Feb. 1, 1944. C. J. MALHIOT 2,340,835

PACKAGING APPARATUS

Filed July 10, 1941 3 Sheets-Sheet 1

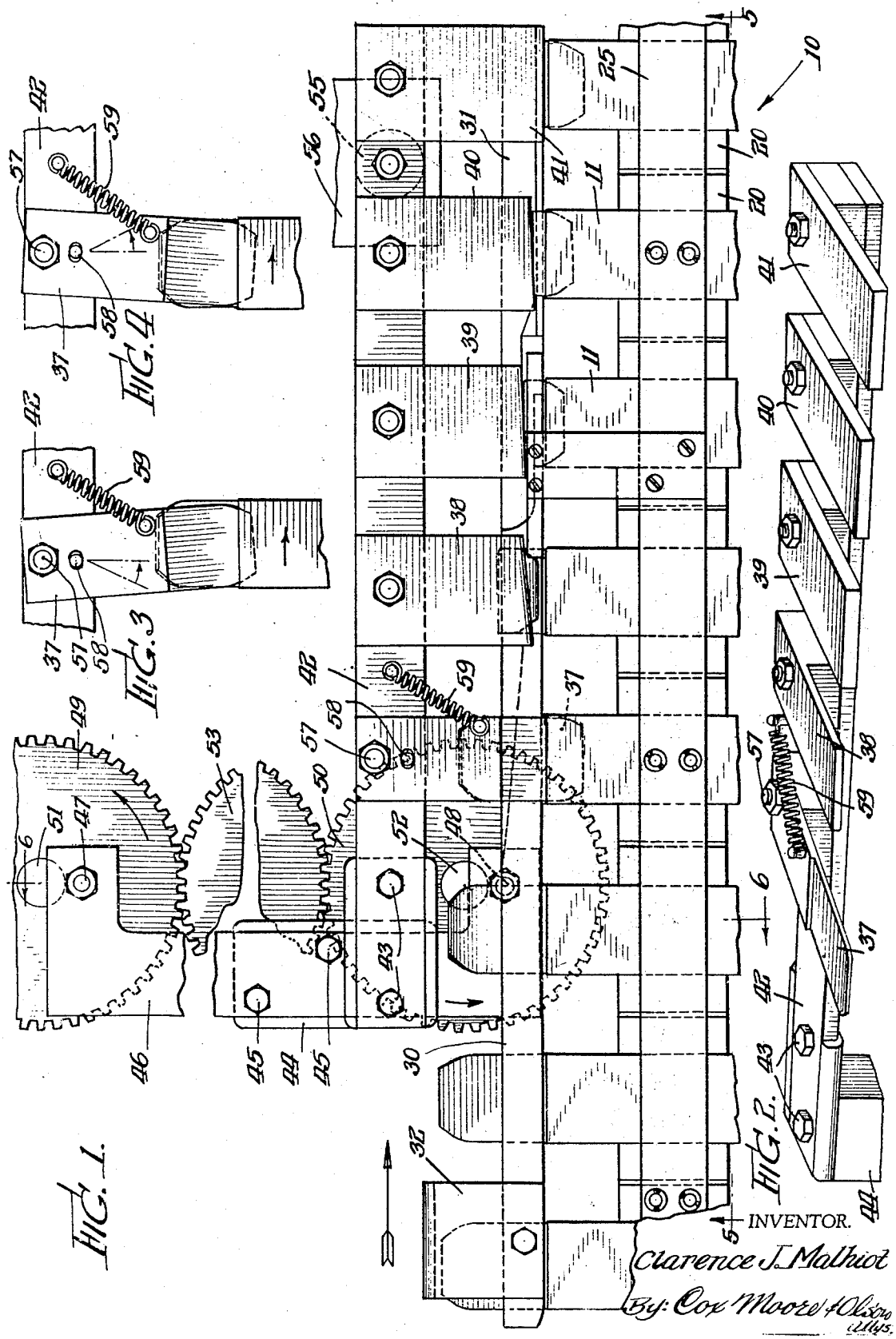


FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

INVENTOR.
Clarence J. Malhiot
By: Cox Moore & Olson
Attys.

