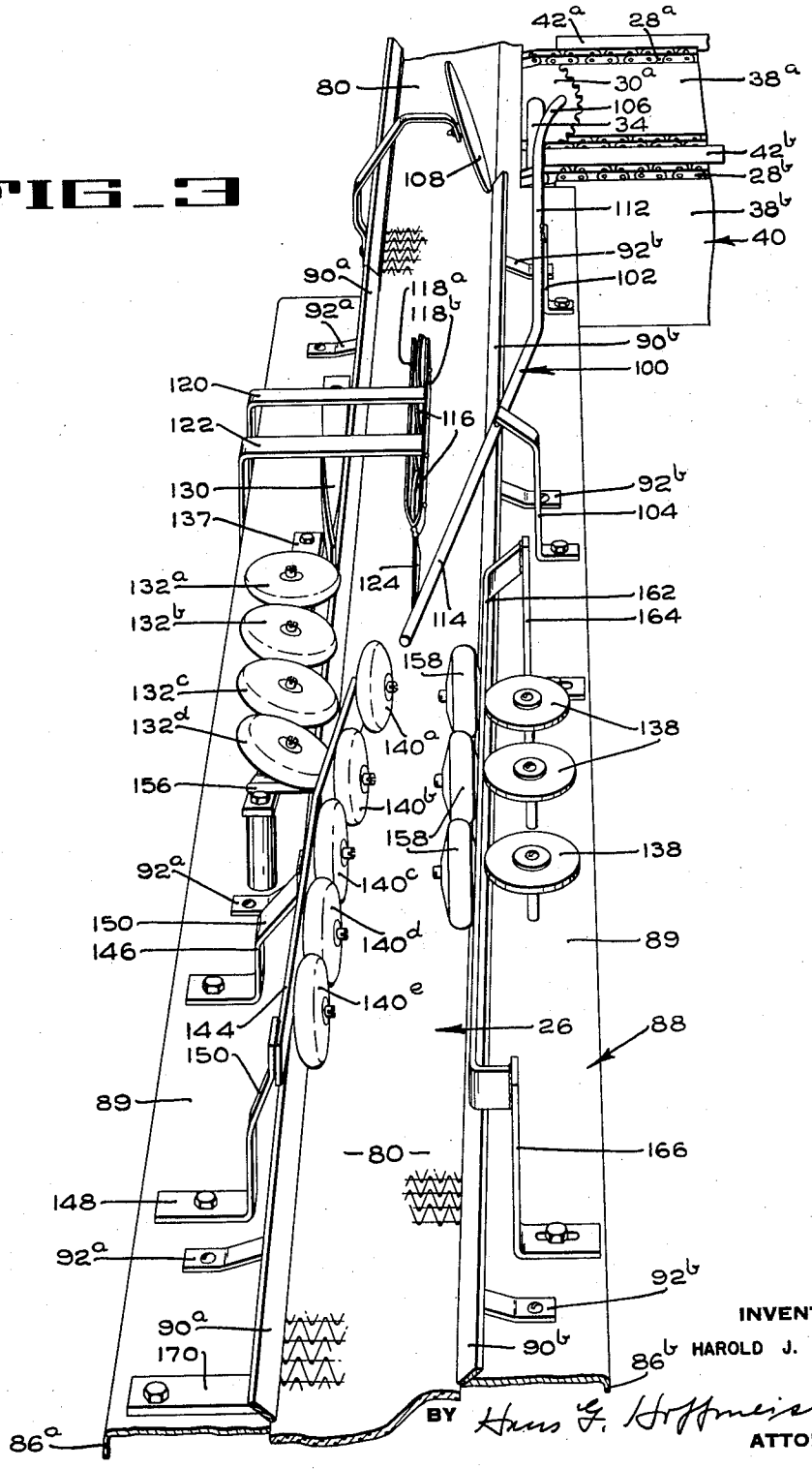
BY Hans G. Hoffmeister
ATTORNEY

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CARTON CLOSING MACHINE

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FIG. 3



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FIG_4

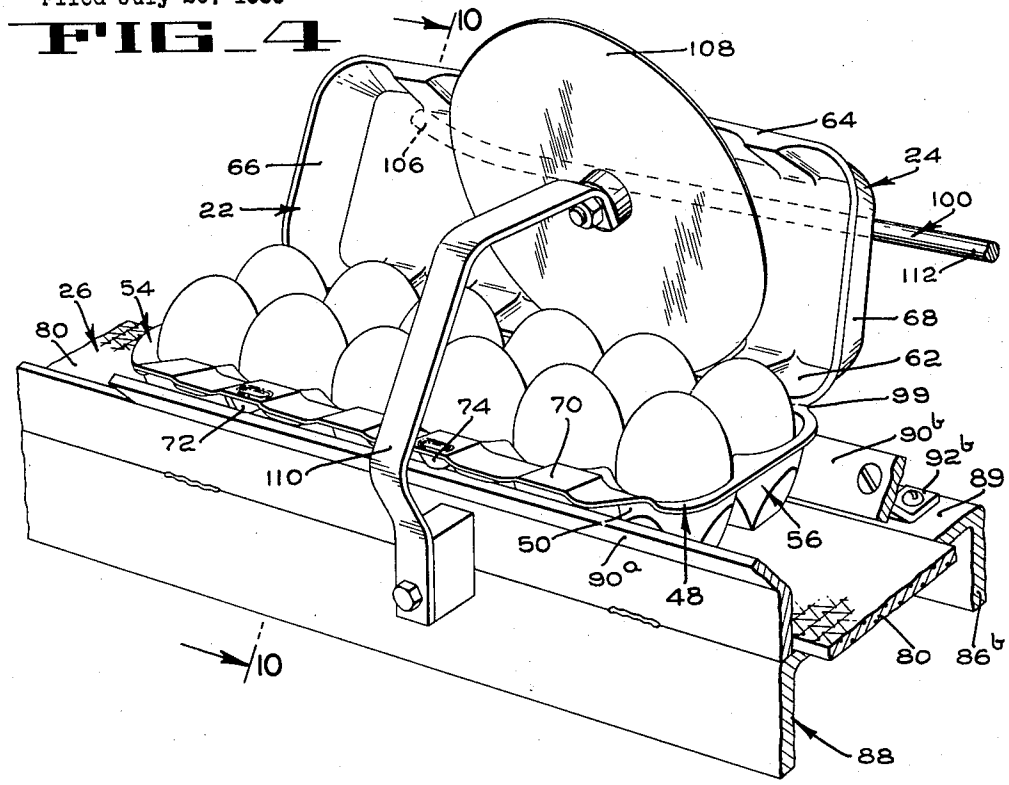
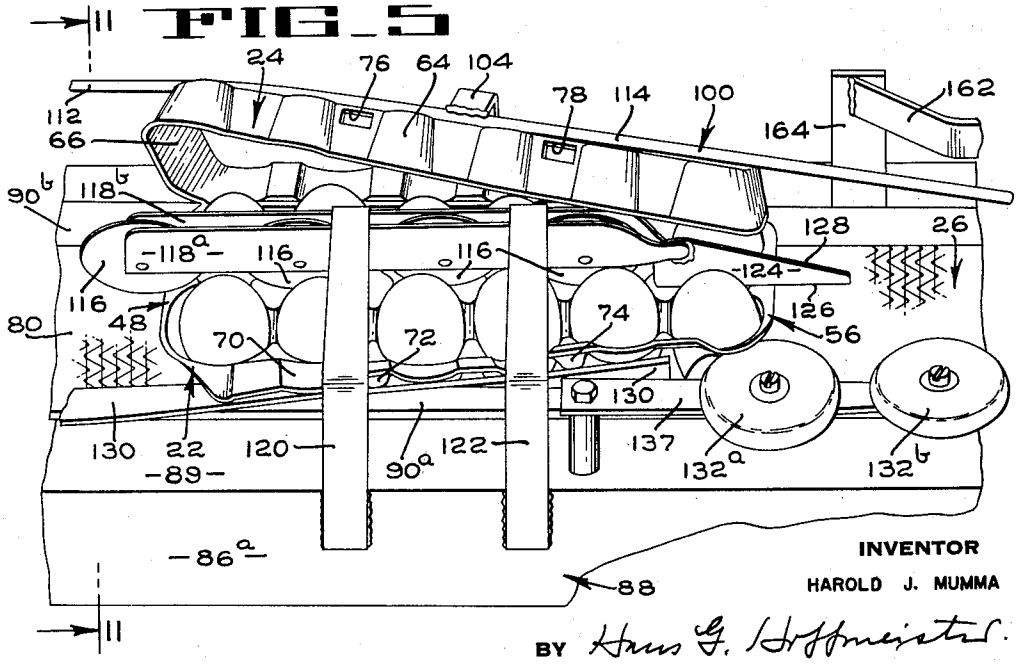


