

July 24, 1951

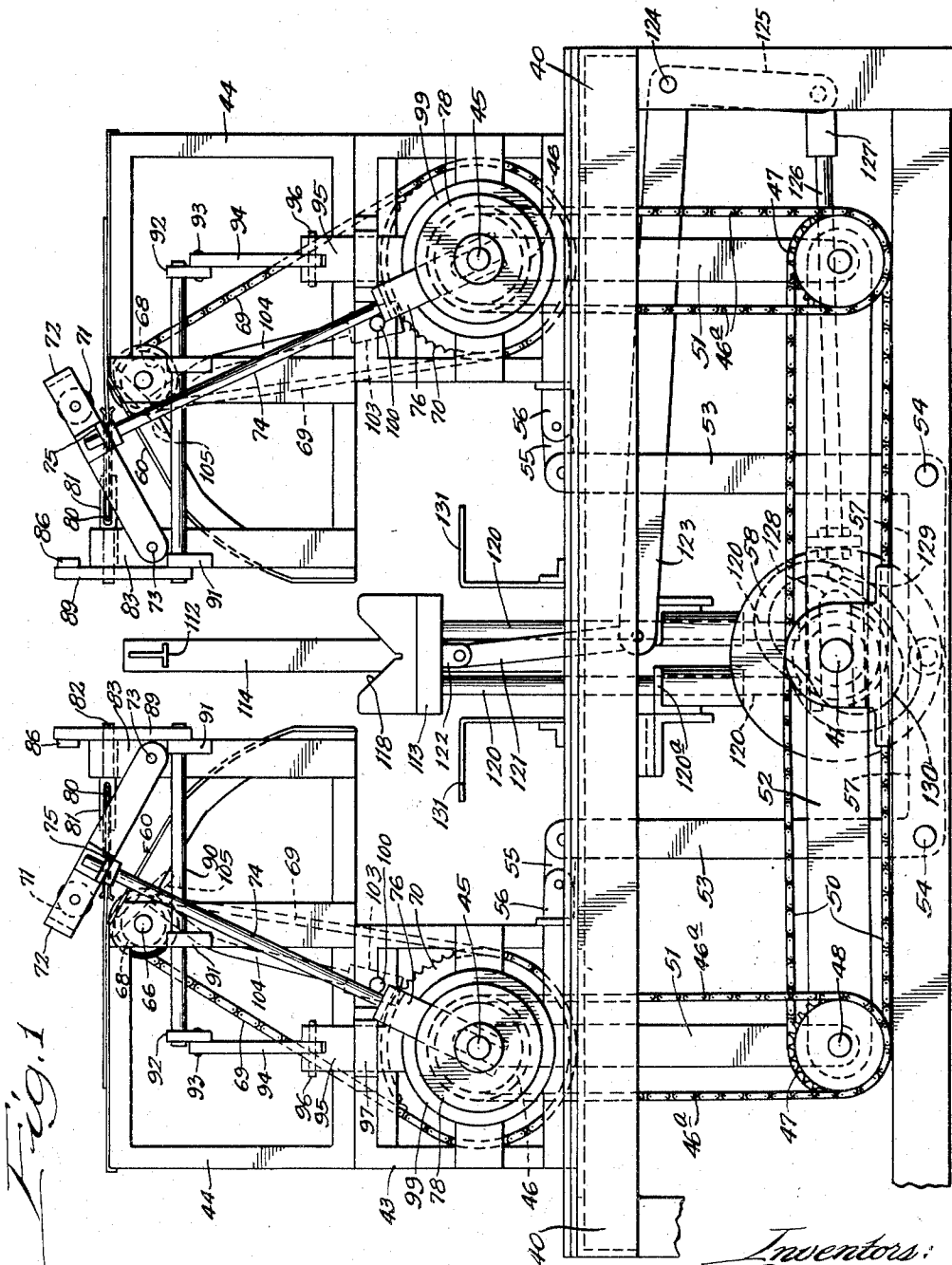
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2,561,776

AUTOMATIC CARTON ERECTING MACHINE

Filed Dec. 5, 1945

6 Sheets-Sheet 1



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Fig. 2

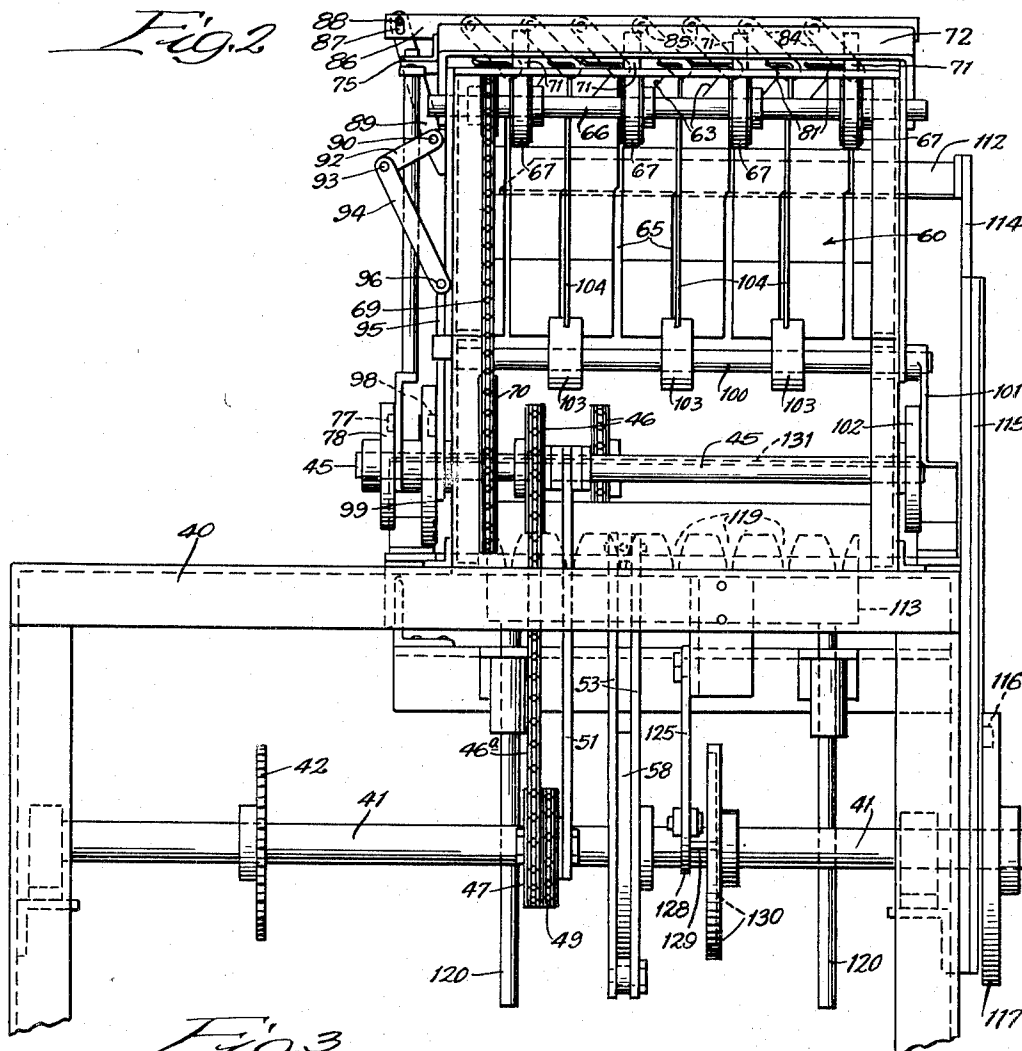
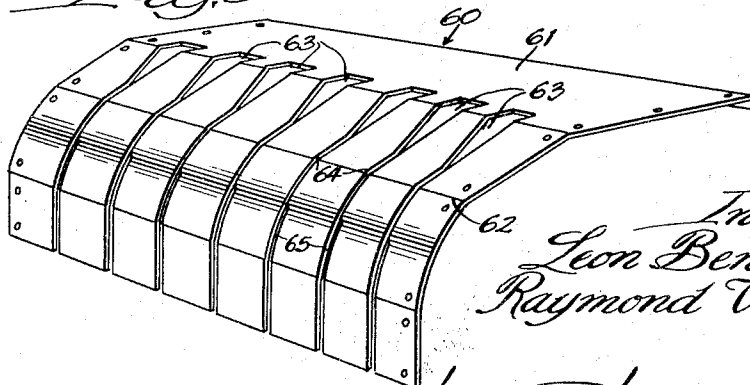