Feb. 1, 1944. C. J. MALHIOT 2,340,835

PACKAGING APPARATUS

Filed July 10, 1941 3 Sheets-Sheet 2

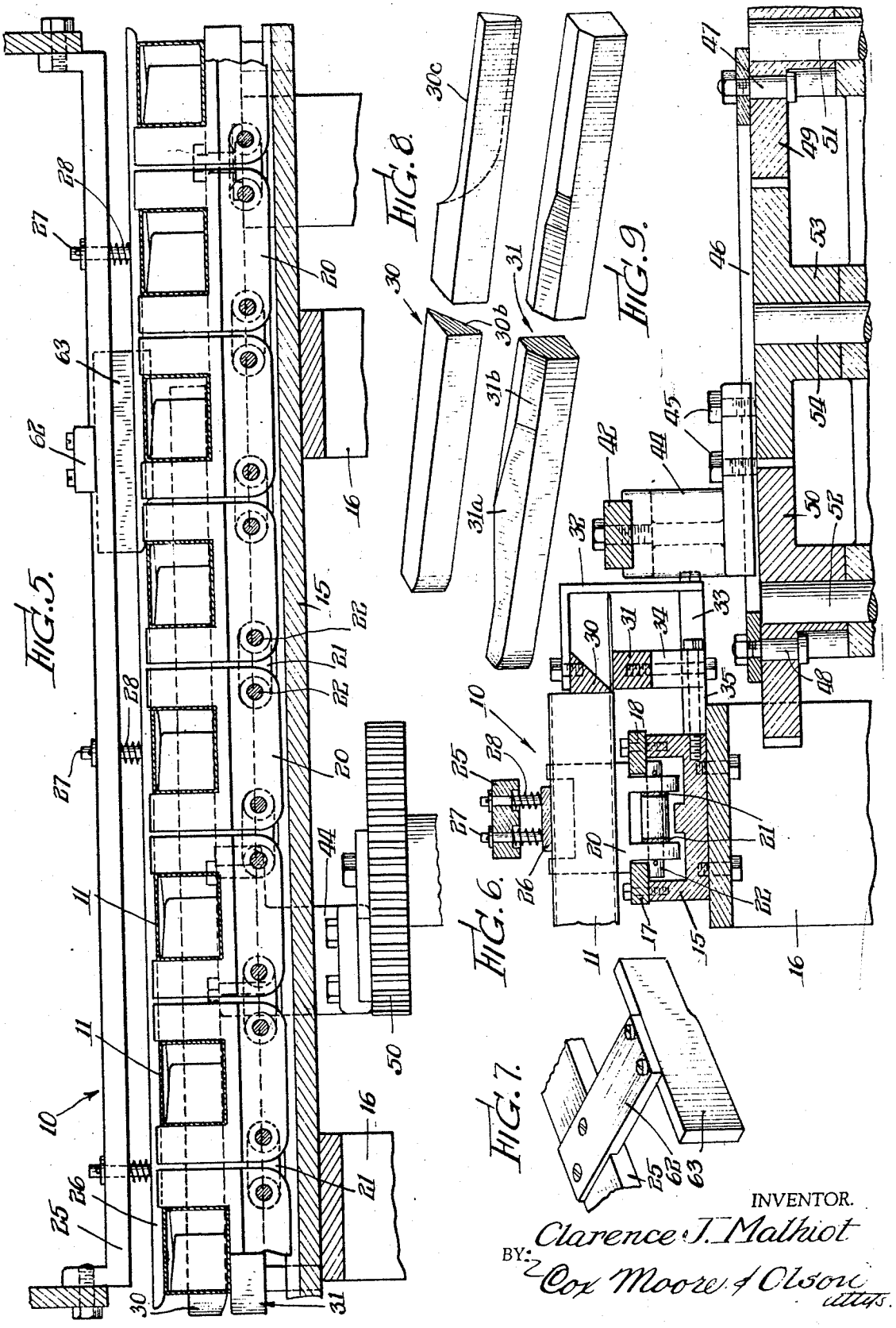


FIG. 5.

FIG. 8.

FIG. 9.

FIG. 6.

FIG. 7.

INVENTOR.
Clarence J. Malhiot
BY: Cox Moore & Olson
ATTYS.