FIG_5



INVENTOR
HAROLD J. MUMMA

BY Hans G. Hoffmeister

ATTORNEY

Oct. 27, 1959 H. J. MUMMA 2,909,880

CARTON CLOSING MACHINE

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FIG_6

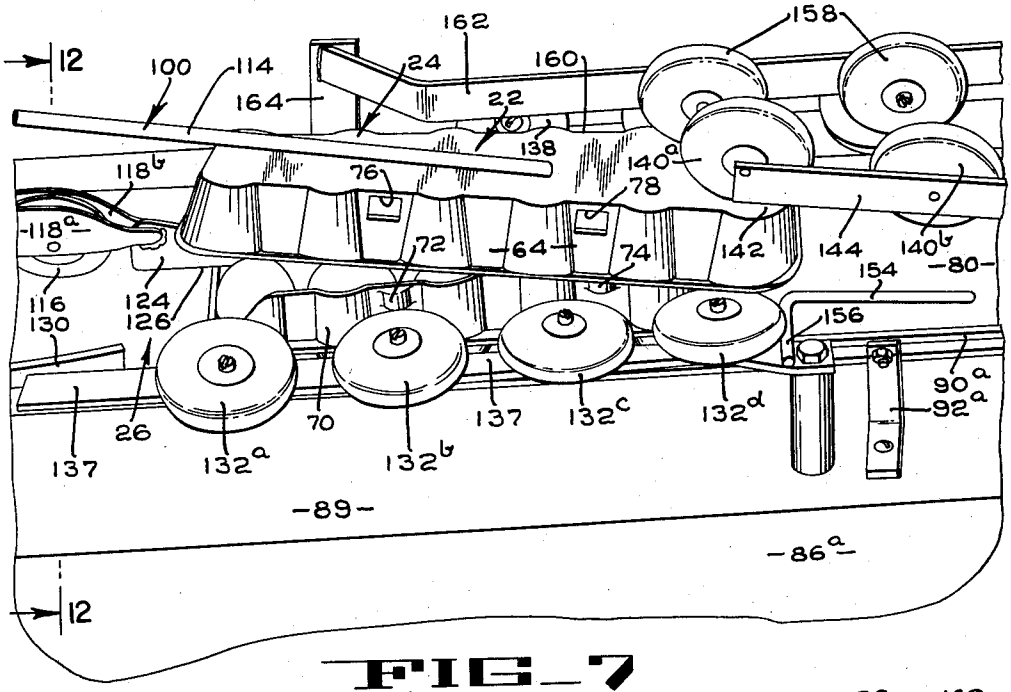
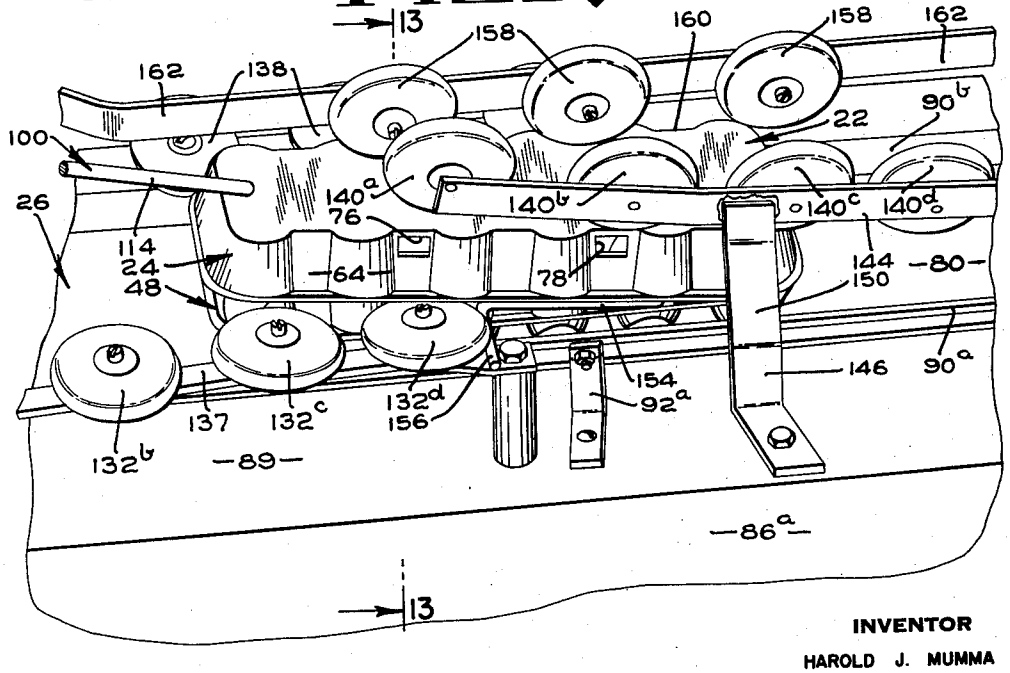