Fig. 3



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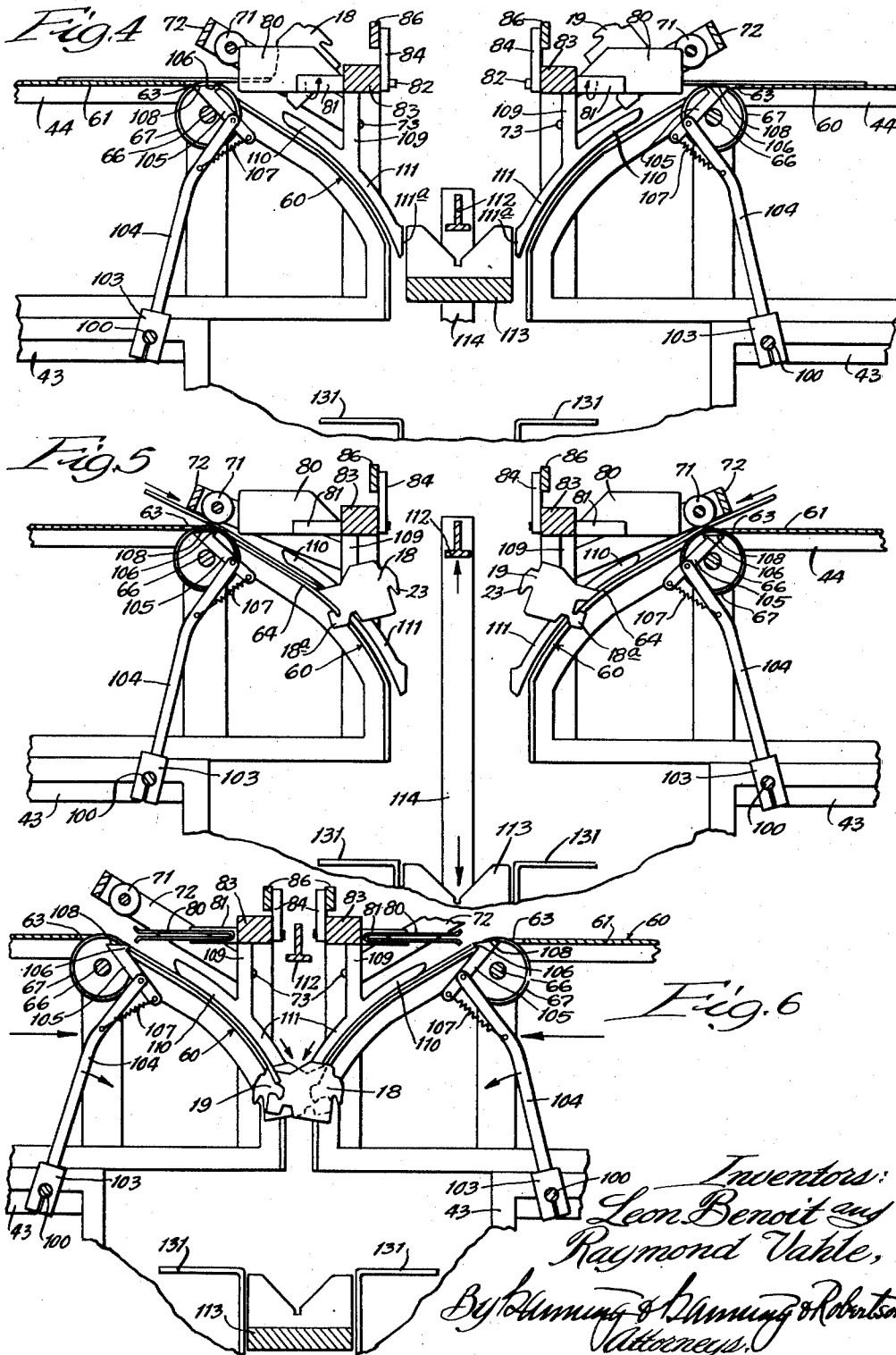
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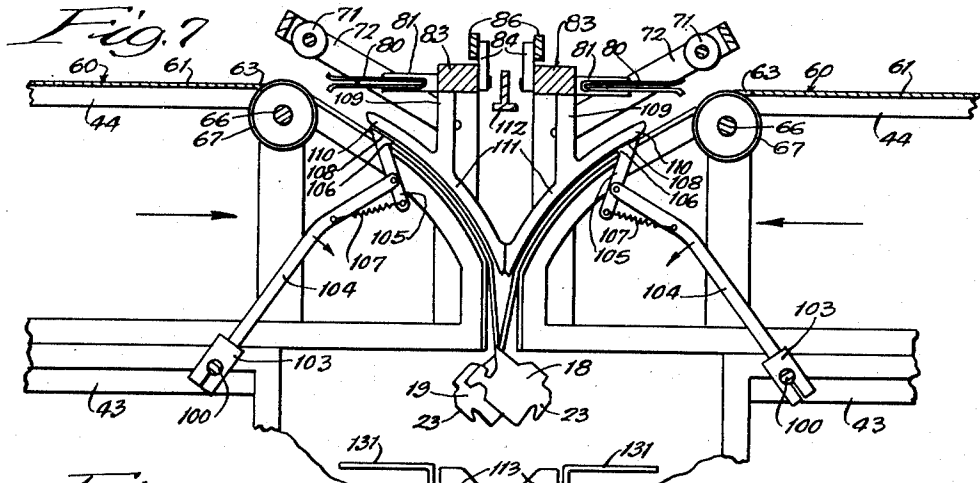
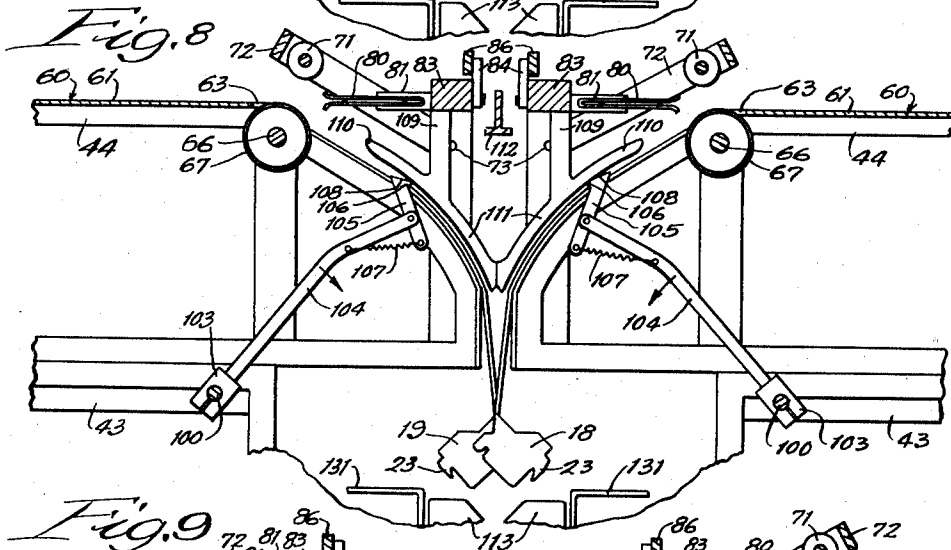
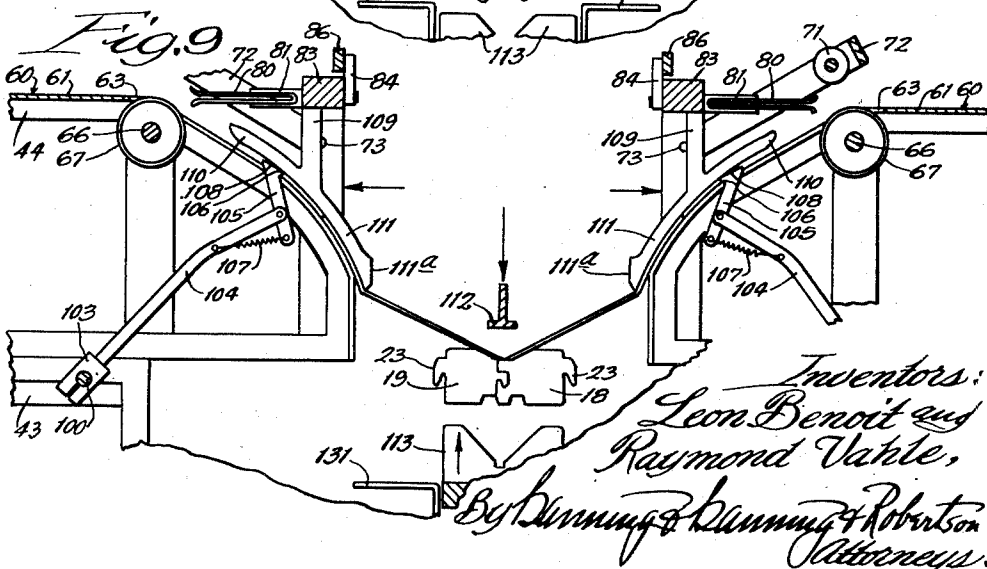
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AUTOMATIC CARTON ERECTING MACHINE