Feb. 1, 1944. C. J. MALHIOT 2,340,835

PACKAGING APPARATUS

Filed July 10, 1941 3 Sheets-Sheet 3

FIG. 10

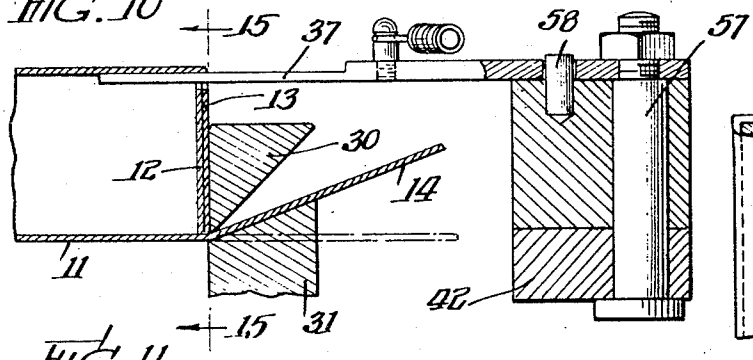


FIG. 15

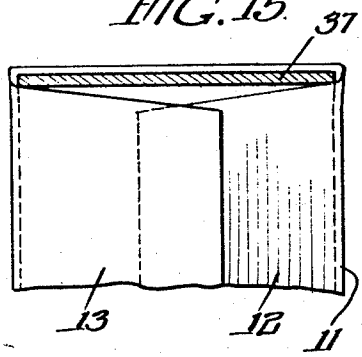


FIG. 11.

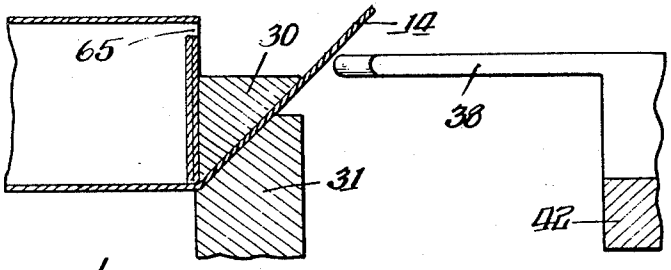


FIG. 16

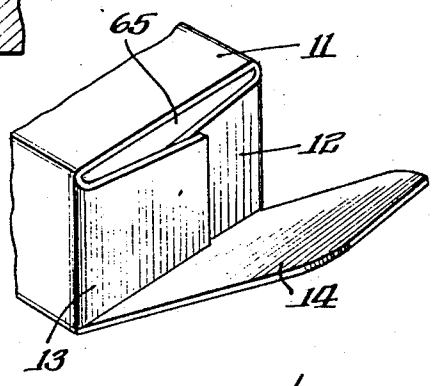


FIG. 12.

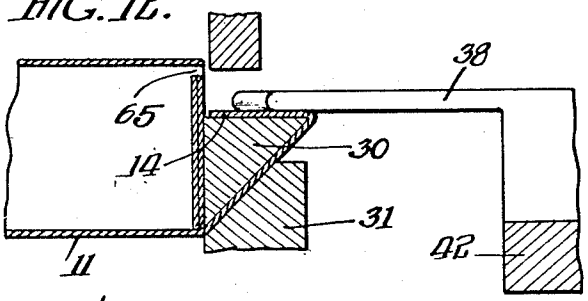


FIG. 13.

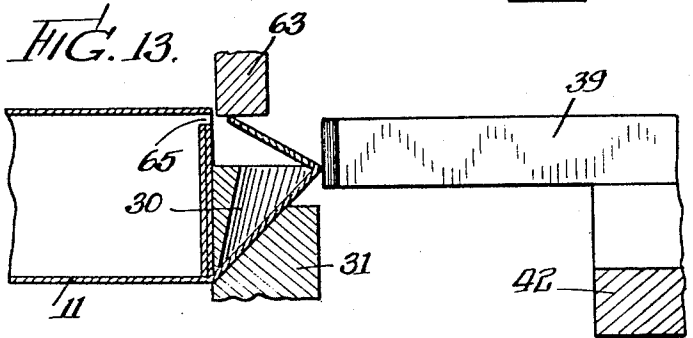


FIG. 17.

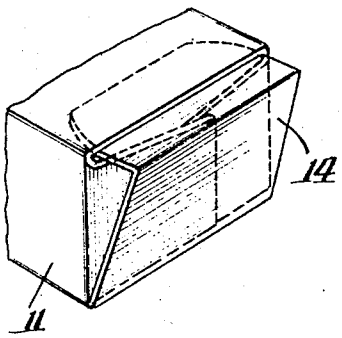
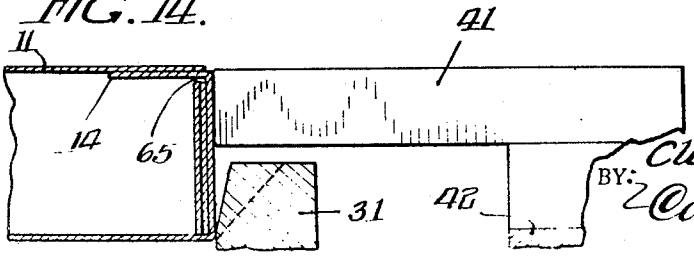


FIG. 14.