FIG_7



INVENTOR
HAROLD J. MUMMA

BY Hans G. Hoffmeister
ATTORNEY

Oct. 27, 1959 H. J. MUMMA 2,909,880

CARTON CLOSING MACHINE

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FIG_8

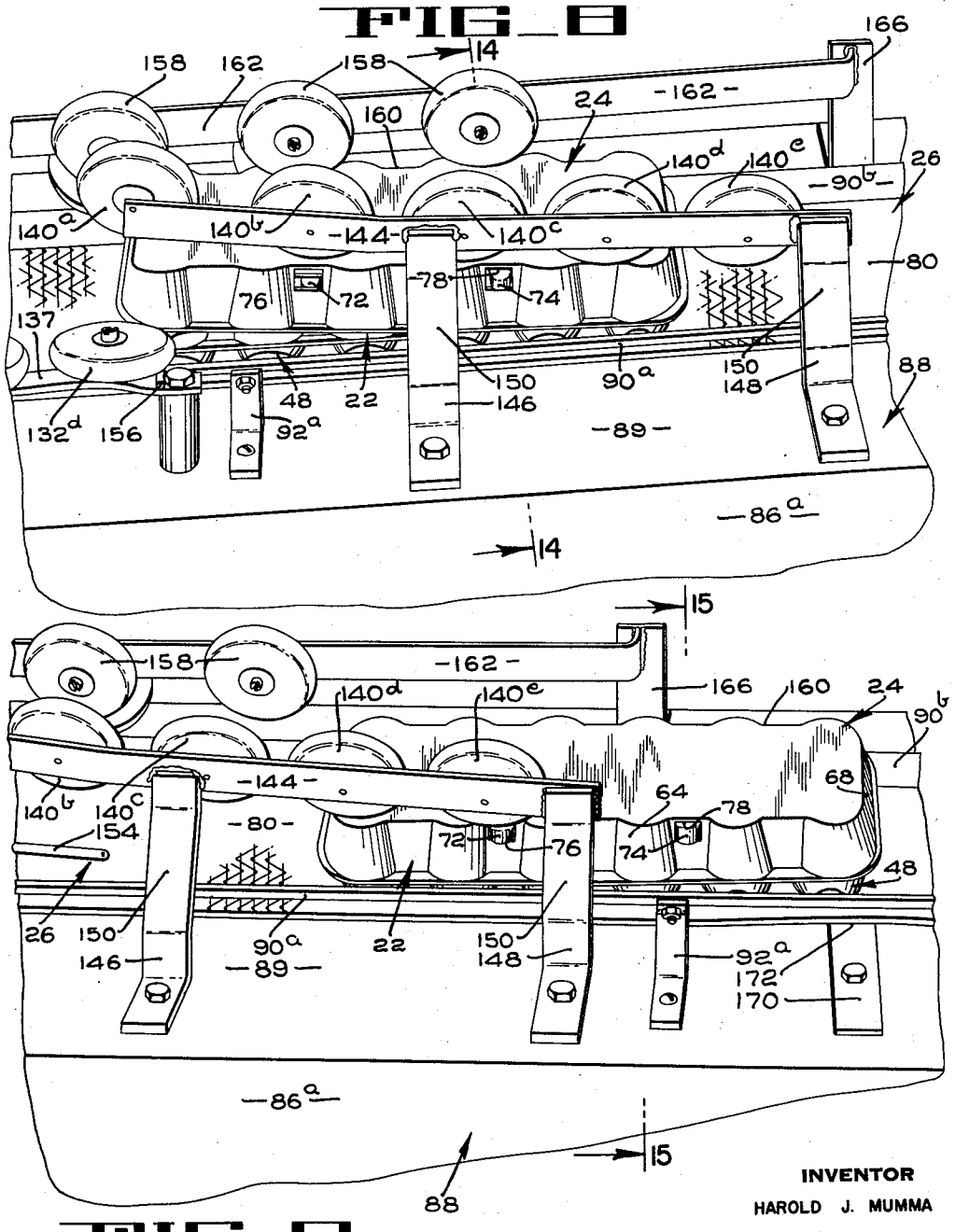


FIG_9

INVENTOR
HAROLD J. MUMMA

BY Hans G. Hoffmeister

ATTORNEY

Oct. 27, 1959 H. J. MUMMA 2,909,880

CARTON CLOSING MACHINE

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FIG_10

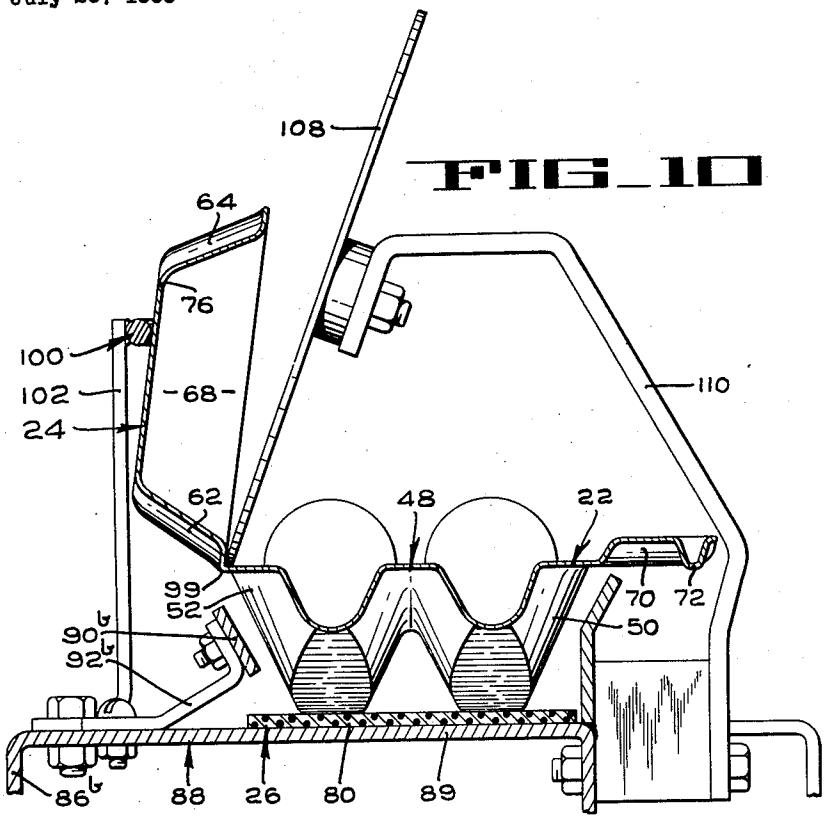
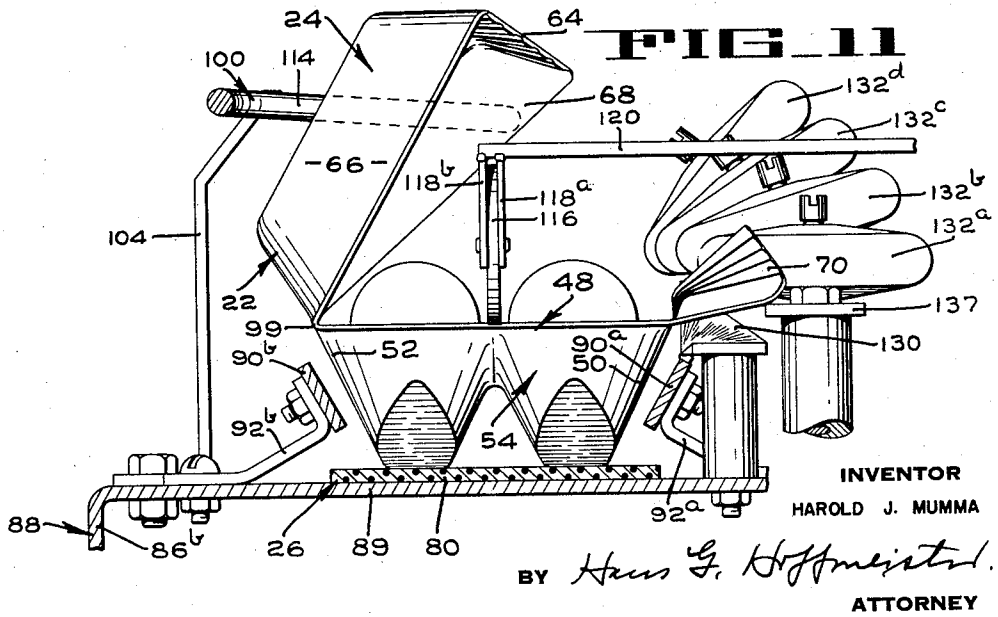


FIG_11



INVENTOR
HAROLD J. MUMMA

BY Hans G. Hoffmeister

ATTORNEY

Oct. 27, 1959 H. J. MUMMA 2,909,880

CARTON CLOSING MACHINE

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FIG_12

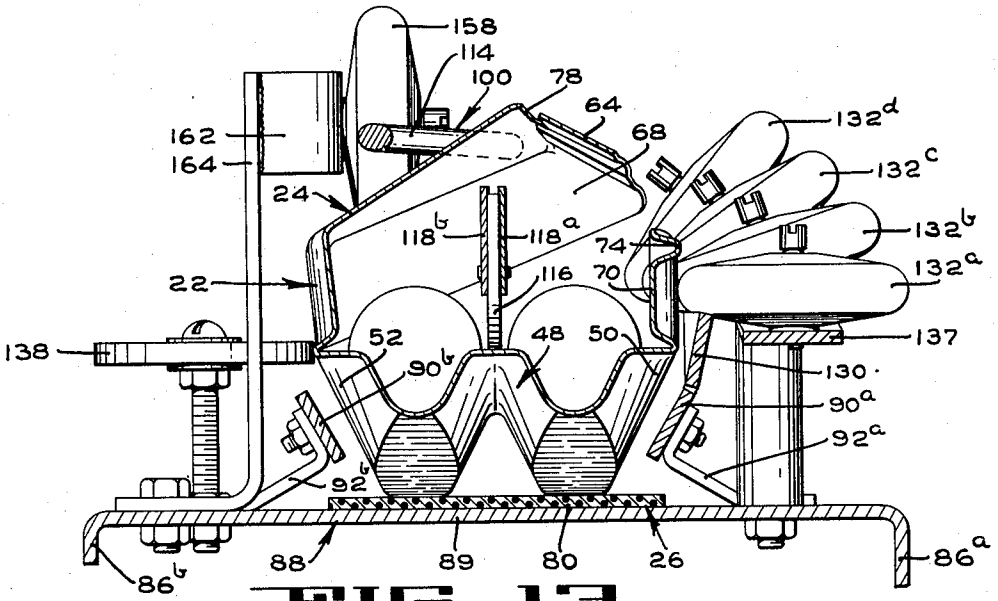
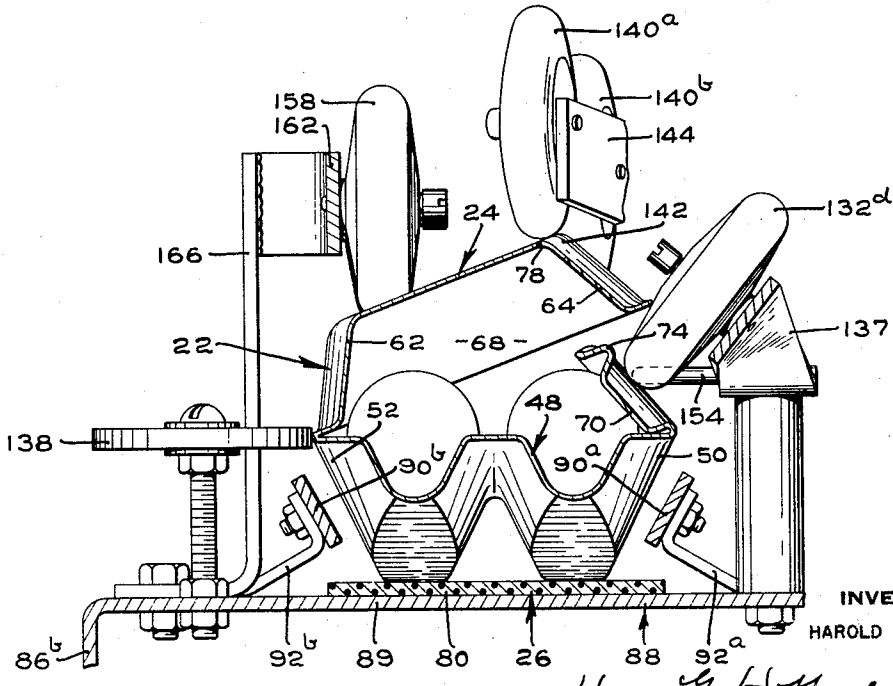


FIG_13



INVENTOR
HAROLD J. MUMMA
BY Hans G. Hoffmeister
ATTORNEY

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CARTON CLOSING MACHINE

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FIG_14

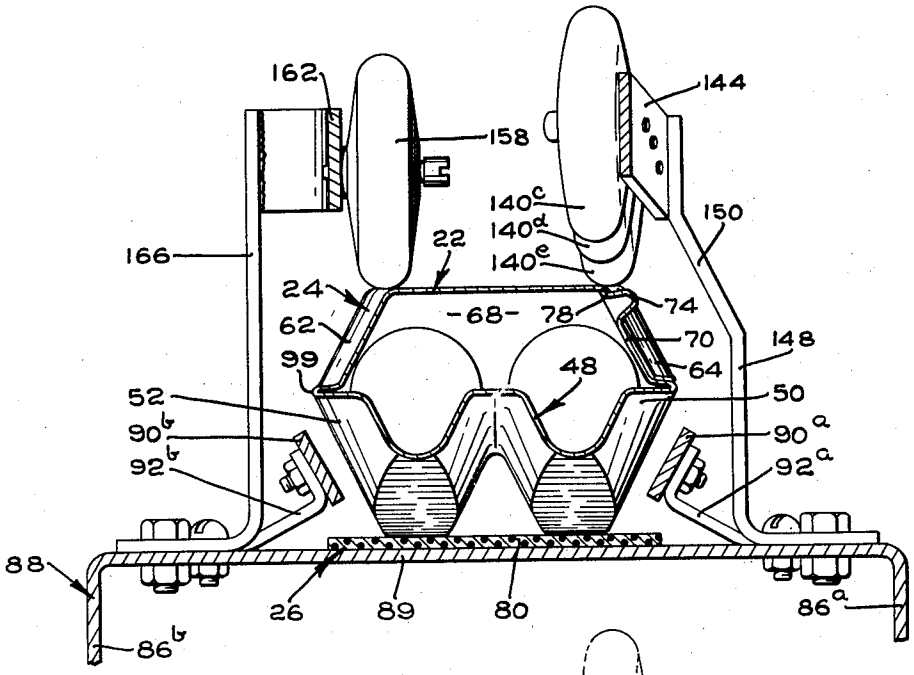
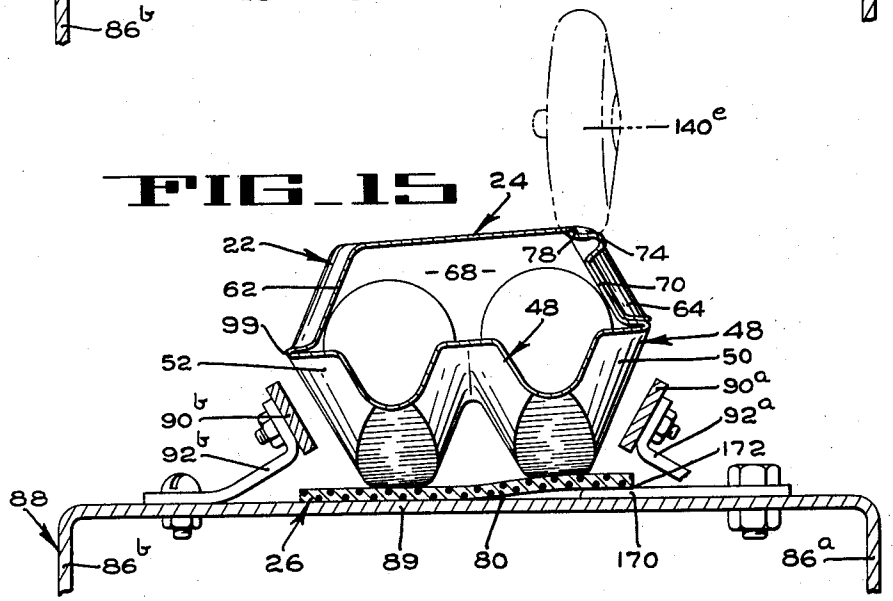