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6 Sheets-Sheet 4



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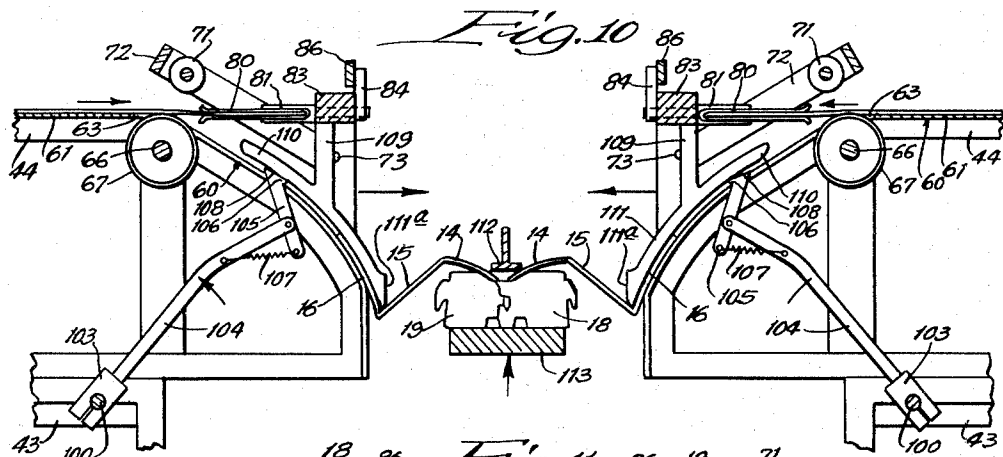
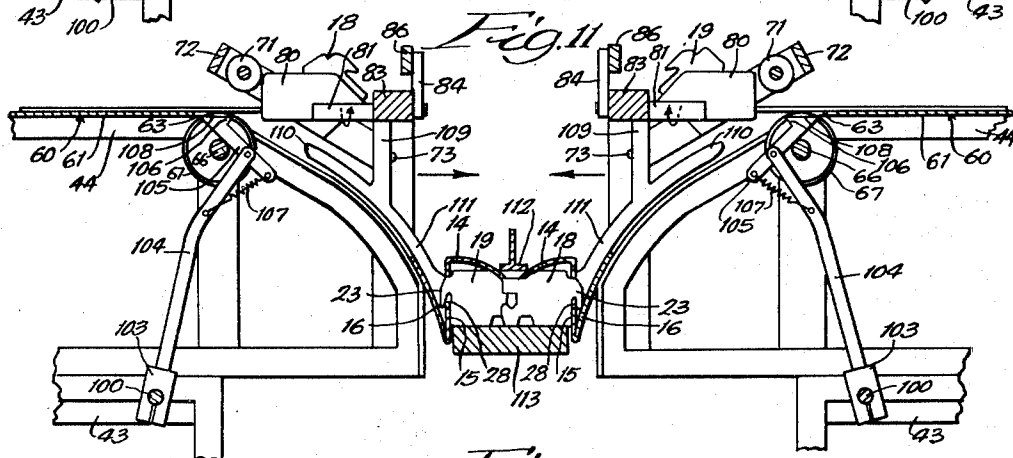
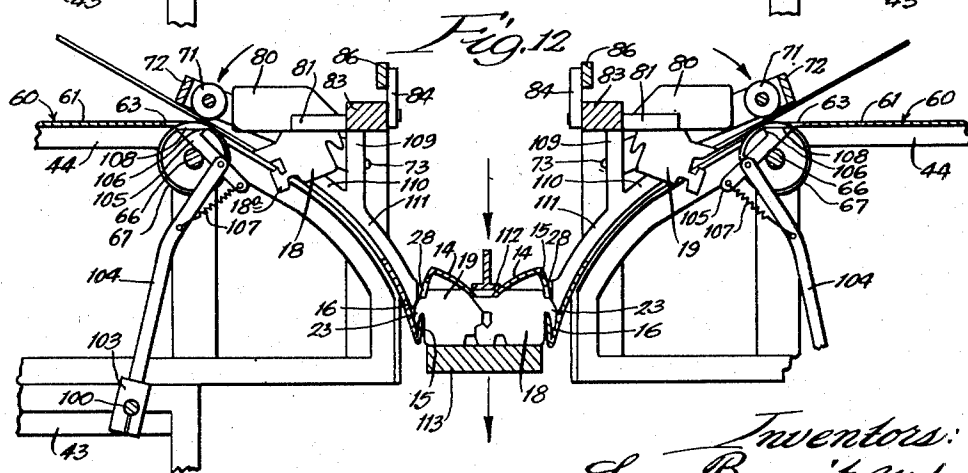
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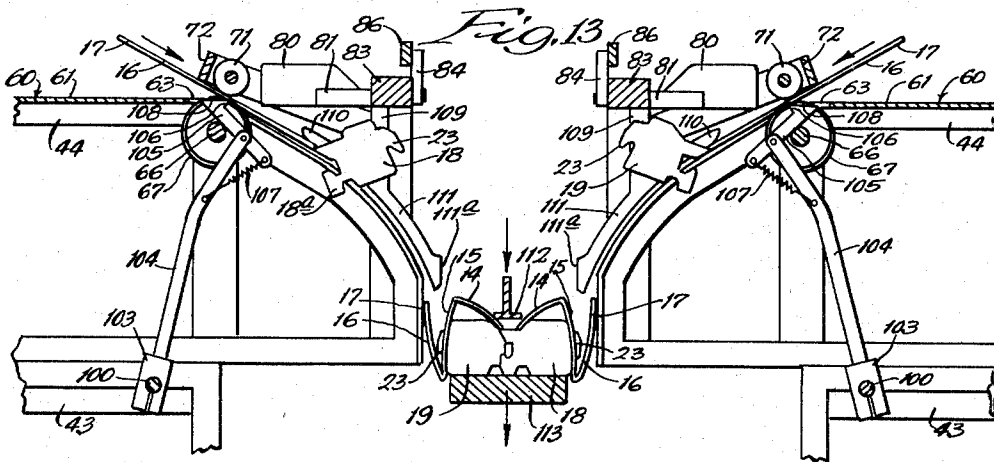
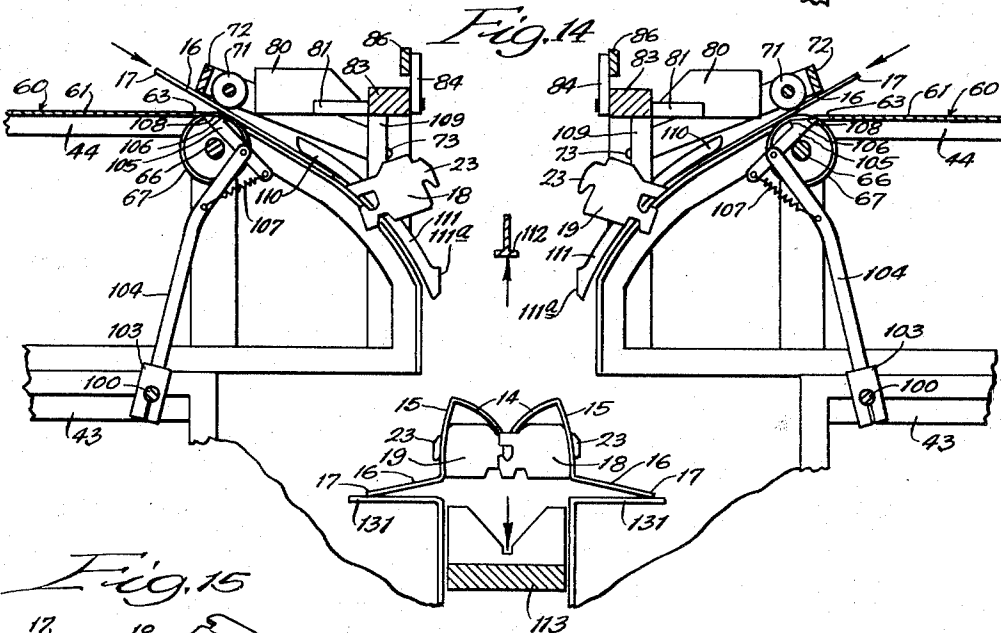
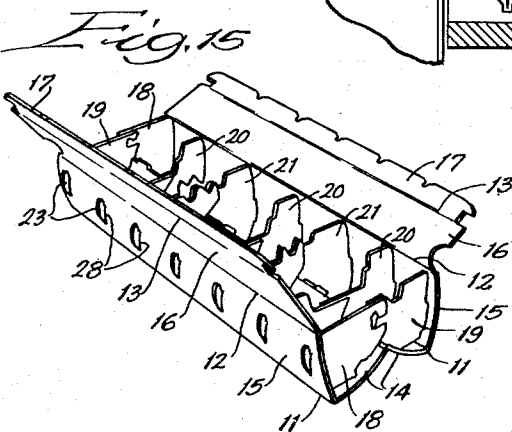
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AUTOMATIC CARTON ERECTING MACHINE