INVENTOR.
Clarence J. Malhiot
BY: Cox Moore & Olson
Atty.

Patented Feb. 1, 1944 2,340,835

UNITED STATES PATENT OFFICE

2,340,835

PACKAGING APPARATUS

Clarence J. Malhiot, Oak Park, Ill., assignor to F. B. Redington Co., Chicago, Ill., a corporation of Illinois

Application July 10, 1941, Serial No. 401,867

17 Claims. (Cl. 93—6)

This invention relates to packaging apparatus and to methods of packaging, and particularly to packaging operations wherein during the course thereof a tab member or the like is tucked or inserted into a receiving package opening.

It is an object of the invention to provide improved packaging apparatus and methods, and more particularly to provide packaging operations which will impart and insure to the package a smooth and proper exterior contour, and wherein damage to the package parts such as crushing or buckling of tab elements or the like is precluded.

A further object of the invention is to provide improved packaging methods and apparatus for folding and inserting a package part, such as a carton tab or flap or the like, into a receiving opening.

A still further object of the invention is to provide, in connection with packaging operations of the type stated, for the preconditioning or shaping of a package opening into which a tucked or inserted element is to be introduced, whereby to facilitate and insure the invariable and proper seating of the element within said opening.

Various other objects, advantages and features of the invention will be apparent from the following specification when taken in connection with the accompanying drawings wherein a preferred embodiment of the invention is set forth for illustrative purposes.

In the drawings, wherein like reference numerals refer to like parts throughout:

Fig. 1 is a plan view of a packaging apparatus constructed in accordance with the principles of the invention and adapted for carrying out the methods thereof;

Fig. 2 is a partial perspective view of the apparatus of Fig. 1, more particularly illustrating the former member and associated flap-folding and tucking elements;

Figs. 3 and 4 are partial plan views illustrating the action of the former member as it is engaged and withdrawn from the package opening during the shaping or forming operation;

Fig. 5 is a longitudinal sectional view through the structure of Fig. 1, on the line 5—5 thereof;

Fig. 6 is a transverse sectional view through the structure, on the line 6—6 of Fig. 1;

Fig. 7 is a detail, perspective view of the aliner member forming a part of the flap or tab-tucking means;

Figs. 8 and 9 are detail perspective views of the flap-folding cams forming a part of the flap-folding and flap-inserting structures;

Figs. 10 to 14, inclusive, are sectional, illustrative views, on an enlarged scale, showing successive steps in the flap-folding and inserting or tucking operations;

Fig. 15 is a sectional, illustrative view, on a further enlarged scale, and taken on the line 15—15 of Fig. 10, illustrating the action of the former member; and

Figs. 16 and 17 are illustrative, perspective views further showing the tab or flap-inserting operations.

Referring more specifically to the drawings, it will be seen that the structure comprises a conveyor, generally indicated by the numeral 10, Figs. 1, 5 and 6, adapted to convey a series of packages along a predetermined path of movement. Specifically, the packages in the illustrated embodiment are cartons or the like 11 of a type having an end closure formed of a pair of cooperating side flaps 12 and 13, Fig. 16, and an overlapping cover flap 14. The conveyor comprises a track structure 15, shown in section in Fig. 6, mounted upon the frame 16 of the machine by suitable means such as bolts or the like. The track member 15 is of general U-shape in section, and has secured to the upper portions thereof a pair of track members 17 and 18 which, together with members 15, form the longitudinal extending track structure along which the movable elements of the conveyor are adapted to be propelled.