FIG_15



INVENTOR
HAROLD J. MUMMA

BY Hans G. Hoffmeister
ATTORNEY

United States Patent Office 2,909,880 Patented Oct. 27, 1959

2,909,880

CARTON CLOSING MACHINE

Harold J. Mumma, Riverside, Calif., assignor to Food Machinery and Chemical Corporation, San Jose, Calif., a corporation of Delaware

Application July 26, 1955, Serial No. 524,356

20 Claims. (Cl. 53—377)

The present invention relates to machines for closing cartons. More particularly the present invention relates to machines for closing cartons designed to hold parallel rows of eggs and made from papier-mache.

It is an object of the present invention to provide a machine for closing cartons of the type referred to, that is of simple construction.

Another object is to provide a rapidly yet dependably operating carton closing machine of the type referred to.

Another object is to provide a carton closing machine, of the type referred to, that is smooth in operation so that it does not endanger the eggs contained in the cartons.

Another object is to provide a machine for closing cartons having corresponding apertures and projections in their covers and bodies, respectively, in such a manner that said projections and apertures will dependably interlock.

Another object is to provide a carton closing machine that requires no power driven components for effective operation other than the conveyor that advances the carton through the machine.

These and other objects of the present invention will be apparent from the following description of the accompanying drawings which illustrate a preferred embodiment thereof and wherein:

Fig. 1 is a diagrammatic perspective of a carton closing machine embodying the invention.

Fig. 2 is a perspective of the egg carton for which the machine of the invention is designed.

Fig. 3 is a fragmentary perspective of the carton closing machine viewed from a point in front and somewhat above the machine.

Figs. 4 to 9 are fragmentary perspectives illustrating consecutive stages in the operation of the machine.

Fig. 10 is a cross section taken along line **10—10** of Fig. 4.

Fig. 11 is a cross section taken along line **11—11** of Fig. 5.

Fig. 12 is a cross section taken along line **12—12** of Fig. 6, with the carton in a less advanced position.

Fig. 13 is a cross section taken along line **13—13** of Fig. 7, with the carton in a less advanced position.

Fig. 14 is a cross section taken along line **14—14** of Fig. 8.

Fig. 15 is a cross section taken along line **15—15** of Fig. 9.

The machine of the invention comprises a feed conveyor **20** (Fig. 1) that delivers cartons **22** filled with eggs and with their covers **24** folded backwardly into trailing position. The cartons **22** are transferred from the conveyor **20** onto another conveyor **26** which extends transversely past the leading end of the feed conveyor **20** and which constitutes the actual cover closing portion of the machine. The feed conveyor **20** may be formed by two transversely spaced, endless chains **28***a* and **28***b* that are trained about sprockets **30***a*, **32***a* and **30***b*, **32***b*, respectively. The sprockets **30***a* and **30***b* are mounted upon a transverse shaft **34** which may be an idler shaft, and the

sprockets **32***a* and **32***b* are mounted upon a transverse shaft **36** which may be the drive shaft of the conveyor. Both shafts are rotatably mounted in the side panels **38***a* and **38***b* of a base frame **40**. Along their upper edges said side panels carry lateral guide bars **42***a* and **42***b* for the cartons travelling on conveyor **20**. Arranged above conveyor **20** near the trailing end thereof is a carton magazine **44** from which empty cartons are dropped upon the upper run of the conveyor, and suitably secured to its chains **28***a* and **28***b* at appropriate intervals are transverse impeller members **46** that engage the trailing side of the body **48** of cartons deposited upon the conveyor and advance them toward the transversely extending conveyor **26**. As the egg cartons travel upon conveyor **20** from the trailing to the leading end thereof, they may pass underneath mechanisms (not shown) which deposits eggs into their pockets, such as the mechanism described in my copending patent application Serial No. 400,466 for "Machine for Handling Eggs" filed on December 28, 1953.

The carton for which the particular embodiment of the invention illustrated in the accompanying drawings is designed, is illustrated in Fig. 2. It is made of papier-mache and it comprises the hereinbefore mentioned body **48** which has the form of a tapering tray that has a slanting front wall **50**, a slanting rear wall **52** and two end walls **54** and **56**, and which forms two parallel rows of pockets **58** that are divided by a center partition **60**. Each pocket row forms six individual pockets **58**. Hingedly secured to the upper edge of rear wall **52** is the slanted rear wall **62** of the above mentioned cover **24** which has also a slanting front wall **64** and two end walls **66** and **68** corresponding to the front and end walls of the carton body. The front wall **50** of the carton body **48** is provided with an outwardly turned lip **70** that forms on its underside adjacent its outer edge projections or protrusions **72** and **74** which are adapted to enter into interlocking engagement with corresponding apertures **76** and **78** provided in the slanting front wall **64** of the carton cover adjacent the inner corner thereof when the lip **70** has been turned upwardly into an inwardly slanted position and the cover **24** is closed fully upon the carton body **48**.

Reverting to Fig. 1, after a carton on conveyor **20** has been filled with eggs, the conveyor **20** pushes it, with its cover **24** in backwardly folded trailing position, upon the hereinbefore mentioned transversely extending conveyor **26**. The conveyor **26** is formed by a suitable endless canvas belt or a chain belt **80** as shown in the drawings that is trained about rollers **82**. In Fig. 1 only the roller **82** at the leading or discharge end of conveyor **26** is shown. This roller is the drive roller of said conveyor and is firmly mounted upon a transverse shaft **84** that is suitably journalled in side panels **86***a* and **86***b* of a base frame **88** which has the cross sectional contour of an inverted U with its horizontal portion **89** underlying the upper run of the chain belt **80** to provide proper support for said run. To safely retain the filled cartons upon conveyor **26** the upper run of chain belt **80** may be flanked at either side by guide bars **90***a* and **90***b* that are held in inwardly slanted positions, parallel to the downwardly converging planes of the front and rear walls **50** and **52**, respectively, of the carton body **40**, by means of brackets **92***a* and **92***b* that are mounted upon and rise from the top portion **89** of the base frame **88**, as shown in Figs. 3 and 10 to 15. One end of the hereinbefore mentioned shaft **84** protrudes through and beyond the side panel **86***a* of frame **88** and its projecting end carries a pulley **94** that derives power from a suitable source of rotary power, such as the electric motor **96**, by means of an endless belt **98**.

As soon as an impeller member **46** on conveyor **20**

has pushed a carton filled with eggs onto the upper run of chain belt 80 beyond the ends of the lateral guide bars 42*a* and 42*b*, the chain belt 80 which is in continuous operation during performance of the machine, takes hold of the carton and advances it in a direction at right angles to its previous direction of movement, with its cover 24 in reclining condition and projecting in a direction laterally of the chain belt 80 and with its end wall 56 in leading position. As the carton advances in this manner means enter into operation that swing the carton cover about its hinge line 99 from its reclining position into a substantially vertical position. For this purpose a camming rod 100 of shallow S-shaped conformation (Figure 3) is supported from the base frame 88 adjacent the hinge line side of conveyor 26, i.e., the left side as viewed in the direction of the carton advance, by means of suitable standards 102 and 104 in such a manner that as a carton advances on the chain belt 80, its reclining cover slides over the initial portion 106 of said rod. Said initial rod portion 106 is arranged to slant from a point laterally removed from the hinge line side of the conveyor toward said conveyor at a level above the level of the hinge line of the carton as best shown in Fig. 4. As the reclining cover on the advancing carton comes against the initial portion 106 of rod 100 while the carton is retained upon the conveyor belt 80 by the guide bar 90*a* on the opposite side of the belt, the carton cover is cammed into an upwardly directed position as shown in Figs. 4 and 10. To prevent that the carton be tilted laterally, as its cover comes against the initial portion 106 of the camming rod 100 and to provide an abutment about which the cover may be folded, a disc 108 is rotatably supported from the base frame 88 above the carton travelling on the chain belt 80 in such a position that its bottom edge overlies and engages the top edge of the rear wall 52 of the carton body adjacent the hinge line 99 of the cover. As shown in Figs. 1, 4, and 10 the disc 108 may be supported by a bracket 110 that is secured to the side panel 86*a* of the base frame 88 and which forms an arch, over the chain belt 80, that is sufficiently high to permit a carton body filled with eggs to pass unhindered underneath. To prevent entanglement of the disc with the end walls of the carton cover as the cover swings into the upwardly directed position illustrated in Figs. 4 and 10, the disc 108 is preferably mounted in a position wherein its plane slants away from the hinge line 99 of the carton cover as shown in said Figs. 4 and 10.