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6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

2,561,776

AUTOMATIC CARTON ERECTING MACHINE

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a corporation of New York

Application December 5, 1945, Serial No. 632,857

24 Claims. (Cl. 93—37)

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This invention relates in general to a machine for automatically erecting cartons of a cellular holder type adapted to contain and to protect within its cells articles such as eggs, fruits, candies and the like, and it is more particularly described as a machine for setting up a double-lock carton formed from a pair of similar blanks having flaps on each blank adapted to form transverse cross walls with hooks at the extremities which are forced through slits in the opposite sides and thus providing a double, interlocking, unitary structure having cells with yielding walls for containing articles therein.

An important object of the invention is to provide a simple automatic machine having similar mechanisms disposed at opposite sides of the center and operating in unison on similar or complementary blanks fed from stacks at opposite sides of the machines.

A further object of the invention is to provide an automatic carton erecting machine in which opposite flat carton blanks are fed inwardly together, the flaps turned and interconnected for forming a double-lock carton with the flaps open and extending upwardly.

Still a further object of the invention is to provide an assembling machine for a cellular carton made from a pair of similar blanks each having a row of flaps which are turned to form cross walls and engaged with the side wall of the opposite blank and resiliently locking the parts together.

Other objects of the invention will appear in the specification and will be apparent from the accompanying drawings which illustrate a suggestive embodiment of the invention in which

Fig. 1 is front elevation of a carton erecting machine in accordance with this invention;

Fig. 2 is an end view of the machine shown in Fig. 1;

Fig. 3 is a perspective of one of the carton guide plates;

Figs. 4 to 14 inclusive show certain of the operating parts of the machine in successive operating positions with respect to the carton blanks;

Fig. 4 with the blanks fed inwardly and the flaps turned at right angles;

Fig. 5 with the outer edges of the blanks tipped upwardly and the blanks fed inwardly together;

Fig. 6 with the flaps of the blanks extending oppositely together in pairs to form cross walls;

Fig. 7 with the blanks and cross walls fed downwardly together;

Fig. 8 with the blanks fed still further downward to their lowermost position;

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Fig. 9 with the carriages moved apart but engaging the flaps of the blanks and the upper and lower die members approaching the blanks to engage the cross walls;

Fig. 10 with the carriages moved partially together with the upper and lower die members moved upwardly between them gripping the cross walls;

Fig. 11 with the carriages further advanced toward each other until the angles between the flaps and the side walls of the cartons are quite sharp, the holding dies being near the top of their movement and the hooks of the flaps forced through the slits' side walls;

Fig. 12 with the dies in the beginning of their downward movement forcing the hooks to shift and engage in the slits of the carton walls;

Fig. 13 with a continuation of the downward movement of the dies and the connected blanks freeing the blanks from the guiding plate and fingers;

Fig. 14 with an erected carton discharged at the bottom below the carriages and released from engagement with the die blocks ready for ejection in complete erected condition; and

Fig. 15 is a perspective of an assembled and erected carton of the type to which this machine is applicable.

This invention relates to a machine for automatically erecting a cellular carton of the type which comprises two identical or complementary blanks each having flaps which when turned at 90 degrees become the cross walls of the opposite adjacent cellular section, the cross walls having hooks which are engaged through the slots of the opposite walls and thereby forming a double locked carton connecting the two sections of the carton when it is erected.

In the present invention there are two carriages which receive carton blanks from opposite sides and move toward and from each other in completing a movement cycle. During the movement cycle, each blank is fed forwardly, the flaps are turned and the blanks are moved downwardly together to interengage the opposite blanks and to form a completely erected carton. While one carton is undergoing its erecting in the machine, a pair of blanks for a second or other cartons may be started therethrough. In this way the operation of the machine is continuous, progressive and automatic.

Referring now more particularly to the drawings, particularly Figs. 1 and 2, a pair of carton blanks is fed simultaneously from the opposite sides of the machine, each blank 10 being cut,

scored and slit to form longitudinal score lines 11, 12 and 13, dividing it into a bottom 14, a side 15, a cover 16 and a cover flap 17. At the outer edge of the bottom are end flaps 18 and 19 and intermediate flaps 20 alternated with flaps 21. Each of these flaps is hinged to the edge of the bottom section by a scored hinge line extending at an angle to the edge of the bottom so that when the flap is folded thereon and turned at 90 degrees, it extends outwardly or oppositely from the edge of the bottom 14 and across the bottom of the opposite carton section when it is erected to form a carton.