The movable elements of the conveyor comprise a series of U-shaped buckets 20, Fig. 5, connected by means of links 21, the links and buckets being pivotally secured by a series of pivot pins 22. The conveyor is of the endless type, and may be propelled by means of sprockets or the like, not shown, arranged at its ends, as will be understood by those skilled in the art. In the particular embodiment shown, the conveyor is adapted to be propelled by its driving mechanism continuously and at a uniform speed during the operation of the machine. The buckets 20 form a series of alined pockets within which the cartons 11 are carried along the path of travel of the conveyor, it being understood that the cartons may be arranged on the conveyor at one end and removed from the conveyor at the other end thereof, by suitable means. The present invention concerns that phase of the packaging operation occurring after the cartons have been loaded and the side flaps 12 and 13 of the end closure folded into position, more particularly

concerning the folding, and insertion or tucking of the cover flap or tab member 14, and the shaping of the carton opening to receive the flap.

The conveyor also includes an upper frame bar 25, Figs. 5 and 6, extending along the length of the conveyor, and adapted to carry a presser bar 26 by means of a series of studs 27. Compression springs 28 are mounted on these studs, and are operative to maintain the presser bar in yielding contact with the upper surfaces of the cartons, whereby to hold the cartons in proper position within the conveyor buckets during the packaging operations.

The means for folding and tucking the carton flap 14 into proper seated position comprises a pair of stationary folding cams, an operating flap-folding or breaking member, a series of tucking members, an aliner member or guide member cooperable with the tuckers, and a forming or shaping member insertable into the carton opening adapted to receive the flap, prior to the insertion of the flap member therein. These members, and their manner of operation, will now be described.

The structure of the stationary folding cams will be best understood by reference to Figs. 8 and 9, and their manner of mounting with respect to the conveyor is best shown in Fig. 6. As illustrated, there are two of these folding cams, an upper folding cam 30, Fig. 8, and a lower folding cam 31, Fig. 9. The upper folding cam 30 is carried by a series of brackets one of which is indicated at 32 in Figs. 1 and 6, which bracket is supported from the conveyor track 15 by means of a support arm 33. Similarly, the lower folding cam 31 is carried by a series of brackets 34 supported from the conveyor track by support arms 35. The manner in which the cams progressively fold the carton flap 14 and effect the tucking of the flap, as illustrated in Figs. 10 to 14, inclusive, will be later described in reference to the operation of the structure.

The forming member 37, the folding or flap-breaking member 38, and the series of tucking elements 39, 40 and 41 are all carried by a support frame 42, as will be best understood by reference to Fig. 2. Whereas the folding cams 30 and 31 are stationary during the operative functioning of the machine, the forming and tucking members are movable, and to this end the support frame 42 is adapted for movement in predetermined and timed relation to the movement of the conveyor. More specifically, the support 42 is adjustably mounted by means of bolts such as indicated at 43, Fig. 2, upon a bracket 44, Figs. 1, 2 and 6. This bracket is in turn adjustably mounted by means of bolts 45 upon an operating frame 46 pivotally mounted by means of studs 47 and 48 upon a pair of gear wheels 49 and 50, respectively. Gear 49 is mounted on a driven shaft 51, whereas gear 50 is mounted on an idler shaft 52, and the two gears are connected for simultaneous operation by means of an intermediate idler gear 53 mounted upon an idler shaft 54.

As stated, the shaft 51 is adapted to be driven, and this shaft is preferably driven from the same operating means that drives the conveyor, so that the shaft and conveyor will be continuously operated in predetermined timed relation during the operation of the machine. As the shaft 51 is driven, the gears 49, 50 and 53 will all be driven in timed relation, and the movement of the gears 49 and 50 imparts a bodily circular shifting to the operating frame 46, due to the eccentric positions of the studs 47 and 48 upon the gear wheels. This circular motion of the operating frame is transmitted to the support frame 42 through the intermediary of the bracket 44, a circular motion thereby being imparted to the forming or shaping element 37, the folding or flap-breaking member 38, and the several tucking elements 39, 40 and 41. The circular motion of the support 42 gives the elements a component of movement toward and away from the conveyor, and also longitudinally of the conveyor. The conveyor and gears are driven as indicated by the arrows in Fig. 1, and it will be seen that the conveyor moves to the right and that the frame 42 and the elements carried thereby likewise move to the right during the time that the frame is projected toward the conveyor and the operating elements are in operative association with the cartons. The support 42 may be adjusted toward or away from the conveyor by means of the adjustment screws 45, and longitudinally of the conveyor by means of the adjustment screws 43. The support is provided at its end remote from the bracket 44 with a bearing foot 55 adapted to slidably engage a support platform 56 formed as a part of the frame of the machine.