The center portion 112 (Figs. 1 and 3) of the S-shaped camming rod 100 extends above and substantially parallel to the guide bar 90*b* at the hinge line side of the chain belt 80 and is effective to maintain the cover in upwardly directed position. In the embodiment of the invention illustrated in the accompanying drawings said center portion 112 of camming rod 100 is relatively long to provide time for an inspector to check the contents of the carton before the cover is closed down upon the carton body.

The terminal portion 114 of the camming rod 100 is bent to extend diagonally across slightly more than one half of the width of chain belt 80 and slants downwardly to an extent that is effective to lower the carton cover to a level wherein the edge of its front wall 64 reaches the level of the lip 70 of the carton body when said lip is in the upturned position illustrated in Fig. 12. Hence, when a carton advancing on chain belt 80 with its cover in upright position encounters the terminal portion 114 of the camming rod 100, the cover is progressively cammed downwardly upon the carton body into a semi-closed condition as illustrated in Figs. 5, 11 and 12. Lest the carton be dislodged from the chain belt 80 as its cover is acted upon by the terminal portion 114 of the camming rod 100, a bank of four roller discs 116 is arranged above the chain belt 80 along the center line thereof at such an altitude that their edges engage the crest of the center partition 60 of the carton travelling on the chain belt. The rollers 116 may be pivotally supported between two elongated plates 118*a* and 118*b* that are supported from the side panel 86*a* of the conveyor frame 88 above and in vertical alignment with the center line of the chain belt 80 by means of two L-shaped brackets 120 and 122, as shown in Figs. 1 and 5. To hold the carton dependably upon the chain belt 80 while its cover is closed upon the carton body by the extreme end portion of the camming rod 100, the plates 118*a* and 118*b* may carry between their downstream ends an extension 124 whose bottom edge 126 is aligned with the nadir sectors of the rollers 116 and whose top edge 128 slants in a direction substantially parallel to the slanting plane containing the terminal portion 114 of the camming rod 100.

As the cover of a carton travelling upon chain belt 80 is bent into semi-closed position in the described manner by the terminal portion 114 of the camming rod 100, while the carton is held in proper position upon the belt by the rollers 116 and the plate extension 124, the outwardly turned lip 70 on its front wall 50 encounters a cam in the form of a gently rising twisted bar 130 that is supported from the top portion 89 of the conveyor frame 88 and which bends the lip 70 gradually into an upwardly directed position, as shown in Figs. 5 and 11. As the leading portion of lip 70 slides past the twisted bar 130 in almost upright position while its trailing portion is still engaged by said bar, the leading portion of the lip 70 encounters a bank of four consecutive roller discs 132 that complete the bending of the lip 70 to an extent wherein said lip slants in a direction inwardly of the carton so that the slanting front wall 64 of the carton cover may readily be closed upon the lip. The first of rollers 132 which is individually identified by the suffix letter *a* in Figures 1, 3, 5, 6, 11 and 12 is arranged for rotation about a vertical axis adjacent the right edge of the chain belt 80 in such a position that its inner segment contacts the lip and raises it fully into vertical position (Fig. 12) and the succeeding three rollers 132*b*, 132*c* and 132*d* are mounted for rotation about axes that incline increasingly toward the chain belt 80, and are located at points progressively closer to the path of the carton on said belt. Hence, as the carton advances on chain belt 80 and its lip 70 encounters successively said progressively inclined and inwardly displaced rollers 132*a* to 132*d*, its lip 70 is bent inwardly until the last roller 132*d* bends it practically into contact with the protruding upper ends of the eggs in the outer pocket row, as shown in Fig. 13. The rollers 132*a* to 132*d* are pivotally mounted in their proper position upon a bar 137 that flanks the right side of the chain belt 80 and which is suitably supported from the top portion 89 of the conveyor frame 88. To prevent that the carton may shift laterally upon the chain belt 80 while the lip 70 on its front wall 50 is acted upon by the rollers 132*a* to 132*d*, a bank of three rollers 138 is mounted upon the top portion 89 of the frame 88 for rotation about vertical axes adjacent the left side of the chain belt 80 in such a manner that the peripheral edges of said rollers engage the rear wall of the carton advancing on said chain belt along the hinge line thereof, as best shown in Figs. 12 and 13.

When the lip 70 of the carton has been turned inwardly to the described degree, the carton cover may be fully closed over the carton body. Hence, as the leading portion of the carton moves past roller 132*d*, its cover which emerges from underneath the terminal portion 114 of the camming rod 100 encounters the first of a bank of five rollers which are collectively identified by the reference numeral 140 and which are disposed above the chain belt 80, along a diagonal line, for rotation about transverse horizontal axes (Figs. 1, 3, 6, 7 and 13). Having reference to Fig. 13 the first of rollers 140 which is individually identified by the suffix letter *a* is placed sufficiently far inwardly from the right side of the chain belt 80 (as viewed in downstream direction) to be encountered by the

leading front corner **142** of the semi-closed cover on the carton emerging from underneath the terminal portion of the camming rod **100**, and it is located sufficiently high above said chain belt to permit the carton to move with its semi-closed cover readily underneath said roller. The consecutive four rollers **140***b*, **140***c*, **140***d* and **140***e* are arranged at progressively lower levels to progressively close the carton cover over the carton body as the carton advances on the chain belt **80**, and each consecutive roller is somewhat displaced toward the right side of the conveyor chain as best shown in Fig. 14 so that the rollers will consecutively contact and act upon the margin of the carton cover adjacent its upper front edge as the progressive lowering of said cover moves its front edge along a circular arc closer toward the front edge of the carton body. The last of the rollers **140**, i.e., roller **140***e* is arranged so low above the conveyor chain **80** that it closes the carton cover fully over the carton body so its slanted front wall **64** lies directly above the inwardly tilted lip **70** of the carton body as shown in Fig. 14, with the protrusions **72** and **74** of the latter in registry with the recesses **76** and **78**, respectively, in the former. The rollers **140***a* to **140***e* may be pivoted to a bar **144** that is suitably supported from the top portion **89** of the conveyor frame **88** by means of standards **146** and **148**, and which may be bent as shown at **150** in Fig. 3 to place the rollers **140***a* to **140***e* into their proper position in a direction transversely of the conveyor advance.

To maintain the lip **70** on the front wall of the carton body in its inwardly tilted position as the cover is closed fully upon the carton body, a rod **154** extending in a direction longitudinally of the conveyor advance may be arranged adjacent the right side of the conveyor belt **80** at the level of the upturned lip **70** (Figs. 7 and 8). To mount the rod **154** in such manner that it does not interfere with the final cover folding operation, its upstream end is bent outwardly to form a laterally projecting arm **156** that is suitably supported from the top portion **89** of the conveyor frame **88** adjacent the last of the bending rollers **132** as best shown in Fig. 8. Lest the carton be tilted out of contact with the chain belt **80** along the left side of the conveyor while the closing rollers **140** act upon the front margin of its cover, a bank of three rollers **158** may be arranged above the chain belt in a position to bear down upon the carton cover in the margin along the upper rear edge **160** thereof as shown in Figs. 1, 3, 7, 8, 12 and 13. Said rollers **158** are pivoted for rotation about transverse horizontal axes to a bar **162** that is suitably supported above the chain belt **80** by standards **164** and **166** which rise from and are adjustably secured to the top portion **89** of the conveyor frame **88**.

When the cover is fully closed upon the carton body by the action of the rollers **140***a* to **140***e* in the manner described hereinbefore, and the apertures **76** and **78** in the front wall **64** of the carton cover lie directly in front of the protrusions **72** and **74**, respectively, of lip **70** as pointed out above, said protrusions will snap onto and interlock with said apertures as soon as the conveyor **26** advances the carton beyond the lip retaining rod **154** due to the fact that the lip when released by said rod will tend to return to its original position and endeavor to swing outwardly. Thus, carton cover is dependably locked in closed position.

During performance of the described carton closing mechanism the camming rod **100** and the various rollers that bear upon the carton cover may somewhat retard the advance of the carton cover as compared with the advance of the carton body with the result that the apertures in the front wall of the cover may not accurately register with the protrusions on the inwardly tilted lip **70** of the carton body. In such an event the protrusions on the lip may fail to interlock with the apertures in the front wall of the cover as the carton moves past the retaining rod **154**. To re-establish proper alignment of the carton cover with the carton body and thus enable the protrusions on the lip **70** to interlock with the apertures in the front wall of the carton cover, means may be provided in accordance with the invention that twist the carton slightly before it emerges fully from underneath the cover closing rollers **140**. This may be accomplished by providing a slight elevation of the right side of the chain belt **80** at a point beyond the last of the carton closing rollers a distance less than the dimension of the carton in the direction of the conveyor advance. Having reference to Figs. 1 and 15, a bar **170** of metal, wood or the like is placed underneath the chain belt **80** to raise its right edge briefly to a slightly higher level as indicated at **172**. When the leading portion of a carton passes over this elevation **172** in the belt **80** while the trailing portion of its closed cover is still engaged by the last closing roller **140***e*, the leading portion of the carton is twisted relative to its trailing portion about an axis extending longitudinally of the conveyor advance. This is effective to re-establish proper alignment between the carton body and the cover, and as a result the protrusions **72** and **74** in the carton lip are able to snap onto the apertures **76** and **78**, respectively, in the front wall of the carton cover and securely lock the cover in closed position.