At the outer edge of each flap is a hook lug 23 for engaging a corresponding side lock of the opposite blank, each lock comprising a locking slit 28 for engagement with its hook lug 23. This cross and side wall lock construction is such that the hook lugs 23 of one carton blank are extended and pushed through the locking slits 28 of the opposite carton section, the extremity of each hook being inserted between the slit and the hook being displaced longitudinally to engage and lock beyond the end of the slit.

A suitable automatic machine for assembling and erecting such cartons is shown more particularly in Figs. 1 and 2 and comprises a framed support 40 having an operating shaft 41 suitably mounted therein and extending from front to back of the frame with a driving wheel or sprocket 42 on the shaft for power operation. Slidable on top of the support at each side of the shaft is a carriage having a lower gear mounting portion 43 and an upper inwardly extending carton blank carrier 44. In the gear mounting portion is a shaft 45 extending parallel with the driving shaft 41 and connected thereto by a sprocket 46 mounted on shaft 45, a sprocket chain 46a extending thereover and around a sprocket 47 mounted on a lower shaft 48. To this shaft 48 is connected a sprocket 49 which is then connected by a sprocket chain 50 with a sprocket on the shaft 41. To permit movement of the carriage, the sprocket shaft 48 is mounted for movement on links 51 and 52, link 51 being freely connected at one end to the shaft 45 and freely connected at its other end to the shaft 48 and the link 52 freely connected at one end to the shaft 48 and at its other end to the driving shaft 41. With this construction the shaft 48 has a floating connection and is raised and lowered to maintain the driving relation between shafts 41 and 45 as the carriage is moved to and fro on the frame 40.

To effect timed movement of the carriage a lever 53 which may be in the form of a bell crank is rotatable upon a pivot 54, intermediate its ends, the upper end is pivotally connected by means of a link 55 which is also pivoted to an extension 56 of the lower carriage 43, and the other end of the lever 53 is connected by a projection 57 with a suitably formed cam slot in a cam member 58 mounted on the shaft 41. Thus in accordance with the shape of the cam, the carriage will be reciprocated in timed relation for receiving and feeding the carton blanks as the shaft 41 is rotated and a proper driving connection is maintained at all times with the shaft 45.

Mounted at the top of the carton blank carrier is a guide plate 60 having a flat top or table portion 61 (see Fig. 3) and a downwardly turned slotted portion 62 with a plurality of slots extending from the table portion to the lower edge thereof, each slot having an upper triangular opening 63 terminating in a narrow slot 64 and

continuing as a wider slot 65 near the bottom thereof. Also mounted near the top of the carton blank carrier is a shaft 66 having a plurality of friction rollers 67 thereon preferably one for each of the openings 63 and partially projecting therethrough to engage the underside of a carton blank on the plate for feeding it forwardly. To rotate the shaft a sprocket 68 is provided at one end to which a chain 69 is connected which passes around a sprocket wheel 70 secured to the shaft 45.

A presser roller 71 is mounted at its ends in a yoke 72, the ends of the yoke being mounted on pivots 73 at the front and rear of the carton blank carrier adjacent the inner end thereof. This yoke is raised and lowered by a rod 74 extending at its upper end through a bracket 75 and having a forked extremity 76 at its lower end extending over the shaft 45 so that the rod can be raised and lowered with respect thereto, the raising and lowering action being effected by means of a projection 77 engaging a cam 78. With this construction the continued rotation of the shaft 45 causes the rod 74 to be raised and lowered moving a roller 71 downwardly to press a carton blank downwardly into engagement with the rollers 67 for feeding blanks forwardly in timed relation with each other and to the movements of the carriages.

As the flat carton blanks are fed inwardly the bendable flaps which are to be turned at right angles to form the cross walls are moved into engagement with a number of U-shaped clips 80 each of which is mounted in a block 81 having a projecting stem 82 extending through a support 83 at one end of the carriage. Each stem is connected to a link 84, the upper end of which has a pivot 85 for mounting it in a suitable hole in a movable cross-piece 86. The cross-piece is reciprocated endwise which rocks the clips in timed relation to the feeding movement of the carton blanks to receive the flaps and bend them substantially at right angles to the remainder of the carton blank.

In order to reciprocate the cross-piece 86 it is provided at one end with a slot 87 engaged by a projection 88 at one end of a lever 89 pivoted at one end of a rock shaft 90 suitably mounted at the end of the carriage in brackets 91. An arm 92 is secured to the shaft and has a pivot 93 at its free end connecting it to the upper end of a link 94 which is pivoted to the upper end of a slide 95 by a pivot pin 96. The slide is mounted for vertical movement with respect to the carriage by a bracket 97 and near its lower end it has a projection 98 engaging in a cam groove in a plate 99 mounted on shaft 45 so that the rotation of the cam plate will cause corresponding movement of the slide 95 and rocking of the shaft 90 and consequent movement of the flap engaging clips 80.

The carton blanks are fed inwardly by the rollers 67 and 71, the flaps are engaged and turned by the clips 80, and each carton blank is fed downwardly over the guide plate 60. Additional means are necessary to continue the downward movement of the cartons after the rear ends of the cartons pass the rollers 67 and 71. For this purpose a shaft 100 is suitably mounted transversely of each carriage having an arm 101 secured to one end of the shaft and adapted to engage a cam 102 mounted on a shaft 45. Also mounted on the shaft intermediate the ends (see Figs. 4 to 14) are blocks 103 each having a bar 104 supported thereby and extending upwardly therefrom to a point below the guide plate 60,

At the upper end of the bar, a lever 105 is freely pivoted intermediate its ends. At one end is an angular tooth 106 projecting therefrom and adapted to extend through an opening 63 and the slots 64 and 65 corresponding thereto of the guide plate. Connected to the other end of the lever 105 is a spring 107 which is also connected to the adjacent portion of the bar 104 so that the spring tends to thrust the engagement tooth 106 through the openings and the slots of the guide plate as the shaft 100 is rocked and the bar 104 moved therewith. The shaft 100 is reciprocated by the engagement of arm 101 and cam 102 which rocks each of the toothed levers backward and forward, the levers 105 each having an inclined end portion 108 which adapts them to engage below the upper portion of the plate 60, in one limiting position and to be thrust upwardly through the guide plate 60 behind and to engage the rear edge of a carton blank on the plate. After a blank has been thus engaged and moved forwardly and downwardly the toothed levers are returned to their upper position and the next carton blank is similarly engaged.

Overlying the guide plate and spaced therefrom between the slots thereof are a plurality of guiding fingers (see Fig. 4) each having a support 109 extending downwardly secured to the carriage above the plate with an upward extending portion 110 overlying the upper slotted portion 62 of the plate and with a downwardly extending portion 111 extending over the lower slotted portion of the plate and terminating in a flat abutment portion 111a in advance of the lower extremity of the guide plate. Both of the extending portions 110 and 111 are spaced sufficiently from the guide plate 60 to permit a carton blank to pass freely therebetween, and the extensions of adjacent fingers being spaced apart to permit the turned flaps of a carton to pass freely between adjacent fingers and to assist in holding the turned flaps in their relative position at right angles to the remaining portion of the carton blank.

The carton blank flaps, as 18 in Fig. 5, are also commonly provided with projections 18a which extend opposite to the engaging hooks 23 and engage in corresponding slots of the guide plate 60 which are provided for receiving them through the upper slot 63 and for guiding and holding the flaps at right angles to the remainder of the carton blanks during their movement downwardly over the guide plate.

Movable vertically between the carriages is an upper pressure bar 112 and a lower die block 113. The pressure bar is carried from one end by a guide bar 114 slideable in a fixed guide 115. The pressure bar is reciprocated in timed relation in any suitable manner as by the engagement of a projection 116 at the lower end of the guide bar 114 with a cam 117 secured to and rotatable with the shaft 41.