The several elements 38, 39, 40 and 41 are rigidly carried upon the support 42, whereas the forming or shaping member 37 is pivotally mounted upon the support for limited pivotal shifting with respect thereto. More specifically, as best shown in Figs. 3, 4 and 10, the forming member is pivotally mounted upon a stud 57 carried by the support, there being also provided a pin 58 anchored to the support and engageable within a slot formed in the forming member. A tension spring 59 is anchored at one end to the support and at the other end to the forming member, and normally urges the latter counterclockwise is seen in Figs. 3 and 4 to the limit permitted by the pin and slot connection.

The position of the parts as the forming member operatively engages the carton is illustrated in Fig. 3, and Fig. 4 shows the relative position of the parts as the forming member leaves its operative engagement. It will be seen in Fig. 3 that as the forming member engages the carton it is slightly behind the carton with respect to the latter's longitudinal travel, whereas as the forming member leaves the carton it is in advance thereof. This action is secured due to the fact that while the gears are driven at constant speed, the support 42 has a maximum rate or component of movement longitudinally of the conveyor, and greater than the speed of movement of the conveyor, during that portion of the operating cycle while the forming member is projected into operative contact with the carton.

The structure of the aliner or guide member for guiding the folded carton flap into seated position within its receiving opening is illustrated in Figs. 1, 5 and 7. As shown, the upper frame bar 25 of the conveyor carries a laterally projecting support arm 62 on the end of which is mounted the aliner or guide member 63. The lower surface of this aliner is adapted to contact the carton flap and guide the same into seated position.

The flap-folding and tucking operations will be best understood by reference to Figs. 10 to 14, inclusive, and also Figs. 15, 16 and 17. It is to be understood that the cartons are moved continuously through the machine by the conveyor, engaging the stationary folding cams; and as the cartons are moved along the support 42 they are

acted upon successively by the forming member, the folding or flap-breaking member, and the several tucking members in sequence, at each cycle of operation of the support. The action of the forming member is illustrated in Fig. 10; the action of the flap-breaking member is illustrated in Figs. 11 and 12; and the actions of the first and last tucking members are illustrated in Figs. 13 and 14, respectively.

Referring to Fig. 10, as the carton is brought into operative engagement with the folding cams 30 and 31, the upper cam 30 becomes operative to engage and hold the previously folded flaps 12 and 13 in position, and the lower cam 31, by reason of a cam surface 31a, Fig. 9, formed thereon, engages and effects an initial bending operation upon the cover flap 14. Simultaneously the forming or shaping member 37 is projected into engagement with the carton to form and shape an opening 65, Fig. 16, therein, above the flaps 12 and 13, for receiving the cover flap 14 subsequently to be folded into position. As will be understood by reference to Figs. 3 and 4, the end of the forming member is shaped generally to correspond with the shaping of the end of the flap 14 but, as indicated in Fig. 15 on a somewhat exaggerated scale, the forming member is made slightly wider as well as slightly thicker than the end of the carton flap, whereby to insure the production of an opening 65 in the carton adequate to readily receive the flap without possibility of jamming or crushing of the parts.

It will be understood that in automatic packaging machines of the type herein provided, tab members such as the flap 14 are moved very rapidly into folded and seated position into the carton. Also, this action is effected by mechanical operating devices of a rigid and non-yielding character. The preconditioning of the opening 65 by means of the forming or shaping member 37 which, as stated, is shaped to simulate generally the flap 14, but is slightly greater in width and thickness, insures the production of a proper sized and positioned opening so that the flap may be received within the carton without possibility of crushing, buckling or jamming, and notwithstanding rapid and positive operation of the flap-inserting mechanisms. More particularly, the slightly over-size forming member produces a permanently set and properly disposed opening in the carton, as shown in Fig. 16, insuring the ready reception of the tab or flap. The action of the flap-tucking members is facilitated, and it is insured that the end closure for the carton, as the cartons leave the conveyor, will be in proper condition.

Due to the circular motion of the support member 42, the former 37 may be inserted into the carton opening 65 to form and shape the same while the carton is being moved by the conveyor, and due to the resilient or yielding mounting of the former member upon its support 42, the former member is enabled to feel its way into the carton opening without damage to the carton, notwithstanding slight variations in successive carton bodies. Rapid and automatic operation with continuous motion of the cartons is permitted. The spring 59 not only permits the yielding or resilient movement of the forming member, but also restores the member to an invariable position as the former leaves contact with the carton, whereby to facilitate its introduction into the opening of the next succeeding carton body. The end of the forming member, which is rounded to simulate the tab 14, has a rocking action as it shapes the opening, as will be understood by reference to Figs. 3 and 4.