Operation

While the operation of the machine of the invention has been described concurrently with the description of its structure and component mechanisms, it will now be briefly recapitulated to facilitate an understanding of the principles of the invention.

A filled carton travelling upon conveyor **20** with its cover **24** folded backwardly and in trailing position, is pushed by one of the impeller members **46** of said conveyor upon the transversely extending chain belt **80** of conveyor **26**, and from now on it travels endwise with its end wall **56** in leading position, the front wall **50** of its body portion facing the right side of the conveyor **26** and its open backwardly folded cover **24** projecting beyond the left side of said conveyor as viewed in the direction of the conveyor advance. When travelling upon the conveyor **26** in the described position, the backwardly folded cover **24** of the carton slides over the initial portion **106** of the camming rod **100** which slants toward the left side of the conveyor and which engages the cover, as the carton advances further on the conveyor **26**, and raises said cover into the upwardly directed position illustrated in Figs. 4 and 10, while the freely rotatable disc **108** engages the upper edge of the rear wall of the carton body and provides an abutment about which the carton cover may be folded and which prevents the carton from tipping laterally about its right bottom edge.

As the carton continues to advance upon conveyor **26**, the cover comes against the diagonally descending terminal portion **114** of the camming rod **100** which folds the cover into a semi-closed position as illustrated in Figs. 5, 11 and 12, while the rollers **116** and the extension **124** of bars **118***a*, **118***b* hold the carton securely upon the chain belt **80** of the conveyor by engaging the crest of the center partition **60** thereof. At the same time the outwardly turned lip **70** at the upper edge of the front wall **50** of the carton body comes against the gently rising twisted camming bar **130** at the right side of the chain belt **80** and as the carton moves past said bar, the lip **70** is bent into an upwardly directed position while the carton is held in properly centered position upon the chain belt by the rollers **138** as likewise shown in Figs. 5, 11 and 12. As the carton continues to advance upon the chain belt and before it has moved beyond the terminal portion **114** of the camming rod **100**, its upwardly bent lip **70** encounters the bank of rollers **132***a* to **132***d* which push the lip progressively into the inwardly tilted position illustrated in Fig. 13 wherein said lip lies inwardly of, and substantially parallel to, the slanting front wall **64** of the descending cover.

As the carton with its cover in semi-closed position emerges from underneath the terminal portion **114** of the camming rod **100**, the leading front corner of the cover encounters and slides underneath the first **140***a* of the diagonally arranged rollers **140** and as the carton continues to advance and the margin adjacent the upper front edge of its cover encounters the successively lower rollers **140***b* to **140***e*, while the lip **70** at the front wall **50** of the carton body is held in its inwardly tilted position by the retaining rod **154**, the carton cover is closed fully upon the filled carton body until its slanting front wall **64** lies directly above the outer surface of said lip (Fig. 14). During this final cover closing operation the carton is held in its proper position upon the chain belt **80** by the rollers **158** that bear down upon the carton cover along the margin adjacent rear edge thereof as shown in Figs. 7, 8 and 14. As the carton moves beyond the lip-retaining rod **154** at the right side of the chain belt **80**, said lip is released from the restraining effect of said rod and endeavors to return to its original position due to the resiliency of the material from which the carton is made. As a result thereof, the protrusions **72** and **74** formed in said lip snap onto the corresponding apertures **76** and **78** in the front wall of the carton cover which overlies said lip, so that the cover is properly locked in closed position and remains closed after the carton has emerged fully from underneath the cover bending rollers **140**. It is now impossible for eggs to spill out accidentally when the carton is handled by the packer, retailer or consumer.

In cases where the protrusions **72** and **74** on the lip of a carton are not properly aligned with their corresponding apertures **76** and **78** in the front wall of the carton cover due to relative displacement of carton body and the carton cover, the twist to which the carton is subjected as the right side of its body encounters the elevation **172** in the chain belt **80** while the trailing portion of its cover is still engaged by the last of cover closing rollers **140**, is usually sufficient to establish realignment of carton body and carton cover, and as a result thereof the protrusions on the lips of such a carton that have not previously engaged their respective apertures in the front wall of the carton cover, will not engage said apertures and securely lock the cover in closed position.

With the cover closed fully upon the egg-filled carton body and locked securely in closed position in the manner described, the chain belt may now deliver the carton to a take-off conveyor, ramp or packing platform (not shown).

The described carton closing mechanism is rapid, smooth and dependable in operation, it is of a very simple and inexpensive construction, and it requires no power driven elements other than the conveyor itself.

While I have described my invention with the aid of an exemplary embodiment thereof, it will be understood that I do not wish to be limited to the specific constructional details shown and described which may be departed from without departing from the spirit and scope of my invention.

What I claim is:

1. A machine for closing and locking the cover of a carton having a carton body to whose rear wall the cover is hingedly attached and which has an outwardly turned lip along its front wall provided with means adapted to interlock with corresponding means in the front portion of the cover, comprising means for advancing the carton in edgewise position along a predetermined path with its backwardly folded cover extending in a direction transversely of its advance; camming means for bending the cover from its backwardly folded position into a semi-closed position relative to the carton body as it travels on said carton advancing means, means adjacent said carton advancing means on the side of the outwardly turned lip of a carton travelling thereon for bending the outwardly turned lip of the carton into an inwardly slanted position, means adjoining said lip-turning means for retaining the lip of a carton travelling on said carton advancing means temporarily in its inwardly slanted position, and means for closing the cover fully upon the carton body so that its front portion overlies the inwardly slanted lip of the carton body and the lip, when released from said retaining means, bears against said front portion and causes engagement of said interlocking means on the front portion of the cover and on said lips.

2. A machine for closing and locking the cover of an egg carton having a carton body to whose rear wall the cover is hingedly attached and which has an outwardly turned lip along its front wall provided with protrusions adapted to fit into corresponding apertures in a front portion of the cover, comprising means for advancing the carton in endwise position along a predetermined path with its backwardly folded cover extending in a direction transversely of its advance; camming means for bending the cover from its backwardly folded position into a semi-closed position relative to the carton body as it travels on said carton advancing means, means adjacent said carton advancing means on the side of the outwardly turned lip of a carton travelling thereon for bending the outwardly turned lip of a carton into an inwardly slanted position, means adjoining said lip-turning means for retaining the lip of a carton travelling on said carton advancing means temporarily in its inwardly slanted position, and means for closing the cover fully upon the carton body so that its front portion overlies the inwardly slanted lip of the carton body and that as the carton advances past said retaining means the lip released from said retaining means bears against said front portion and engages its protrusions into the apertures of said front wall.

3. A machine for closing and locking the walled cover of a carton having a carton body to whose rear wall the rear wall of the cover is hingedly attached and which has an outwardly turned lip along its front wall provided with protrusions adapted to fit into corresponding apertures in the front wall of the carton cover, comprising means for advancing the carton in endwise position along a predetermined path with its backwardly folded cover extending in a direction transverse of its advance; camming means for bending the carton cover from its backwardly folded position into a semi-closed position relative to the carton body as it travels on said carton advancing means, means for retaining the carton in its proper position upon said carton advancing means as it is acted upon by said camming means, means in the terminal region of said camming means adjacent said carton advancing means on the side of the outwardly turned lip of a carton travelling thereon for successively bending the outwardly turned lip of a carton into substantially upright and inwardly slanted positions, means adjoining said lip-turning means for retaining the lip of a carton travelling on said carton advancing means temporarily in its inwardly slanted position, means for closing the cover fully upon the carton body so that its front wall overlies the inwardly slanted lip of the carton body and the lip when released from said retaining means, as the carton advances past said retaining means, bears against said front wall and engages its protrusions into the apertures of said front wall, and means for holding the carton in its proper position upon said carton advancing means as its cover is acted upon by said cover closing means.

4. As part of a machine for closing the cover of a carton having a carton body to whose rear wall the cover is hingedly attached and which forms parallel rows of egg receiving pockets divided by a center partition; an arrangement for bending the carton cover from a backwardly folded position into a semi-closed position comprising a belt arranged to advance the carton in endwise position along a predetermined path with its backwardly folded cover extending in a direction transversely of the advance of said belt, an initial camming rod portion slanting from a point laterally removed from the cover side of the carton on the belt to a point adjacent

the rear wall of the carton body at a level above the hinge line of the cover on the carton to fold the carton cover into a substantially upright position as the carton advances upon said belt, a disc slanting in a direction away from the hinge line of the carton on the belt rotatably supported above said belt and arranged to engage the top edge of the rear wall of the carton body adjacent the hinge line thereof as said initial camming rod portion acts upon the carton cover, a terminal camming rod portion extending diagonally across said belt to bend the upright carton cover into a semi-closed position relative to the carton body as the carton advances further on said belt, and a number of discs rotatably supported above said belt for engaging the crest of the carton body partition to retain the carton in its proper position on the belt while its cover is acted upon by said terminal camming rod portion.

5. As part of a machine for closing the cover of a carton having a carton body to whose rear wall the cover is hingedly attached and which forms parallel rows of egg receiving pockets divided by a center partition; an arrangement for bending the carton cover from a backwardly folded position into a semi-closed position comprising a chain belt arranged to advance the carton in endwise position along a predetermined path with its backwardly folded cover extending in a direction transversely of the advance of said belt, an initial camming rod portion slanting from a point laterally removed from the cover side of the carton on the belt to a point adjacent the rear wall of the carton body at a level above the hinge line of the cover on the carton to fold the carton cover into a substantially upright position as the carton advances upon said belt, a disc slanting in a direction away from the hinge line of the carton on the chain belt rotatably supported above said belt and arranged to engage the top edge of the rear wall of the carton body adjacent the hinge line thereof as said initial camming rod portion acts upon the carton cover, a terminal camming rod portion extending diagonally across said belt to bend the upright carton cover into a semi-closed position relative to the carton body as the carton advances further on said belt, a number of discs rotatably supported above said belt, and a plate having a downwardly slanting upper edge adjoining said discs on the downstream side thereof for engaging the crest of the carton body partition to retain the carton in its proper position on the belt while its cover is acted upon by said terminal camming rod portion.