The lower die block 113 has an angular groove 118 in its upper face to receive the carton blanks therein and slots 119 extending transversely of the block in the upper edges at spaced distances apart to receive the turned flaps. This die block is provided with downwardly extending guide bars 120 (see Fig. 1) which extend through openings in an angular bar 120a in the lower frame 40 of the machine so that the die block will be accurately supported for vertical movement. To move the die block in timed relation, a link 121 is pivoted at its upper end to a projection 122 depending from the underside of the block 113 and the lower end of the link is pivotally

connected to one extremity 123 of a bell crank mounted intermediate its ends upon a pivot 124 and having an arm 125 extending downwardly. An operating rod 126 has an end support 127 connecting it to the lower end of the arm 125 and at the other end of the rod is a forked bracket 128 extending over the operating shaft 41 to maintain the rod in alignment therewith. Extending from the bracket 128 is a projection 129 for engaging a cam 130 secured to the shaft 41 so that the rod is moved endwise, rocking the bell crank lever and thereby moving the die block upwardly and downwardly in accordance therewith.

With this machine constructed as above described and the parts movable in timed relation, carton blanks are fed simultaneously to the carriages at both sides thereof in any suitable manner, the blanks are moved inwardly with the carriages, and the flaps forming the interengaging cross walls are extended together in parallel relation. The operation of the pressure bar and the die block causes the hook lugs of one carton blank to be pushed through the locking slit of the opposite carton section, the side walls to be moved relatively for engaging the hooks and the cartons then released and discharged in assembled or erected condition. To receive the erected cartons, a pair of angular plates 131 are mounted in the lower frame support 40 projecting at the side of the die block 113 so that an erected carton dislodged from the die block will be engaged, received and held thereby.

The carton erecting operation will be best understood by an examination of Figures 4 to 14 inclusive which show successive positions of the erecting mechanism in the forming of one carton. The feeding of carton blanks simultaneously to each of the carriages forms no particular part of the present invention as this may be done manually or automatically, by depositing blanks at the same time on top of the carriers 44 in operative position, and advancing them to engage the roller 67 with the rollers 71 in raised position as shown in Fig. 4, the clips 80 being in a receiving position as shown more clearly in Fig. 10. After the clips 80 engage the flaps of a carton blank, the clips are turned at right angles by the movement of their cross bar 86 until the flaps are at right angles to the remainder of the blanks as shown in Fig. 4.

With the flaps of the blanks turned at right angles, the front ends of the carton blanks are tipped downwardly by moving the rollers 71 downwardly into engagement with the blanks on the rollers 67, thereby moving the flaps downwardly between the upper projections 110 of the separating fingers and into the slots 64 in the guide plate. The downward movement of the blanks under the projections 110 and 111 of the guiding fingers is continued as shown in Fig. 5 until the rear edge of each blank passes the rollers 67 as shown more clearly in Fig. 6. At this point the carriages which were separated at the start have been moved closely together, the toothed levers 105 are moved to engage the rear edges of the blanks, and the carton cross walls formed by the flaps are extended oppositely in closely adjacent pairs with the pressure bar 112 remaining in raised position and the lower die block 113 in lowered position. The downward movement of the connected blanks is continued by the toothed levers as shown in Fig. 7, crossing the corresponding opposite flaps in interengaging position, and freeing them from the slots

of the guide plate as shown in Figs. 7 and 8. At this time the opposite angular portions of the flaps of the blanks are closely adjacent and opposite each other so that when the carriages are moved sharply apart as shown in Fig. 9 the covers 16 of the blanks are engaged by the outer projections 111 of the guiding fingers, thereby spreading the flaps 18 and 19 oppositely at right angles to each other with each flap projecting adjacent the wall of the other blank. At this point in the cycle, the upper pressure bar is moving downwardly and the lower die block is moving upwardly to engage the spread flaps in their extended positions, the flaps being engaged in the slots 119 of the lower die block and pressed therein as shown more clearly in Fig. 10 by the upper pressure bar 112.

The carriages which have been spread apart as shown in Fig. 9 to extend the flaps, now proceed to move inwardly again. The flap extremities of the blanks being retained between the lower extremities 111 of the guiding fingers and the lower surfaces of the guide plates 60, this inward movement, as shown in Fig. 11, results in causing an acute bending of the flaps 18 and 19 where they engage the side walls of the carton blanks, thereby pressing the side walls inwardly and extending the hook lugs 23 of the blanks through the corresponding slits 28 of the opposite side walls. In this position the bottoms 14 of the nearly erected cartons are only slightly raised above the lower die block, and the hook extremities, although pressed through the engaging slits 28, are not yet hooked over the extremities of the slits.

The next movement of the pressure bar and the die block is slightly downward, with the flap extremities still engaged between the lower extremities 111a of the guiding fingers and lower edges of the guide plate 60, so that the hook extremities 23 are moved to the lower ends of the slits 28, as shown more clearly in Figure 12.

A continuation of this downward movement of the upper pressure bar and the lower die block disengages the flap extremities of the now erected, but inverted, carton from the fingers and guide plate, as shown in Fig. 13, and the completed carton is then moved below the lower edges of the carrier, as shown in Fig. 14, the flaps spreading outwardly and resting upon the upper outward extensions of the receiving plates 131. From this position the erected cartons may be removed manually or discharged in any suitable manner from the erecting machine.

As soon as two complementary carton blanks are fed downwardly upon the guide plate 60 clearing the upper flat table portion 61, the next two complementary blanks are fed into the U-shaped clips 80 in the opposite carriages as shown in Fig. 10, the operation of the machine being thus continuous and the assembly cycle of one carton following closely upon that of the other. At the same time the toothed feeding levers 105 are advanced with one side of carton blanks to feed them forwardly and downwardly to the position indicated approximately in Fig. 8, and then the spreading movement as shown in Fig. 9 pulls the blanks apart, as restrained by the downwardly projecting portions 111 of the guiding fingers shown more clearly in Fig. 9, whereupon the feeding levers 105 are moved reversely and below the upper portion of the plates 60 as shown more clearly in Fig. 4 to pick up and engage the rear edge of the next pair of carton blanks.

With this construction the erected carton

blanks are assembled in inverted position, that is with the bottoms of the cartons uppermost and held in place by the pressure bar 112, and they are delivered downwardly upon the receiving plates 131 with the flaps spreading apart and opening outwardly as shown more clearly in Fig. 14 in which position they are easily removed, stacked upon each other, placed upon conveyors or belts for removal from the erecting machine, or they may be turned over immediately for filling the cells with articles to be contained therein.

This carton erecting machine is simple in construction and operation, the operative parts are easily accessible for cleaning, repair and replacement and the movements of the mechanisms are preferably timed by cam structures which are easily set, adjusted and varied. Accessibility of the guiding plate and its slots as well as the die block follower is important as the carton blanks are usually made of paperboard or similar material which is easily broken or improperly bent during the erecting operations, thereby resulting in a clogging of the feed slots or other parts of the mechanism.

Carton blanks of the type to which the present invention relates are also more particularly shown and described in our application for a Carton Erecting Machine, filed concurrently under Serial No. 632,856, which matured into Patent No. 2,505,703 April 25, 1950. Any terms of direction used in this application such as up, down, vertical, horizontal, and the like, are used in a relative and not in a limiting sense.

Although a preferred embodiment of the invention is thus shown and described, it is to be understood that various changes in the construction, combination and arrangement of the parts may be made without departing from the spirit and scope of the invention.

We claim:

1. In a machine for erecting cellular cartons, each comprising two foldable blanks having flaps hinged along one edge and extensible at right angles to said edge within the other to form cross walls, means holding the blanks horizontally at opposite sides of the machine with flaps extending inwardly and for advancing them oppositely together, means for turning the flaps at right angles, guide means for engaging the turned flaps and directing them oppositely together, upper and lower blank holding means with cross slots for engaging the flaps therein, and means for swinging the sides of the blanks against the ends of the flaps for connecting them together.