As the carton reaches a position opposite the folding or flap-breaking member 38, the member engages the end of the flap 14 breaking and folding it over the upper cam member into position as illustrated in Figs. 11 and 12. At this station of the conveyor the cooperating contours 30b and 31b of the upper and lower stationary cams are shaped so that during the folding and breaking operation the cams firmly guide the lower flap portion and hold it in position. As the carton then moves to succeeding stations opposite the tucking members 39, 40 and 41, these tucking members operate to tuck the folded flap into position within the carton opening 65. The action of the first tucking member 39 is illustrated in Fig. 13, and it will be seen that during this initial tucking operation the aliner or guide member 63 operates to guide the bent flap end into the carton opening. The action of the final tucking member 41 is illustrated in Fig. 14, this tucking member being operable to push the carton flap into fully seated position. By reference particularly to Fig. 1, it will be seen that the several tucking members are of progressively increasing length whereby to effect the progressive tucking of the carton flap into proper seated position. Also, the tucking members 39 and 40, as well as the folding and flap-breaking member 38, are provided with tapered or inclined end surfaces whereby to facilitate the flap-folding and tucking operations. The upper folding cam is recessed as indicated at 30c, Fig. 8, to permit the inward movement of the flap during the initial tucking operation, as illustrated in Fig. 13, the cam entirely terminating as the final tucking members become operative to move the flap into fully seated position. The manner in which the flap is finally tucked into position into the carton opening is also illustrated in Fig. 17.

It is obvious that various changes may be made in the specific embodiment of the invention set forth for purposes of illustration without departing from the spirit thereof. Accordingly, the invention is not to be limited to the specific embodiment described, but only as indicated in the following claims.

The invention is hereby claimed as follows:

1. A packaging apparatus comprising means for conveying a package having a projecting tab element along a predetermined path, means associated with said conveying means and disposed at an inserting station therealong for inserting the tab element into an opening in the package adapted to receive said tab, a former member also associated with the conveying means and disposed at a forming station therealong in advance of the inserting station, a support for the former member, means for projecting said support toward the package whereby to insert the former member into the package opening, and means for resiliently mounting the former member upon its support to facilitate the movement of the former member into said package opening.

2. A packaging apparatus comprising means for conveying a package having a projecting tab element along a predetermined path, means associated with said conveying means and disposed at an inserting station therealong for inserting the tab element into an opening in the package adapted to receive said tab, a former member also associated with the conveying means and disposed at a forming station therealong in advance of the inserting station, and means operable

while the package is being moved by the conveying means for shifting the former member into the package opening and simultaneously along the path of travel of the package whereby to shape said opening.

3. A packaging apparatus comprising means for conveying a package having a projecting tab element along a predetermined path, means associated with said conveying means and disposed at a predetermined point therealong for inserting the tab element into an opening in the package adapted to receive said tab, a former member also associated with the conveying means and disposed at a predetermined point therealong in advance of the inserting means, and means operable while the package is being moved by the conveying means for projecting the former member into the package opening whereby to shape said opening, said projecting means having a component of movement in the direction of travel of the conveying means but at a different speed than the speed of travel of the conveying means.

4. A packaging apparatus comprising means for conveying a package having a projecting tab element along a predetermined path, means associated with said conveying means and operable while the package is being moved by the conveying means for inserting the tab element into an opening in the package adapted to receive said tab, and means also associated with the conveying means and operable while the package is being conveyed by the conveying means for shaping said package opening to receive said tab, said shaping means comprising a former member having an increment of movement along the path of travel of the conveyor and projectible into the package opening while the package is in motion.

5. A packaging apparatus comprising means for conveying a package having a projecting tab element along a predetermined path, means comprising a series of stationary cams associated with said conveying means and operable while the package is being moved by the conveying means for inserting the tab element into an opening in the package adapted to receive said tab, a former member associated with the conveying means, and means for moving said former member into the package opening and along the path of travel of the package while the package is being moved by the conveying means whereby to shape said package opening to receive the tab element.