6. As part of a machine for fully closing and locking the semi-closed cover of a carton having a body to whose rear wall the cover is hingedly attached and which has a lip along the top edge of its front wall provided with protrusions adapted to fit into and interlock with corresponding apertures in a front portion of the carton cover; an arrangement comprising means adapted to advance the carton in endwise position along a predetermined path, a bank of progressively inwardly turned rollers mounted at points progressively closer to the front wall of a carton travelling on said carton advancing means to bend the upwardly turned lip of a carton travelling on said carton advancing means into an inwardly slanted position, a rod mounted adjacent the last of said lip-bending rollers and extending a limited distance in the direction of the advance of said carton advancing means to retain the lip of a carton travelling on said carton advancing means temporarily in its inwardly slanted position as the carton moves beyond said lip-bending rollers, and a bank of rollers mounted for rotation about consecutively lower transverse axes above said carton advancing means to successively engage the cover of the carton travelling on said carton advancing means and close it fully upon the carton body as the carton advances beyond said lip-retaining rod so that the front portion of the cover overlies the inwardly slanted lip of the carton body and said lip upon release from said rod engages its protrusions into the apertures of said front portion.

7. As part of a machine for fully closing and locking the semi-closed walled cover of a carton having a body whose rear wall the rear wall of the cover is hingedly attached and which has a lip along the top edge of its front wall provided with protrusions adapted to fit into and interlock with corresponding apertures in the front wall of the carton cover; an arrangement comprising a belt adapted to advance the carton in endwise position along a predetermined path, a bank of progressively inwardly turned rollers mounted at points progressively closer to the front wall of a carton travelling on said belt to bend the upwardly turned lip of a carton travelling on said belt into an inwardly slanted position, a rod mounted adjacent the last of said lip-bending rollers and extending a limited distance in the direction of the advance of said belt to retain the lip of a carton travelling on said belt temporarily in its inwardly slanted position as the carton moves beyond said lip-bending rollers, and a bank of rollers mounted for rotation about consecutively lower transverse axes above said belt in a line extending diagonally across a portion of said belt to successively engage the area adjacent the upper front edge of the semi-closed cover of the carton travelling on said belt and close it fully upon the carton body as the carton advances beyond said lip-retaining rod so that the front wall of the cover overlies the inwardly slanted lip of the carton body and said lip upon release from said rod engages its protrusions into the apertures of said front wall.

8. As part of a machine for fully closing and locking the semi-closed walled cover of a carton having a body to whose rear wall the rear wall of the cover is hingedly attached and which has a lip along the top edge of its front wall provided with protrusions adapted to fit into and interlock with corresponding apertures in the front wall of the carton cover; an arrangement comprising a a chain belt adapted to advance the carton in endwise position along a predetermined path, a bank of progressively inwardly turned rollers mounted at points progressively closer to the front wall of a carton travelling on said belt to bend the upwardly turned lip of a carton travelling on said belt into an inwardly slanted position, a rod mounted adjacent the last of said lip-bending rollers and extending a limited distnce in the direction of the advance of said belt to retain the lip of a carton travelling on said belt temporarily in its inwardly slanted position as the carton moves beyond said lip-bending rollers, a bank of rollers mounted for rotation about consecutively lower transverse axes above said belt in a line extending diagonally across a portion of said belt to successively engage the area adjacent the upper front edge of the semi-closed cover of the carton travelling on said belt and close it fully upon the carton body as the carton advances beyond said lip-retaining rod so that the front wall of the cover overlies the inwardly slanted lip of the carton body and said lip upon release from said rod engages its protrusions into the apertures of said front wall, and roller means engaging a region adjacent the rear corner of the carton cover for holding the carton in its proper position upon said belt as its cover is acted upon by said cover-closing rollers.

9. As part of a machine for closing and locking the semi-closed cover of a carton having a body to whose rear wall the cover is hingedly attached and which has an outwardly turned lip along the top edge of its front wall provided with protrusions adapted to fit into and interlock with corresponding apertures in a front portion of the cover; an arrangement comprising a belt adapted to advance the carton in endwise position along a predetermined path, a twisted camming bar arranged adjacent said belt on the side of the outwardly turned lip of the carton travelling on said belt to bend the lip of the car-

ton on said belt into a substantially upright position, a bank of progressively inwardly turned rollers mounted beyond said twisted camming bar at points progressively closer to the front wall of a carton travelling on said belt to engage the upwardly turned lip of a carton travelling on said belt successively with their peripheral edges and bend it into an inwardly slanted position, a rod mounted adjacent the last of said lip-bending rollers and extending a limited distance in the direction of the advance of said belt to retain the lip of a carton travelling on said belt temporarily in its inwardly slanted position as the carton moves beyond said lip-bending rollers, a bank of rollers mounted for rotation about consecutively lower transverse axes above said belt to successively engage the semi-closed cover of the carton travelling on said belt and close it fully upon the carton body as the carton advances past said lip-retaining rod so that the front portion of the cover overlies the inwardly slanted lip of the carton body and said lip upon release from said retaining rod bears against said front wall and engages its protrusions with the apertures in said front portion, and means for holding the carton in its proper position upon said belt as its cover is acted upon by said cover-closing rollers including a bank of rollers mounted for rotation about vertical axes adjacent the hinge line side of the belt with their peripheral edges in contact with the hinge line of the carton travelling on said belt.

10. As part of a machine for closing and locking the semi-closed walled cover of a carton having a body to whose rear wall the rear wall of the cover is hingedly attached and which has an outwardly turned lip along the top edge of its front wall provided with protrusions adapted to fit into and interlock with corresponding apertures in the front wall of the carton cover; an arrangement comprising a belt adapted to advance the carton in endwise position along a predetermined path, a twisted camming bar arranged adjacent said belt on the side of the outwardly turned lip of the carton travelling on said belt to bend the lip of the carton on said belt into a substantially upright position, a bank of progressively inwardly turned rollers mounted beyond said twisted camming bar at points progressively closer to the front wall of a carton travelling on said belt to engage the upwardly turned lip of a carton travelling on said belt successively with their peripheral edges and bend it into an inwardly slanted position, a rod mounted adjacent the last of said lip-bending rollers and extending a limited distance in the direction of the advance of said belt to retain the lip of a carton travelling on said belt temporarily in its inwardly slanted position as the carton moves beyond said lip-bending rollers, and a bank of rollers mounted for rotation about consecutively lower transverse axes above said belt in a line extending diagonally across a portion of said belt on the side thereof corresponding to the front wall of the carton travelling thereon from a point substantially in transverse alignment with the last of said lip-bending rollers to successively engage the area adjacent the upper front edge of the semi-closed cover of the carton travelling on said belt and close it fully upon the carton body, as the carton advances past said lip-retaining rod, so that the front wall of the cover overlies the inwardly slanted lip of the carton body and said lip upon release from said retaining rod bears against said front wall and engages its protrusions with the apertures in said front wall.

11. Arrangement according to claim 10 including a mechanism for insuring engagement of the protrusions on the inwardly turned lip of the body of a carton travelling on said chain belt with the apertures in the overlying front wall of the closed cover as the carton moves beyond said lip-retaining rod, said mechanism comprising means for elevating one side of the belt at a point beyond the last of said cover-closing rollers by a distance less than the dimension of the carton in a direction longitudinally of its advance.

12. As part of a machine for closing and locking the semi-closed walled cover of a carton having a body to whose rear wall the rear wall of the cover is hingedly attached and which has an outwardly turned lip along the top edge of its front wall provided with protrusions adapted to fit into and interlock with corresponding apertures in the front wall of the carton cover; an arrangement comprising a belt adapted to advance the carton in endwise position along a predetermined path, a twisted camming bar arranged adjacent said belt on the side of the outwardly turned lip of the carton travelling on said belt to bend the lip of the carton on said belt into a substantially upright position, a bank of progressively inwardly turned rollers mounted beyond said twisted camming bar at points progressively closer to the front wall of a carton travelling on said belt to engage the upwardly turned lip of a carton travelling on said belt successively with their peripheral edges and bend it into an inwardly slanted position, a rod mounted adjacent the last of said lip-bending rollers and extending a limited distance in the direction of the advance of said belt to retain the lip of a carton travelling on said belt temporarily in its inwardly slanted position as the carton moves beyond said lip-bending rollers, a bank of rollers mounted for rotation about consecutively lower transverse axes above said belt in a line extending diagonally across a portion of said belt on the side thereof corresponding to the front wall of the carton travelling thereon from a point substantially in transverse alignment with the last of said lip-bending rollers to successively engage the area adjacent the upper front edge of the semi-closed cover of the carton travelling on said belt and close it fully upon the carton body as the carton advances past said lip-retaining rod so that the front wall of the cover overlies the inwardly slanted lip of the carton body and said lip upon release from said retaining rod bears against said front wall and engages its protrusions with the apertures in said front wall, and means for holding the carton in its proper position upon said belt as its cover is acted upon by said cover-closing rollers including a bank of rollers mounted for rotation about vertical axes adjacent the hinge line side of the belt with their peripheral edges in contact with the hinge line of the carton travelling on said belt, and a bank of rollers mounted above said chain belt for rotation about transverse axes with their peripheral edges in contact with an area adjacent the rear corner of the cover as said cover is closed fully upon the carton body by said cover-closing rollers.