2. A carton erecting machine for a two-piece carton comprising two foldable blanks each having flaps hinged along one edge and extensible at right angles to said edge within the other to form cross walls, having a side wall with slits therein and hook lugs corresponding to the slits at the outer edge of each flap, said machine comprising means for supporting and advancing two carton blanks toward a central position with the flaps disposed inwardly, means for engaging and rotating the flaps at right angles to the bodies of the blanks, guide means for engaging the turned flaps and directing them oppositely together in pairs, upper and lower carton holding means with cross slots for engaging the flaps leaving the hook lugs projecting at the sides, and means to swing the side walls inwardly against the projecting hooks of the opposite flaps to insert them through the corresponding side wall

3. A carton erecting machine for a two-piece carton comprising two foldable blanks each having flaps hinged along one edge, comprising means for receiving two carton blanks and advancing them toward a central position with the flaps disposed inwardly, means for engaging and rotating the flaps at right angles to the bodies of the blanks, means for guiding and feeding the blanks to bring flaps together in pairs, upper and lower relatively movable die members with transverse slots for engaging the flaps and holding them together with the extremities of the flaps projecting at the ends of the slots, means for pressing the side walls of the blanks inwardly against the extremities of the flaps to connect them together, and means for separating the die members for releasing an erected carton and discharging it in inverted erected position.

4. A carton erecting machine for a two-piece cellular carton comprising two foldable blanks each having flaps hinged along one edge and extensible at one edge over the opposite folded blank to form cross walls with a side wall in each blank having a locking slit therein and a hook at the outer edge of each flap inserted through the slit in the wall of the opposite blank, said machine comprising means for receiving and advancing two blanks toward a central position with the flaps disposed inwardly, means for engaging and rotating the flaps at right angles to the body portions of the blanks, guide means for engaging the turned flaps and directing them oppositely together in pairs, movably mounted upper and lower holding means with cross slots, including operating means engaging said holding means with the flaps leaving the hooks thereof projecting from the slots at the sides of said holding means, means for swinging the sides of the blanks against the hooks to insert them through the slits in the walls, said operating means moving said holding means while engaged and thereby the flaps, relatively to the side walls of the blanks and engaging the hooks at the ends of the wall slits, and means for separating the holding means to discharge the erected carton therefrom.

5. In a carton erecting machine for a two-piece carton as described, a supporting base, upper and lower carton holding members vertically movable centrally of the base, a pair of carriages movable laterally toward and from the carton holding means, carton blank feeding and flap rotating means separately movable on each carriage, common driving means for moving the carriages and the said carton holding members and the said feeding and flap rotating means, the means for moving the feeding and flap rotating means comprising a floating driven shaft and a driving connection from the common driving means to the driven shaft and from the driven shaft to the carriage moving and flap rotating means.

6. In a carton erecting machine for a two-piece carton, a supporting base having upper and lower vertically movable carton engaging means, a carriage movable at each side of the engaging means, a common driving shaft for the machine, means connecting the driving shaft for reciprocating the carriages, means mounted on the carriages for feeding and engaging the carton blanks, said means comprising a carriage shaft parallel with the driving shaft and a floating drive connection between the carriage shaft and the driving shaft, said connection comprising a floating shaft mounted on a pair of links one extending to the carriage shaft and the other extending to the driving shaft, and a driven connection between

the floating shaft and the carriage shaft and between the floating shaft and the driving shaft.

7. A carton erecting machine comprising a supporting base, a common driving shaft mounted centrally thereof, a pair of carriages movable toward and from each other on the base, driven means connecting the shaft with each of the carriages for moving them along the base, carton blank engaging means in each carriage comprising a rotatable shaft, means connecting the rotatable shaft of each carriage with the driven means, said driven means comprising a floating intermediate shaft having a connection with the carriage rotatable shaft and with the driving shaft, and means for interengaging carton blank parts as the carriages are moved together.

8. A carton erecting machine of the class described comprising a pair of carriages mounted for movement toward and from each other, an upper and lower carton holding means movable vertically between the carriages for receiving carton blanks, a guide plate on each carriage having an upper table portion and a downwardly inclined portion with guide slots therein, means for advancing carton blanks in each carriage with the bendable carton flaps at the forward edge of each blank, operating means on each carriage to receive the bendable flaps of a carton blank therein and to turn them at right angles to the body of a carton and to insert the flap portions in the slots of the guide plate, and means to interengage the bendable flaps with the opposite blanks as the carriages are moved together.

9. In a carton erecting machine, a pair of carriages movable toward and from each other, a guide plate on each carriage for receiving carton blanks thereon having an inclined portion with guide slots therein, means for advancing the carriages oppositely together and feeding the blanks in each carriage with the bendable flaps forwardly, means for receiving the bendable flaps of a carton blank and turning them at right angles to the remainder of the blank, and roller means on each carriage for feeding a carton blank downwardly to engage the turned flaps in the slots of the guide plate.

10. In a carton erecting machine a pair of carriages movable toward and from each other, a guide plate on each carriage having an upper table portion and a downwardly inclined portion with a plurality of guide slots therein having openings at the upper end, means for advancing the carriages oppositely together and feeding the blanks in each carriage with the bendable flaps forwardly, means for receiving the bendable flaps of a carton blank and turning them at right angles to the remainder of the blank, upper and lower roller means for engaging carton blanks for turning them downwardly on the inclined portion of the plate engaging the flap portions in the slots of the plate, and the lower roller means projecting through the upper openings in the guide plate for engaging the underside of a carton blank when the upper side thereof is engaged by the upper roller means.

11. A carton erecting machine comprising carriages movable toward and from each other, a guide plate mounted in each carriage having an upper table portion and a downwardly inclined portion with guide slots therein, means for advancing the carriages oppositely together and feeding the carton blanks in each carriage with the bendable flaps forwardly, means for receiving the bendable flaps of a carton blank and turning them at right angles to the body of the car-

ton, roller means for engaging a carton blank and feeding the turned flaps in the guide slots of the plate, and additional feeding means for engaging the rear ends of carton blanks and feeding them downwardly with the flaps in engagement with the slots of the plate.

12. In a carton erecting machine a pair of carriages movable toward and from each other, each carriage having a guide plate with a downwardly inclined slotted portion, a plurality of guide fingers overlying the plate and extending between the guide slots, means for advancing the carriages oppositely together, means for feeding the carton blanks in each carriage with the bendable carton flaps disposed forwardly, means for engaging bendable flaps of a carton blank and turning them at right angles to the body thereof, roller means for inclining the flap portions downwardly to engage the bent flaps between the fingers and into the slots of the plate, the remaining body of the carton blank extending between the fingers and the plate, and means to engage the rear of the carton blank and to feed it downwardly beyond the point of engagement of the said roller means.

13. A carton erecting machine comprising a pair of carriages movable toward and from each other, a guide plate on each carriage for receiving carton blanks thereon with a downwardly inclined slotted portion, means for advancing the carriages oppositely together, means for feeding the carton blanks in each carriage with the bendable carton flaps disposed forwardly, means for receiving bendable flaps of a carton blank and turning them at right angles to the remainder of the blank, means on each carriage for feeding the blank downwardly and engaging the turned flaps with the slots of the plate, a plurality of fingers overlying the inclined portion of the plate and spaced therefrom to allow a blank to slide between the fingers and plate, the lower ends of the fingers providing abutments for engaging and limiting the movement together of the carriages.

14. In a carton erecting machine, a pair of carriages movable toward and from each other, each carriage having downwardly extending guide means having engaging slots, a plurality of guide fingers overlying the guide means, means for advancing the carriages oppositely together, means for feeding the carton blanks in each carriage with the bendable carton flaps disposed forwardly, means for engaging bendable flaps of a carton blank and turning them at right angles to the body thereof between the fingers and engaging the slots of the guide means, means for feeding the carton blanks downwardly in the guide means, upper and lower relatively movable die members with transverse slots in one of said members for engaging bent flaps of a carton blank from between the said guide fingers, means to raise the die members together between the carriages for engaging carton blanks therein and bending the side walls of carton blanks at an acute angle while the extremities of the carton blanks are engaged by the said fingers, and means for moving the die members downwardly together to disengage the flap ends of cartons from the guiding fingers.

15. In a carton erecting machine for a two piece cellular carton each having flaps hinged along one edge, and each flap having a projecting hook, said machine comprising carriages movable toward and from each other, a guide plate mounted in each carriage having an upper table

portion and a downwardly inclined portion with guide slots therein, means for advancing the carriages oppositely together, means for feeding the carton blanks in each carriage with the bendable carton flaps disposed forwardly, means for receiving the bendable flaps of a carton blank and turning them at right angles to the body of the carton for engaging in said guide slots, means for feeding the blanks downwardly with the opposite flaps disposed interengagingly together, the carriages being movable apart for swinging the interengaged flaps oppositely in parallel relations, movable upper and lower die members including transverse slots for engaging the flaps and holding them with the extremities at the ends of the slots, means for raising the die members when the carriages are moved inwardly together, the carriages having projecting fingers for retaining engagement with the carton walls to bend them acutely against the projecting flaps, and the die members being movable downwardly to engage the hooks of the flaps through the opposite side walls.

16. In a carton erecting machine for a two piece cellular carton comprising two foldable blanks, each having flaps hinged along the edge with a hook projecting from each flap and a locking slit in each wall corresponding to each hook, said machine comprising carriages for receiving the carton blanks movable forwardly and rearwardly with respect to each other, upper and lower carton engaging means movable upwardly and downwardly between and below the carriages, means in each carriage for rotating the flaps at right angles to the body portions of the blanks, means for guiding the turned flaps in each carriage, means for advancing the carriages oppositely together with the carton blanks therein, feeding means on each carriage for advancing the carton blanks in said guiding means together for interengaging corresponding flaps, and means for operating the carriages and the said carton engaging means in any cycle to interengage the flaps of opposite blanks to pull the flaps oppositely by spreading the walls connected therewith to engage the flaps, when thus spread apart, with the hooks projecting from the holding means to raise the carton engaging means upwardly between the carriages, with the free extremities of the carton blanks engaged by the carriage, thereby bending the side walls of the carton blanks, to press the bent side walls inwardly toward each other inserting the hook extremities through the lock slits of opposite carton blanks, to move the carton engaging means downwardly with respect to the carriages for engaging the hook extremities in the ends of the locking slits, to continue the downward movement of the carton engaging means below the carriages and to discharge the erected carton from the said engaging means, said machine being further provided with receiving supports at the sides of the lower carton engaging means, to hold a carton in inverted condition with the free edges of the blanks extending outwardly, and the lower carton engaging means being moved below the said receiving supports to disengage an erected carton from the slots of the engaging means.

17. In a carton erecting machine, a pair of carriages movable toward and from each other, a guide plate in each carriage having slots for receiving carton blanks therein and guiding them downwardly together, means for advancing the carriages oppositely together and feeding the blanks in each carriage with the bendable edges

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forwardly, means for receiving the bendable flaps of a carton blank and turning them at angles to engage the slots of the guide plate, means for advancing opposite carton blanks together for interengaging their bent flaps, upper and lower carton flaps holding means movable upwardly and downwardly between the carriages for folding carton blanks and withdrawing the blanks with interengaged flaps from the guide slots, said carton holding means being movable apart for discharging an erected carton therefrom, and a pair of receiving plates at opposite sides of the lower carton holding means to receive an erected carton in inverted position with the covers of the carton extended when the lower holding means is moved downwardly below the said carton receiving plates.

18. In a carton erecting machine a pair of carriages movable toward and from each other, each carriage having a guide plate with a downwardly inclined slotted portion, means on each carriage for engaging bendable flaps and hook lugs of a carton blank and turning them at right angles to the body thereof, means for advancing the carriages oppositely together, means for feeding the carton blanks in each carriage with the bendable carton flaps disposed forwardly, means for feeding the blanks together with their bent flaps in interengaging position, a lower die member with transverse slots for receiving the interengaged flaps of opposite carton blanks, means below the carriages for guiding the lower die member in a vertical direction below and between the carriages, an upper die member in the form of a pressure bar extending over the lower die member, means at one end of the pressure bar for guiding and moving it vertically with respect to the lower die member and between the carriages, the die members being movable together to engage carton blanks therebetween, then upwardly to engage the blank hook lugs in the opposite carton walls and downwardly to withdraw the erected carton from the carriage guide plates and then movable apart to discharge an erected carton from between the dies.

19. In a carton erecting machine, a supporting base, a pair of carriages movable toward and from a central position on said base, means on each carriage for receiving a carton blank, for engaging the bendable flaps of a carton blank and turning them at right angles to the remainder of the blank, and for feeding the blank downwardly at the inner end of the carriage; means for feeding the blanks from opposite carriages together to interengage the bendable flaps of opposite carton blanks; upper and lower carton blank engaging means mounted for vertical movement in the machine base for holding carton blanks together and withdrawing them from the carriages, and common driving means in the machine base for reciprocating the carriages, for continuously activating the said blank feeding means of each carriage while it is in motion, and for actuating the upper and lower carton receiving means all in proper timed relation with respect to each other.

20. A machine for assembling and erecting a pair of complementary slitted blanks having flaps with hook lugs, as described, to form a cellular carton comprising means for turning the flaps

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of each blank through approximately 90°, means for advancing the two blanks into interfitting relation wherein the flaps of each pair lie side by side, and means for folding each blank for advancing the slitted portion thereof over the hook lugs projecting from the flaps.

21. A machine for assembling and erecting a pair of complementary slitted blanks each having flaps with hook lugs projecting along one side, as described, to form a cellular carton, comprising means for turning the flaps of each blank through approximately 90°, means for advancing the two blanks into interfitting relation wherein the flaps of each pair lie side by side, means for folding each blank for advancing the slitted portion thereof over the hook lugs projecting from the flaps, and means for shifting the lugs and slitted blank portions relative to each other whereby the lugs become interlocked therewith.

22. In a machine for assembling and erecting a pair of complementary slitted blanks having flaps with hook lugs projecting therefrom at one side and corresponding to the slits, as described, to form a cellular carton, comprising means for holding the blanks horizontally at opposite sides of the machine with the flaps disposed inwardly, means for turning the flaps through 90° at the ends of the blanks, means for engaging the turned flaps and directing them oppositely together in pairs, upper and lower holding dies with cross slots for engaging the flaps but leaving the hooks thereof projecting at the sides, and means for swinging the sides of the blanks against the hooks of the opposite blanks to insert them through the wall slots.

23. The method of assembling and erecting a cellular carton from a pair of complementary slitted blanks having flaps with projecting hooks along one edge, which comprises feeding two similar carton blanks with their flaps disposed inwardly toward each other, turning the flaps at the adjacent ends of the blanks through 90° until opposite flaps are located side by side in pairs, extending crosswise between the blanks in cross wall relation to the opposite sides, seating the flaps together in pairs in their cross wall relation, swinging the side walls of the carton blanks inwardly against the projecting hooks of the opposite flaps, and supporting the blanks at the top and bottom during their relative erecting movements.

24. The method of assembling and erecting a pair of complementary slitted blanks each having a row of flaps with hooks projecting therefrom to correspond with the slitted portions, which comprises advancing two similar blanks toward a central position with flaps disposed inwardly, rotating the flaps at right angles to the remainder of the blanks, holding opposite flaps together in pairs in cross wall position with the hooks projecting therefrom, pressing the side walls of the blanks inwardly against the hooks of the opposite flaps to seat the hooks in corresponding fastening slits, and releasing the holding means for discharging the assembled carton.

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No references cited.