6. A packaging apparatus comprising means for conveying a package having a projecting tab element along a predetermined path, means associated with said conveying means and disposed at a predetermined point therealong for inserting the tab element into an opening in the package adapted to receive said tab, said tab inserting means comprising stationary cam means and folding and tucking elements, a former member also associated with the conveying means, and means for moving the former member along the path of travel of the conveying means and for simultaneously projecting the former member into the package opening as the package is conveyed by the conveying means to shape said opening and for withdrawing the former member from said opening prior to the introduction of the tab element therein.

7. A packaging apparatus comprising means for conveying a package having a projecting tab element along a predetermined path, means associated with said conveying means and disposed at a predetermined point therealong for inserting the tab element into an opening in the package adapted to receive said tab, a former member also associated with the conveying means, a support for the former member, and means for moving said support in a circular path whereby to project the former member toward the package and into the package opening to shape said opening and simultaneously move the former member along the path of travel of the conveying means.

8. A packaging apparatus comprising means for conveying a package having a projecting tab element along a predetermined path, means associated with said conveying means for inserting the tab element into an opening in the package adapted to receive said tab, and means also associated with the conveying means and operable while the package is being conveyed by the conveying means for shaping said package opening to receive said tab, said shaping means comprising a former member having an increment of movement along the path of travel of the conveyor and projectible into the package opening while the package is in motion.

9. A packaging apparatus as defined in claim 8 wherein a support is provided for the former member, the former member being resiliently mounted on said support.

10. A packaging apparatus as defined in claim 8 wherein the former member is resiliently mounted upon the support.

11. A packaging apparatus comprising means for conveying a package having a projecting tab element along a predetermined path, means associated with said conveying means and disposed at a predetermined point therealong for inserting the tab element into an opening in the package adapted to receive said tab, a former member also associated with the conveying means, a support for the former member, and means for moving said support in an orbital path whereby to project the former member toward the package and into the package opening to shape said opening and simultaneously move the former member along the path of travel of the conveying means.

12. A packaging apparatus comprising means for conveying a package having a projecting tab element along a predetermined path, means associated with said conveying means and disposed at a predetermined point therealong for inserting the tab element into an opening in the package adapted to receive said tab, a former member also associated with the conveying means, a support for the former member, and means for moving said support toward and from the package whereby to project the former member into the package opening to shape said opening, said former member being yieldably mounted upon its support whereby the former member may adjust itself automatically within predetermined limits to the position of the package and the package opening on the conveying means.

13. A packaging apparatus comprising means for conveying a package having a projecting tab element along a predetermined path, means associated with said conveying means and disposed at a predetermined point therealong for inserting the tab element into an opening in the package adapted to receive said tab, a former member also associated with the conveying means, a support for the former member, the former member being resiliently mounted on said support, and means for projecting the former mem-

ber into the package opening to shape said opening and for withdrawing the former member from said opening prior to the introduction of the tab element therein.

14. In a packaging apparatus for cartons of the type having a body and an end closure comprising a pair of cooperative side flaps and an overlying cover flap provided with a tab element, the combination of means for conveying the carton along a predetermined path, means associated with the conveying means for holding said side flaps in cooperative closed position whereby to form an opening in the carton between the edges of said flaps and one of the side walls of the carton body, a former member mounted adjacent the conveying means, operating means for projecting the former member into said carton opening to shape said opening and for withdrawing the former member from said opening, and means disposed at a predetermined point along the conveying means and operable after the withdrawal of the former member from said carton opening for folding the cover flap into overlying position upon said side flaps and for inserting said tab element into the formed carton opening.

15. A packaging apparatus as defined in claim 14, wherein said former member and said tab inserting means are located at different stations longitudinally of the conveying means, whereby the cartons transmitted by the conveying means are transmitted successively first to the former member and thereafter to the tab element inserting means.

16. A packaging apparatus as defined in claim 14, wherein the operating means for the former member includes means for moving the former member longitudinally of the conveying means simultaneously as the former member is projected into the carton opening, whereby the former member may be projected into the carton opening as the carton is being moved by the conveying means.

17. A packaging apparatus as defined in claim 14, wherein a support is provided for the former member, the former member being resiliently mounted on said support.

CLARENCE J. MALHIOT.

CERTIFICATE OF CORRECTION.

Patent No. 2,340,835. February 1, 1944.

CLARENCE J. MALHIOT.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 41, for "is seen" read --as seen--; page 4, second column, line 30, for the claim reference numeral "8" read --7--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of May, A. D. 1944.

Leslie Frazer

(Seal) Acting Commissioner of Patents.