13. Arrangement according to claim 12 including a mechanism for insuring engagement of the protrusions on the inwardly turned lip of the body of a carton travelling on said belt with the apertures in the overlying front wall of the closed cover as the carton moves beyond said lip-retaining rod, said mechanism comprising means for briefly elevating the belt at the side of the front wall of the carton travelling thereon at a point beyond the last of said cover-closing rollers by a distance less than the dimension of the carton in a direction longitudinally of its advance.

14. A machine for closing and locking the walled cover of an egg carton having a carton body to whose rear wall the rear wall of the cover is hingedly attached and which forms two parallel rows of egg receiving pockets divided by a center partition and has an outwardly turned lip along its front wall provided with protrusions adapted to fit into corresponding apertures in the front wall of the cover, said machine comprising a belt arranged to advance the carton in endwise position along a predetermined path with its backwardly folded cover extending in a direction transversely of the advance of said belt; means for bending the carton cover from its backwardly folded position into a semi-closed position relative to the carton body including an initial camming rod portion slanting from a point laterally removed from the rear wall of the carton on said belt to a point adja-

cent said rear wall at a level above the hinge line of the carton cover on the carton body to fold the cover into a substantially upright position as the carton advances upon said belt, a disc slanting in a direction away from the hinge line of the carton on said chain belt rotatably supported above said belt and arranged to engage the top edge of the rear wall of the carton body adjacent said hinge line as said initial camming rod portion acts upon the carton cover to retain the carton in its proper position upon said belt, a terminal camming rod portion descending diagonally across said belt to bend the upright carton cover into a semi-closed position relative to the carton body as the carton advances further on said belt, and roller means supported above said belt for engaging the crest of the carton body partition to retain the carton in its proper position on said belt while its cover is acted upon by the terminal camming rod portion; a twisted camming bar arranged adjacent said belt on the side of the outwardly turned lip of a carton travelling on said belt in the region of said terminal camming rod portion to bend the lip of a carton on said belt into a substantially upright position, a bank of progressively inwardly turned rollers mounted beyond said twisted camming bar at points progressively closer to the front wall of a carton travelling on said belt to bend the upwardly turned lip of a carton travelling on said belt into an inwardly slanted position, a rod mounted adjacent the last of said lip-bending rollers and extending a limited distance in the direction of the advance of said belt to retain the lip of a carton travelling on said belt temporarily in its inwardly slanted position as the carton moves beyond said lip-bending rollers, a bank of rollers mounted for rotation about consecutively lower transverse axes above said belt in a line extending diagonally across a portion of said belt to successively engage the area adjacent the upper front edge of the semi-closed cover of the carton travelling on said belt and close it fully upon the carton body as the carton advances beyond said lip-retaining rod so that its front wall overlies the inwardly slanted lip of the carton body and said lip upon release from said retaining rod bears against said front wall and engages its protrusions into the apertures thereof; and means for holding the carton in its proper position upon said belt as its cover is acted upon by said cover-closing rollers including a bank of rollers mounted for rotation about vertical axes adjacent the hinge line side of said belt with their peripheral edges in contact with the hinge line area of the body of the carton travelling on said belt and a bank of rollers mounted above said belt for rotation about transverse axes with their peripheral edges in contact with an area adjacent the upper rear edge of the cover as said cover is fully closed upon the carton body.

15. A machine for closing and locking the walled cover of an egg carton having a carton body to whose rear wall the rear wall of the cover is hingedly attached and which forms two parallel rows of egg receiving pockets divided by a center partition and has an outwardly turned lip along its front wall provided with protrusions adapted to fit into corresponding apertures in the front wall of the cover, said machine comprising a belt arranged to advance the carton in endwise position along a predetermined path with its backwardly folded cover extending in a direction transversely of the advance of said belt; means for bending the carton cover from its backwardly folded position into a semi-closed position relative to the carton body including an initial camming rod portion slanting from a point laterally removed from the rear wall of the carton on said belt to a point adjacent said rear wall at a level above the hinge line of the carton cover on the carton body to fold the cover into a substantially upright position as the carton advances upon said belt, a disc slanting in a direction away from the hinge line of the carton on said chain belt rotatably supported above said belt and arranged to engage the top edge of the rear wall of the carton body adjacent said hinge line as said initial camming rod portion acts upon the carton cover to retain the carton in its proper position upon said belt, a terminal camming rod portion descending diagonally across said belt to bend the upright carton cover into a semi-closed position relative to the carton body as the carton advances further on said belt, and roller means supported above said belt for engaging the crest of the carton body partition to retain the carton in its proper position on said belt while its cover is acted upon by the terminal camming rod portion; a twisted camming bar arranged adjacent said belt on the side of the outwardly turned lip of a carton travelling on said belt in the region of said terminal camming rod portion to bend the lip of a carton on said belt into a substantially upright position, a bank of progressively inwardly turned rollers mounted beyond said twisted camming bar at points progressively closer to the front wall of a carton travelling on said belt to bend the upwardly turned lip of a carton travelling on said belt into an inwardly slanted position, a rod mounted adjacent the last of said lip-bending rollers and extending a limited distance in the direction of the advance of said belt to retain the lip of a carton travelling on said belt temporarily in its inwardly slanted position as the carton moves beyond said lip-bending rollers, a bank of rollers mounted for rotation about consecutively lower transverse axes above said belt in a line extending diagonally across a portion of said belt to successively engage the area adjacent the upper front edge of the semi-closed cover of the carton travelling on said belt and close it fully upon the carton body as the carton advances beyond said lip-retaining rod so that its front wall overlies the inwardly slanted lip of the carton body and said lip upon release from said retaining rod bears against said front wall and engages its protrusions into the apertures thereof, means for holding the carton in its proper position upon said chain belt as its cover is acted upon by said cover-closing rollers including a bank of rollers mounted for rotation about vertical axes adjacent the hinge line side of said belt with their peripheral edges in contact with the hinge line area of the body of the carton travelling on said belt and a bank of rollers mounted above said belt for rotation about transverse axes with their peripheral edges in contact with an area adjacent the upper rear edge of the cover as said cover is fully closed upon the carton body by said cover-closing rollers; and mechanism effective to insure engagement of the protrusions in the inwardly turned lip of the carton body with the apertures in the overlying front wall of the closed carton cover as the carton moves beyond said lip-retaining rod, including means for briefly elevating the belt at the side of the front wall of the carton travelling thereon at a point beyond the last of said cover-closing rollers by a distance less than the dimesion of the carton longitudinally of the conveyor advance.

16. An arrangement for closing and locking the cover of a carton having a carton body to whose rear wall the cover is hingedly attached and which has an outwardly turned lip along its front wall provided with means adapted to interlock with corresponding means in the front portion of the cover, comprising means for advancing the carton along a predetermined path, means adjacent said carton advancing means for bending the outwardly turned lip of the carton body into an inwardly slanted position, and means for moving the cover downwardly to a position overlying the inwardly slanted lip of the carton body so that the lip, when released from said bending means, bears against said front portion of the cover to cause engagement between the interlocking means on the front portion of the cover and the interlocking means on the lip of the carton body.

17. An arrangement for closing and locking the cover of a carton having a carton body to whose rear wall the cover is hingedly attached and which has an outwardly turned lip along its front wall provided with means

adapted to interlock with corresponding means in the front portion of the cover, comprising means for advancing the carton along a predetermined path, means adjacent said carton advancing means for bending the outwardly turned lip of the carton body into an inwardly slanted position, means adjoining said lip-turning means for temporarily retaining the lip in its inwardly slanted position as said carton travels on said carton advancing means, and means for closing the cover fully upon the carton body so that its front portion overlies the inwardly slanted lip of the carton body, whereby said lip, when released by said retaining means, bears against said front portion of the cover to cause engagement between the interlocking means on the front portion of the cover and the interlocking means on the lip of the carton body.

18. An arrangement for closing and locking the cover of a carton having a carton body to whose rear wall the cover is hingedly attached and which has a lip along its front wall provided with means adapted to interlock with corresponding means in the front portion of the cover, comprising means for advancing the carton along a predetermined path, and means adjacent said carton advancing means for consecutively bending the lip of the carton body to a predetermined position over the carton body and moving the cover downwardly over the lip of the carton body and into engagement therewith to cause engagement between the interlocking means on the front portion of the cover and the interlocking means on the lip of the carton body.

19. In a machine for closing and locking the cover of a carton having a carton body to whose rear wall the cover is hingedly attached and which has an outwardly turned lip along its front wall provided with means adapted to interlock with corresponding means in the front portion of the cover, comprising means for advancing the carton along a predetermined path, means adjacent said carton advancing means for bending the lip of the carton body inwardly to a predetermined position, a rod mounted adjacent said last means and extending in the direction of advance of the carton on said advancing means to retain temporarily the lip of the carton in the inward position, and means for closing the cover fully upon the carton body so that its front portion overlies the lip of the carton body, whereby said lip, when released by said rod, bears against said front portion of the cover and causes engagement between the interlocking means on the front portion of the cover and the interlocking means on the lip of the carton body.

20. An arrangement according to claim 16 including a mechanism for insuring the engagement between the interlocking means on the front portion of the cover and the interlocking means on the lip of the carton body, said mechanism comprising means for elevating one side of the carton advancing means at a point beyond the downstream end of the cover depressing means by a distance less than the dimension of the carton in a direction longitudinally of its advance.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,909,880 October 27, 1959

Harold J. Mumma

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

Column 5, line 63, after "Thus," insert -- the --; column 7, line 65, for "edgewise" read -- endwise --; column 10, line 46, for "distnce" read -- distance --.

Signed and sealed this 6th day of December 1960.

(SEAL)

Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents