

Nov. 18, 1969

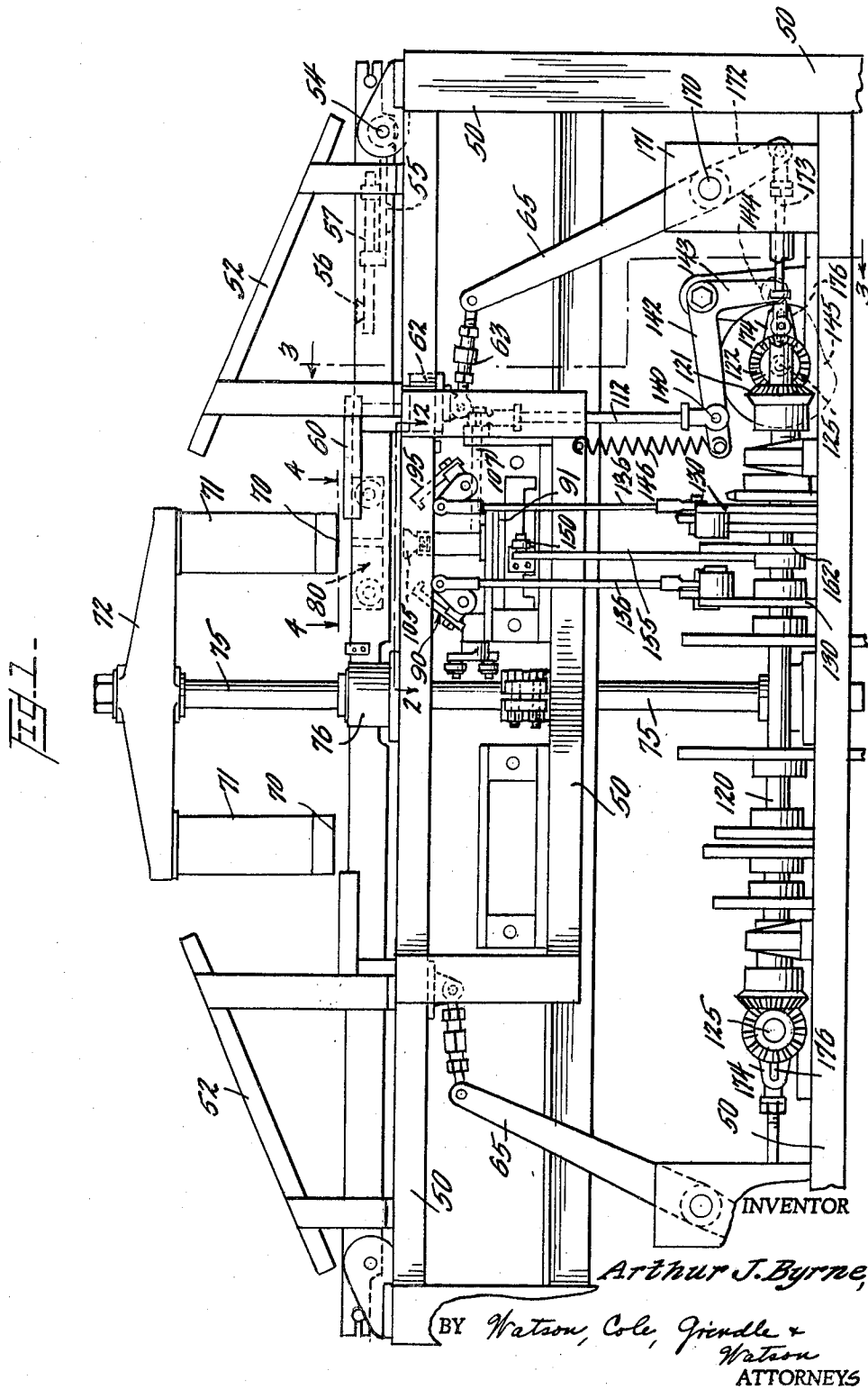
A. J. BYRNE

3,478,653

CARTON FORMING APPARATUS AND METHOD

Filed April 6, 1966

6 Sheets-Sheet 1



**Nov. 18, 1969**

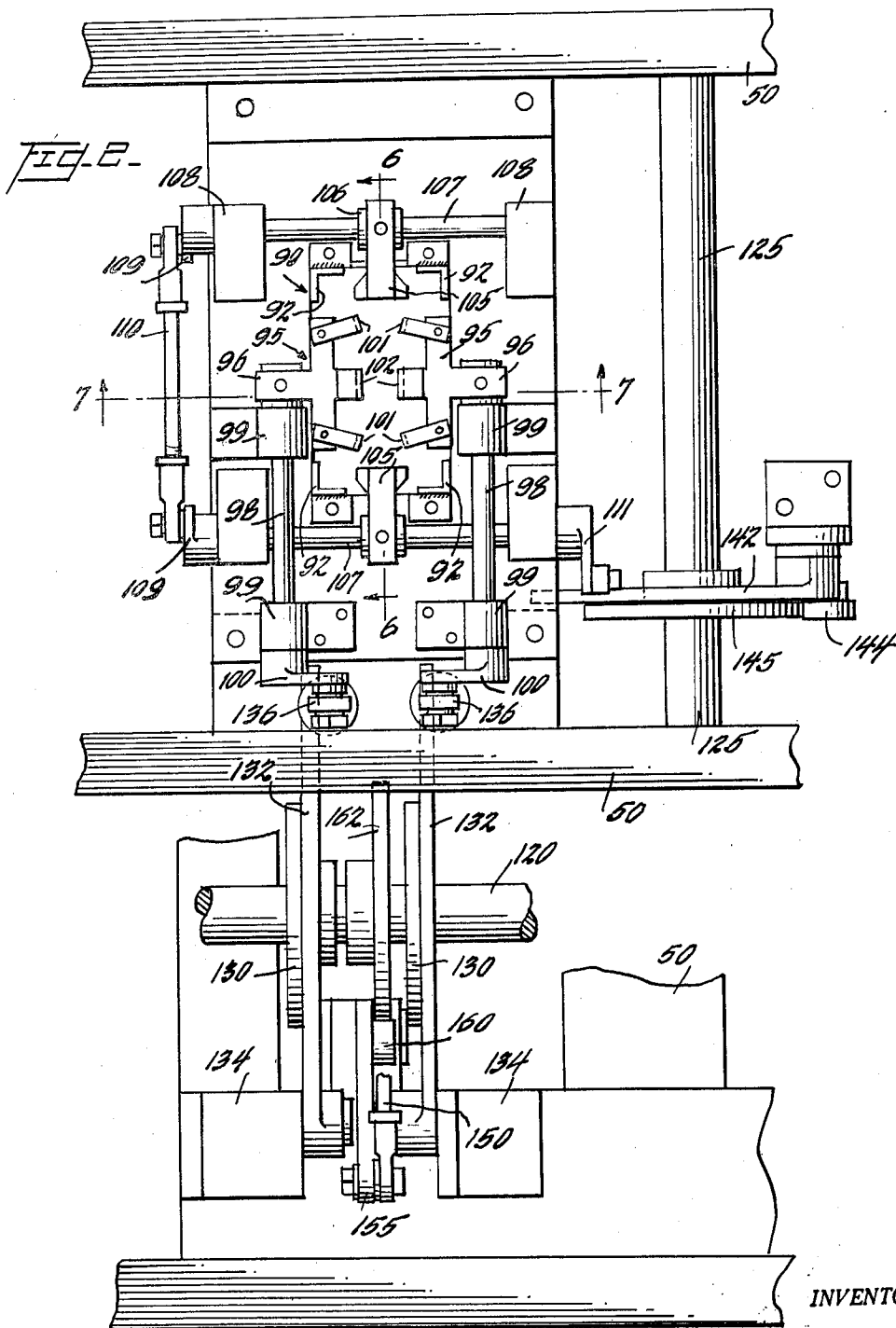
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# CARTON FORMING APPARATUS AND METHOD

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6 Sheets-Sheet 2



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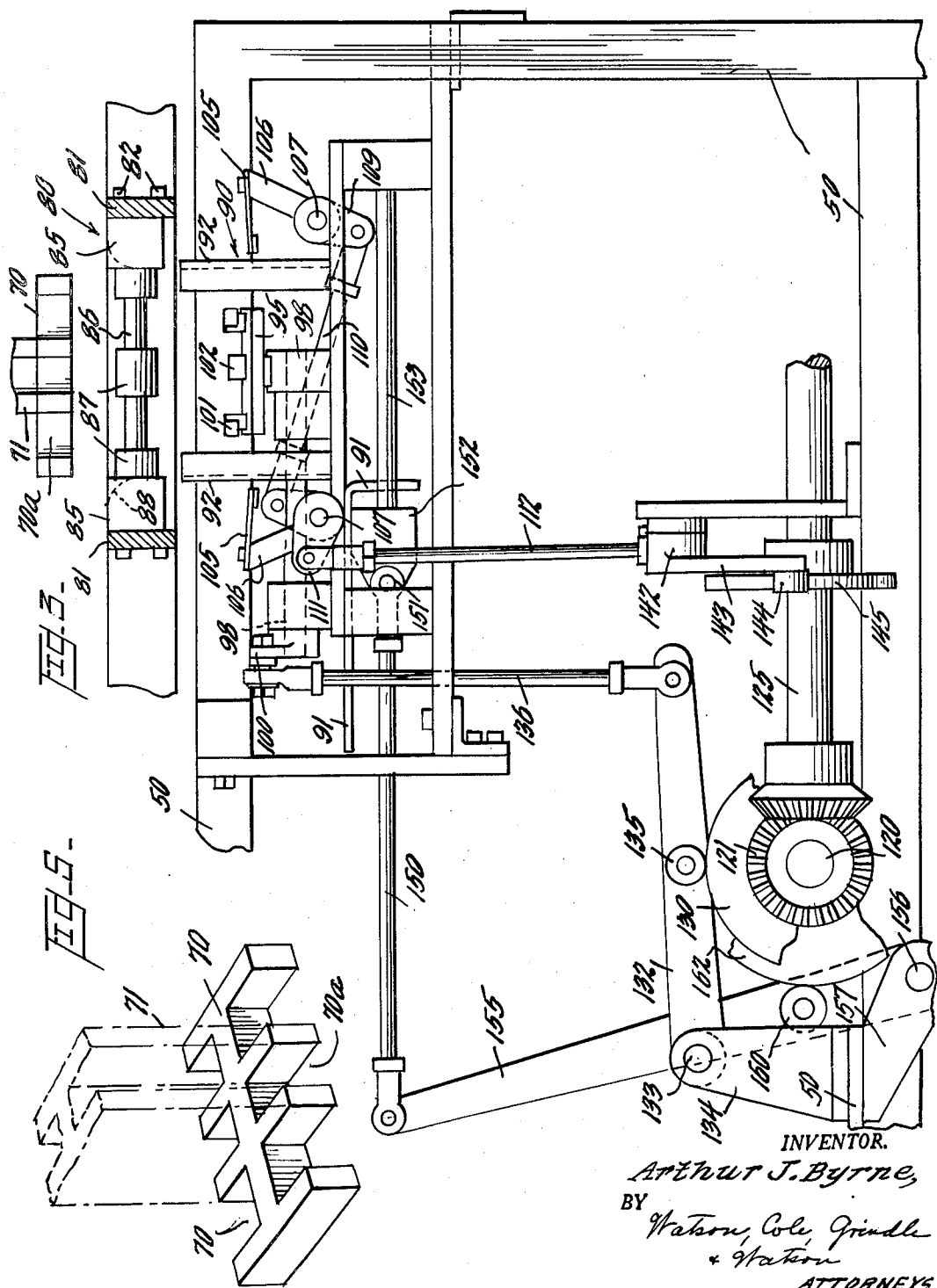
A. J. BYRNE

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CARTON FORMING APPARATUS AND METHOD

Filed April 6, 1966

6 Sheets-Sheet 3



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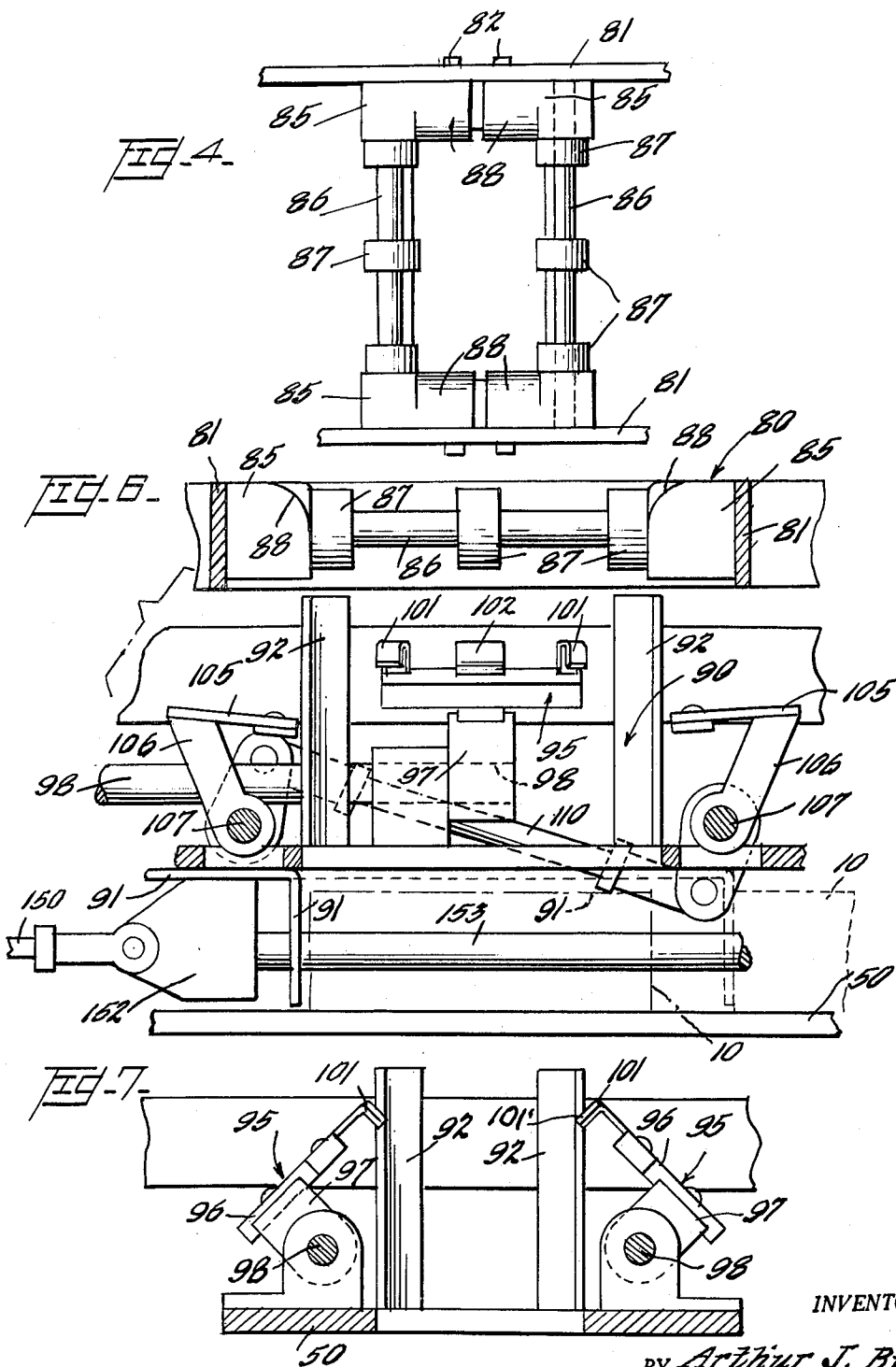
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CARTON FORMING APPARATUS AND METHOD

Filed April 6, 1966

6 Sheets-Sheet 4



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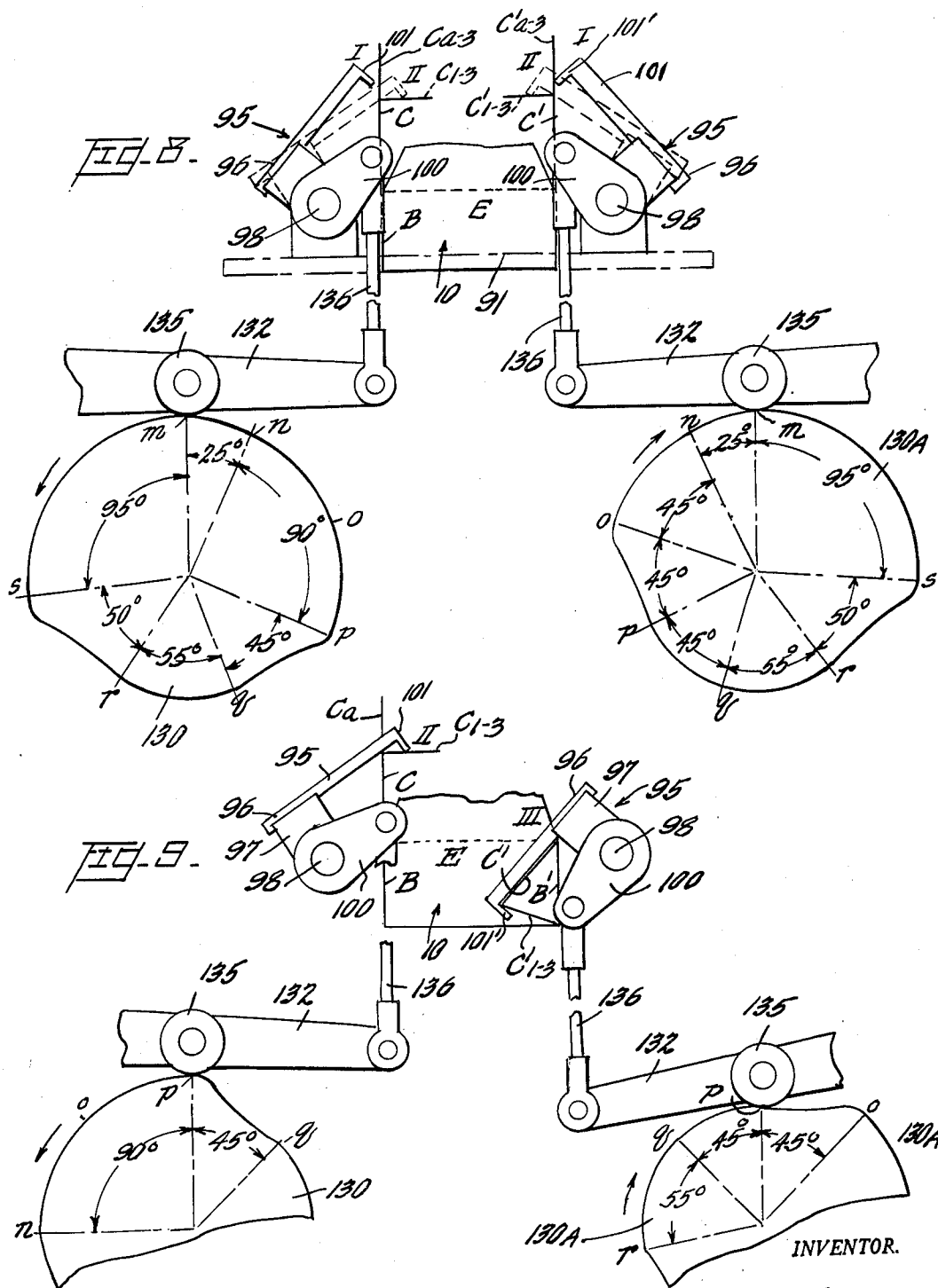
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# CARTON FORMING APPARATUS AND METHOD

Filed April 6, 1966

6 Sheets-Sheet 5



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Nov. 18, 1969

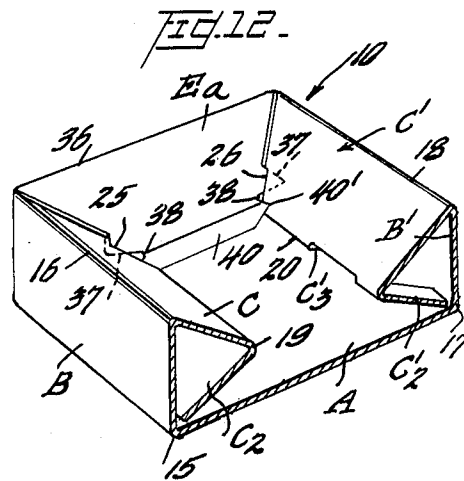
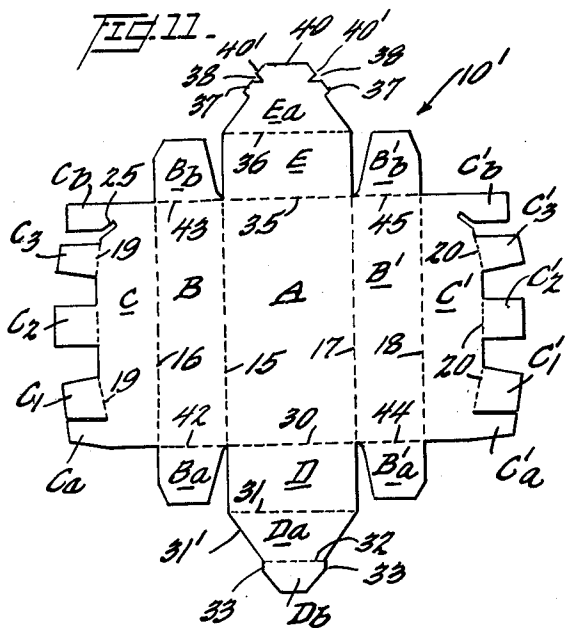
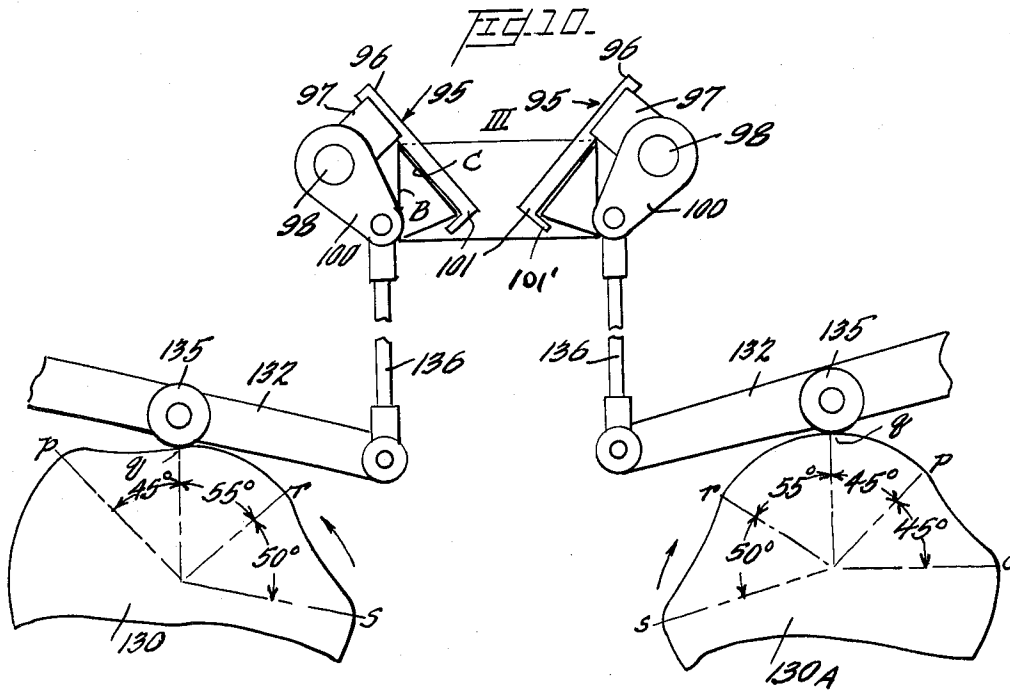
A. J. BYRNE

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CARTON FORMING APPARATUS AND METHOD

Filed April 6, 1966

6 Sheets-Sheet 6



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3,478,653

**CARTON FORMING APPARATUS AND METHOD**  
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U.S. Cl. 93—51

5 Claims

## ABSTRACT OF THE DISCLOSURE

The machine and method disclosed is applicable to the erection of a display carton such as described, for example, in the patent to Puckett, 3,325,079, and involves a die structure through which an appropriate blank is forced by means of a kerfed plunger. The margins of the die are shaped to successively move the side and end walls of the carton to vertical positions. The die structure is also provided with swinging folding fingers, having projecting tongues and timed driving means for their operation. The projecting tongues during their inward movement first contact extended bracing tabs at the ends of the flaps which project from the side walls of the blank, fold them inwardly, and then continue to bend the flaps inwardly in the same direction, whereby the tabs come to a final position beneath the flaps to fix the flaps in article display position. The combined length of each flap and tab combination is greater than half the width of the carton and therefore, the driving means is so constituted as to effect the respective movements of the fingers sequentially to avoid obstruction and collision.

This invention relates to carton or box making machines and to methods of erecting and forming cartons from suitable blanks such as can be pursued by the use of such machines.

The invention has for its general object the provision of a novel and improved machine and method for erecting a carton, box, or tray, especially for display purposes, for example, such as disclosed in the co-pending application of James J. Puckett, Ser. No. 416,429, filed Dec. 7, 1964, issued as U.S. Patent 3,325,079, dated Dec. 7, 1964.

In its preferred embodiments, the invention contemplates the provision of synchronized means not only for erecting the side and end walls of the box or carton, but for tucking-in supplemental side flaps and bracing tongues, in timed sequence with each other and with respect to the folding and tucking of certain end flaps, to effect an interlocking of these side and end elements to provide a display receptacle into which articles, for example, cosmetic containers, may be cradled or nested for transport and for artistic and appealing presentation to the buying public.

Other objects and features of novelty will be apparent from the following specification in which one embodiment of the invention is illustrated by way of example.

In the drawings:

FIGURE 1 is a somewhat diagrammatic view in elevation, with certain duplicated parts omitted, of a machine embodying the principles of the invention;

FIGURE 2 is a horizontal sectional view of a similar generalized nature, of the machine as seen from line 2—2 of FIGURE 1;

FIGURE 3 is a fragmentary view in vertical section taken at right angles to the aspect of FIGURE 1 and taken on line 3—3 of that figure;

FIGURE 4 is a fragmentary plan view of the major portion of the die structure of the carton forming machine, auxiliary parts being omitted for the sake of clarity, as viewed from line 4—4 of FIGURE 1;

FIGURE 5 is a plan view of the plunger or former head;

FIGURE 6 is a fragmentary view in vertical section taken substantially on line 6—6 of FIGURE 2;

FIGURE 7 is a fragmentary vertical sectional view taken substantially on line 7—7 of FIGURE 2;

FIGURE 8 is a diagrammatic view similar to FIGURE 6 but showing certain initial positioning of the folding fingers and the sectors of the driving cam appropriate to these and other positions of the fingers;

FIGURE 9 is a similar view showing the position of the fingers at subsequent stages of the operation;

FIGURE 10 is a similar view showing the final folded positions of the lateral fingers;

FIGURE 11 is a plan view of a blank from which a display carton may be formed by the machine and method of the present invention; and

FIGURE 12 is a view partly in vertical section and partly in perspective of the erected carton.

Before describing the novel apparatus afforded by the present invention, it will be well to disclose one example of a display receptacle or carton which can be easily and expeditiously erected and interlocked by the machine.

Such a carton is the subject of the above mentioned Puckett application and it is fully disclosed in that application. However, for present purposes, the blank from which the carton is made is reproduced in FIGURE 11 of the present drawings and the carton itself is shown in fragmentary form at 10 in FIGURE 12.

The blank is shown in spread-out form at 10' in FIGURE 11 of the drawings. The base panel of the carton is designated A and hinged along the corresponding lines 15 and 17 are the side wall panels B and B'. Further panels which will become inwardly dished upper walls of the completed structure are indicated at C and C', these irregularly shaped panels being hingedly connected to the side wall panels B and B' by the score lines 16 and 18, respectively.

The panels C and C' are provided with a series of projecting tabs which serve the purposes in their several ways of bracing the panels C and C' against the other wall structures of the container, as will be described more fully presently. For example, the panel C is provided at its opposite ends with rigid projections Ca and Cb. Intermediate of the end projections are the tabs C<sub>1</sub>, C<sub>2</sub> and C<sub>3</sub> which are connected with the panel C along the folding or score lines 19. Preferably, the lines of fold 19 for the tabs C<sub>1</sub>, C<sub>3</sub> are slightly angled, giving the general outward edge of the intermediate portion of the panel C a curved or arcuate configuration.

At the base of the projection Cb at one end of the panel C there is an angular notch 25 formed, the purpose of which will be described.

The opposite irregular panel C' is a substantial mirror image of the panel C having the rigid projections C'a and C'b at its ends, the latter having a notch 26 its junction corresponding to the notch 25 at the opposite side of the blank. The intermediate tabs C'<sub>1</sub>, C'<sub>2</sub> and C'<sub>3</sub> are hinged to the panel C' along the score lines 20, the end ones of which are slightly inclined to present a somewhat arcuate configuration of the general outer edge of the panel C' when the carton is erected, that is, in the preferred form of the invention illustrated in the drawings. For some purposes the score lines 19 and 20 may be executed in straight alignment.

The side wall panel B is provided with end tabs Ba and Bb defined by the scored fold lines 42 and 43, respectively. The opposite side wall panel B' has hinged thereto at opposite ends the tabs B'a and B'b along the respective score lines 44 and 45.

An important feature of the invention involves the end structures which are hinged to the base panel A. At the

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lower portion of FIGURE 10, an end panel D is joined to the base panel A along the score line 30, and hinged to the end panel D along the score line 31 is the flap Da, having convergent side edges 31'. Further the outer edge of the flap Da is provided with a tab Db joined to it along the score line 32. The tab Db is of a generally tapered construction but has a portion of its opposite margins disposed in parallel relationship as at 33.

At the opposite end of the blank an end wall E is hinged to the base panel A along the score line 35, and the wall E is provided with a flap Ea joined to it along the score line 36.

The flap Ea is also of a generally tapered or outwardly convergent structure, but the side margins are interrupted in a peculiar manner to provide laterally projecting locking tabs 37 followed by notches 38 and terminating in a portion 40 provided with wings or ears 40', the peculiar double function of this terminal arrangement of the flap Ea being set forth hereinafter.

The initial steps of a preferred method of erecting the display carton will be readily perceived from an inspection of FIGURE 3 of the drawings in the Puckett application. The side wall B is folded to a perpendicular position along the score line 15 and the upward wall or panel C is folded over inwardly along the line 16, while at the same time the bracing tabs C<sub>1</sub>, C<sub>2</sub> and C<sub>3</sub> are bent downwardly and outwardly toward the corner formed by the score line 15, the particular configuration of these tabs and the angularity of the hinge lines 19 provide for rectilinear abutment of the ends of the tabs at the corner 15 and arranging the general contour of the now inner edge of the panel C in a substantially arcuate form.

The end bracing projections Ca and Cb are rigid with the panel C and abut a central portion of the base panel A adjacent the end score lines 30 and 35.

At the same time that the panel C is folded over and positioned, the end flaps Ba and Bb may be folded in against the ends of the projections Ca and Cb and in alignment with the score lines 30 and 35.

The exactly similar in-folding of the opposite side wall panel B' and upper flap C' can readily be visualized from what has gone before in the description of the erection of the carton.

With both side structures folded into position, the end panels and flaps are now bent into proper engagement therewith. The end wall D is folded to a vertical position along the score line 30 and then the flap Da bent inwardly and downwardly along the score line 31 to assume an inclined position clearly illustrated in FIGURE 2 of the drawings, the tapered edges 31' contacting the sloping portions of the opposite top panels C and C'.

The tab Db will be bent in a substantially vertical downwardly projecting position with the parallel edges 33 frictionally engaged with the opposite folded edges 19 and 20 of the first bracing tabs C' and C'<sub>1</sub> of the top panels. The flap Bb is prevented from turning under by its contact with the edges of the bracing projections Ca and C'a, which are concealed behind and beneath the flap Da and tab Db.

The opposite end structure of the carton is somewhat different in its manner of erection and interlocking and this construction and function is illustrated best in FIGURE 12 of the drawings.

In erecting this end of the carton, the end wall E is folded upwardly along the score line 35 and the flap Ea is turned inwardly and downwardly along the line 36. The flap is pressed firmly in a downward and endwise swinging movement until the projections 37 snap past the main portions of the panels C and C' until they enter the angular slots 25 and 26, whereupon the sloping end structure provided by the flap Ea is securely interlocked in position and serves to retain the carton in erected condition, as clearly shown in FIGURE 12.

Instead of being bent to a vertical position as in the case of the flap Db at the opposite end of the carton,

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the terminal portion 40 of the flap Ea remains in a generally inclined position with ears 40' substantially in the clear within the nesting recess in which the article is to be cradled.

Now there will be described the novel machine for accomplishing these successive erecting and interlocking functions.

A somewhat diagrammatical elevational panorama of one form of machine within the purview of the present invention is shown in FIGURE 1 of the drawings. It will be noted that this machine comprises double mechanism for handling two lines of containers at once. Therefore, each half of the mechanism comprises a substantial mirror image of the other half. Thus, only the structure at the right-hand side of FIGURE 1 will be described in any detail, it being understood that the mechanism on the left-hand side are constructed and operated in the same fashion as those on the right.

The supporting frame of the machine is indicated at 50 and carries at either side thereof an inclined blank supporting table 52 which is provided with the usual lateral confining elements and bottom sheet retaining elements (not shown).

Pivoted as at 54 to a portion of the supporting frame is the sheet blank picker arm 55, a suction cup device 56 being carried by the distal end of the arm 55 and adapted to seize the bottom sheet of the stack of blanks resting on the inclined table 52 and pull it downwardly to the level 57 which may constitute tracks or feed rails of any suitable type.

Reciprocable along the rail 57 is the pusher member 60. This member 60 is shown in its ultimate inward blank delivery position in FIGURE 1, but it is understood that in its retracted position it will be found at the extreme right-hand portion of the frame beneath the table 12 and behind a blank brought down to the feed rail 57 by the vacuum picker 56. The pusher 60 is carried by a slide member 62 guided for horizontal reciprocating movement on a portion of the frame, this member 62 being connected by means of the extensible link 63 with the pusher operating lever 65, the mounting and synchronized movement of which will be described in connection with other driving means for the machine.

At 70 there are illustrated former heads or plungers fixed to the lower ends of the arms 71 which depend from either side of the cross beam 72, the central portion of the cross beam being secured to the upper end of the vertical post 75 which moves in proper timed sequence within the vertical bearing 76 carried by the frame 50. The particular configuration of the former head in its relationship to the proper handling of the blank will be described presently.

Each of the former heads 70 comprises rather thick plates secured to the ends of the stanchions or arms 71 and being kerfed as at 70a along each side edge to provide openings for clearance of the folding fingers (yet to be described) so that the former head may be retracted upwardly without interference by the flap folding mechanism (see FIGURES 3 and 5).

Each of the blanks 10' is moved to a position beneath one of the plungers or formers 70 by the pusher 60 and in this position it is directly over the throat member 80. This throat or female die member member is indicated in dotted lines in FIGURE 1 but is shown to better advantage in FIGURES 3, 4 and 6 of the drawings. To the parallel rails 81 forming a part of the frame 50 are bolted, as at 82, the end folder blocks 85. Socketed within openings in the blocks 85 upon either side of the throat member are the shafts 86 and upon these shafts are fixed the side folding cylinders or rolls 87. The mating inwardly directed portions of the adjacent blocks 85 are chamfered or cylindrically curved as at 88 for purposes which will be described.

The mechanism thus far described serves to erect the side wall assemblies BC and B'C' of the display carton,



and direct the end tabs Ba, Bb, B'a, B'b of the principal panels B and B' of the side walls inwardly somewhat ahead of the erecting of the end panel structures D and E in a manner somewhat similar to that disclosed in the United States Letters Patent to Trelford No. 2,995,991, owned by the assignee of the present application. It will be clearly understood that continued downward movement of the former head 70 will move the blank with its upstanding side and end walls through the throat structure 80 and into the folding and interlocking zone of the mechanism which is indicated generally by the reference numeral 90. Limiting temporarily this downward movement of the blank is the horizontal plate of an angular pusher member 91, shown in solid lines as in retracted position in FIGURE 3 and suggested in broken lines in FIGURE 6 as when it is furnishing support for the erected blank during the tab-folding and interlocking process within the zone 90.

In order to maintain the proper lateral position of the blank within this operative area corner angle posts 92 are provided. With the blank occupying this position within the folding zone 90, rocking folding fingers, operative upon both the tabs and flaps of the side wall structures and of the end wall structures, come into play. The first of these folder devices to be described will be the multiple fingered members 95 probably disclosed to the best advantage in FIGURES 2, 3, 6 and 7 of the drawings, and in sequential positioning in the process FIGURES 8, 9 and 10. The members 95 are essentially T-shaped, the shank portion 96 being secured to a block 97 which is provided with an opening to fixedly receive the rock shaft 98, the opposite end portions of these rock shafts being guided in the bearings 99, and the shafts being provided with the cranks 100 fixed at their remote ends and operatively connected to timed driving means which will be described presently.

The cross bar portion of each of the folding members 95 is provided in this embodiment with the end finger elements 101 and the central finger 102. In the operational figures the respective fingers 101 and 102 of the folding members 95 are substantially in alignment and thus the fingers for these diagrammatic purposes will be designated 101.

Now for folding the end flaps Da and Ea at the proper times, folder fingers 105 are provided, these fingers being secured to the stub arms 106 which are in turn fixed to the rock shafts 107 as best shown in FIGURES 2, 3 and 6. The rock shafts 107 find bearings adjacent their ends in the bearing blocks 108, and upon the corresponding ends of the rock shafts 107 cranks 109 are fixed, these cranks being cross-connected by the diagonally disposed tie rod 110 which ensures that the end folding fingers 105 move in mutually opposite directions during the folding process. A crank 111 fixed to the near end of one of the rock shafts 107 is pivotally connected with the rod or link 112 for operation by means yet to be described.

Now before taking up the exact sequence of operation of the side and end flap folding fingers, it may be well to follow through on the synchronized driving means for effecting these movements.

Suitably supported upon the base portion of the supporting frame 50 is the rotary cam shaft 120. At one end of the shaft 120 it carries a bevel gear 121 which meshes with a mating bevel gear 122 fixed to the end of a second rotary cam shaft 125 disposed substantially at right angles to the shaft 120 and finding suitable bearings in the frame structure 50.

A cam member 130 fixed upon the cam shaft 120 serves to swing the lever 132, pivoted at 133 to a pedestal 134 fixed to a portion of the main frame 50, by means of the follower roller 135 carried by an intermediate portion of the lever 132. A link 136 connects the distal end of the lever 132 operatively with the crank 100

which is fixed at the end of the rock shaft 98 upon which the lateral tab-folding fingers 101 and 102 are mounted.

The end folding fingers 105 are operated in a somewhat similar manner. The linkage 112, connected with the crank 111 carried by one of the rock shafts 107, is pivotally connected as at 140 with one arm of the bell crank lever 142, the opposite arm 143 carrying a follower roller 144 which is controlled by the cam 145 carried upon the shaft 125. A coil spring 146 serves to maintain the follower roller 144 in contact with the cam surface 145.

The intermittent sliding of the ejector pusher member 91 is effected by means of the link 150 pivoted at 151 to the block 152 slidably mounted upon the guide rod 153 for carrying the angle pusher element 91. The remote end of the link 150 is pivotally connected to the lever 155 which in turn is pivoted as at 156 to a bracket 157 carried by the main frame 50. A follower roller 160 is contacted by the cam 162 fixed to the shaft 120 and disposed preferably between the cams 130 which actuate the lateral folding fingers.

For reciprocating the blank feed pusher 60 in timed relationship with the erecting and folding of successive blanks the operating lever 65 pivoted at 170 to a bracket 171 carried by the main frame 50, has an extension 172 to which the link 173 is pivoted. At an appropriate point along the shaft 125 there is secured a crank 174 which is slotted at 176 to receive a pin carried by the adjacent end of the link 173. This arrangement provides means for oscillating the blank feeder 60 and the slot permits adjustment of the stroke of the pusher.

The various operative parts of the machine now having been located, the sequence of operation of the erecting, folding, and interlocking, as well as the discharge of the completed cartons, will now be described with particular reference to FIGURES 8, 9 and 10 of the drawings.

After the former head 70 has pressed the blank 10' down through the erecting throat area 80, the bottom of the erected carton 10 rests upon the horizontal plate of the ejector device 91 as clearly shown in FIGURE 8 of the drawings. In this position, the entire side wall structure with the exception of the end flaps Ba and Bb but including the panels B, C and the tabs Ca, Cb, C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub>, are all in alignment and extend vertically as suggested in FIGURE 8 considering the solid line showing which is designated stage I. All have hooked ends 101' and 102'.

At this initial point the follower roller 135 of the finger actuating lever 132 rests at the initial position *m* on the cam 130. The finger device 95 operative upon the opposite side of the carton is also in its initial position when the follower roller 135 of its arm 132 is at the initial position *m* of the right-hand cam 130. It is of course understood that in this diagrammatic view the cams 130 and the lever arms 132 are moved for purposes of demonstration to positions at 90° from their true operative positions, this relative positioning occurring at the break shown in the links 136. Of course, when the two cams 130 are disposed side by side upon the cam shaft 120 they rotate with the shaft in the same direction, but in the spread diagrammatic views of FIGURES 8, 9 and 10 the cams in effect are moving in opposite directions as indicated by the arrows.

Now in moving from stage I to stage II wherein the fingers and the flaps C<sub>1-3</sub> and C'<sub>1-3</sub> are indicated in broken lines, the follower roller 135 in effect passes from point *m* to point *n* through an angle of about 25°. Both the folders move simultaneously in this phase. As shown, this causes the fingers to contact with and cause the flaps C<sub>1-3</sub> and C'<sub>1-3</sub> to move inwardly toward each other and at right angles to their original vertical position as clearly indicated in FIGURE 8. Of course, the tabs C<sub>a,b</sub> and C'<sub>a,b</sub> are not bent but remain in their extended positions

since they do not form the reverse-angle bracing legs constituted by the three intermediate tabs.

Next, under the influence of the rotating cams **130** and moving from point *n* to point *o*, the fingers are idle and retain the positions of phase II since these portions of the cams are concentric. During this period the plunger crosshead **72** rises carrying the slotted former heads **70** upward and out of the way of the folding devices, this movement being permitted by virtue of the kerfs or slots **70a**.

The next phase is represented by the rotation of the cams from points *o* to points *p* through an angle of 45°. Left-hand cam **130** remains concentric, but the right-hand cam serves to lower the forming fingers at the right-hand side of the structure as shown in FIGURE 9 causing the bracing tab portions *C'*<sub>1-3</sub> to move all the way down to the bottom of the carton **10** and abut their ends against the inner corner of the box, at the same time the panel portion *C'* assumes the angular position as shown at the right-hand side of FIGURE 9.

Next, during the movement of the cams from point *p* to point *q* the folding fingers at the right-hand side remain in position III, but the left-hand cam **130** moves the fingers at the left in order to bring the bracing tabs *C*<sub>1-3</sub> down into the corner abutting position as clearly shown in FIGURE 10 of the drawings.

Now from point *q* to point *r* onward for the next 55° of rotation of the cams, both folding devices are idle in the position of FIGURE 10 and the end folding fingers **105** come into operation through the timed mechanism including the cam **145**. The movement of these folding fingers will be readily understood as causing the flaps *Da* and *Ea* to fold inwardly and to interlock with the notches **25** of the side flap structure which results in the finished carton assembly shown in FIGURE 12 of the drawings.

With the end folders **105** out of the way after they have completed their movement and retracted, the movement of the side folding fingers as between points *r* and *s* of the cams, brings the side folding finger assemblies **95** back to position I shown in FIGURE 8. Then from points *s* to the original points *m* through an angle of approximately 95°, the folding fingers are idle during the process of ejection of the folded box and the presentation of a new blank to the die throat **80** beneath the former head **70** for repeat operation.

While the above retraction operation of the side folding fingers is taking place, the angular pusher member **91** is retracted to permit the completed display carton to drop down upon a delivery surface which may include a plate or rail forming a part of the main frame **50**; and then the pusher **91** is moved forwardly to eject the carton toward any suitable conveyor means for carrying it from the machine. The pusher element **91** is of course actuated through the linkages described which in turn are controlled by the cam **162**.

The pusher **91** at the end of the ejection stroke is then in a position to receive the next carton from the former head **70** as the carton passes downwardly through the erecting throat device **80** to the folding and interlocking zone **90**.

It will be readily understood how the hooked ends **101'** and **102'** of the folding fingers aid in the successive folding of first the bracing tabs, then the top flaps, and finally guiding the tabs into reversely directed positions beneath the flaps.

It is understood that various changes and modifications may be made in the embodiment illustrated and described herein without departing from the scope of the invention as defined by the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. Apparatus for erecting and securing in operative condition a display container for example of the type which comprises a bottom panel, oppositely disposed side and end wall panels, and top flaps hinged to the

edges of said side and end wall panels, the side wall connected top flaps being provided with hinged tabs projecting therefrom; this presenting a series of three successive areas of hingedly connected elements extending from each side of said bottom panel, namely, a side wall panel, a top flap, and a tab; the combined lengths of the side wall connected flaps and tabs on each side of the bottom panel being greater than one-half of the width of said bottom panel and thus of the completed carton; said apparatus comprising a former head and a female die member through which said former head is adapted to push a planar container blank which is slit and scored to delineate the above named container parts, guiding surfaces on said die member for erecting said end wall panels and said side wall panels with their flaps and tabs in planar alignment to substantially perpendicular position with relation to said bottom panel; pivoted folding fingers at opposite sides of the die member for progressive angular movement over and inwardly of the thus erected container for first contacting said tabs and bending them to a substantially right angle position relatively to the flaps to which they are hinged, then to fold the flaps inwardly while the tabs are still projected as bent, and thus finally to bring the tabs to rest beneath said top flaps, said folding fingers provided with inwardly projecting hooked ends adapted to first contact the tabs without touching the flaps and then to enable the fingers to contact and fold the flaps while the hooked ends retain the tabs in proper angled position during the final movements.

2. Apparatus for erecting and securing in operative condition a display container for example of the type which comprises a bottom panel, oppositely disposed side and end wall panels, and top flaps hinged to the edges of said side and end wall panels, the side wall connected top flaps being provided with hinged tabs projecting therefrom; this presenting a series of three successive areas of hingedly connected elements extending from each side of said bottom panel, namely, a side wall panel, a top flap, and a tab; the combined lengths of the side walls connected flaps and tabs on each side of the bottom panel being greater than one-half of the width of said bottom panel and thus of the completed carton; said apparatus comprising a former head and a female die member through which said former head is adapted to push a planar container blank which is slit and scored to delineate the above named container parts, guiding surfaces on said die member for erecting said end wall panels and said side wall panels with their flaps and tabs in planar alignment to substantially perpendicular position with relation to said bottom panel; pivoted folding fingers at opposite sides of the die member for progressive angular movement over and inwardly of the thus erected container for first contacting said tabs and bending them to a substantially right angle position relatively to the flaps to which they are hinged, then to fold the flaps inwardly while the tabs are still projected as bent, and thus finally to bring the tabs to rest beneath said top flaps, driving means for the respective folding fingers on the opposite sides of the die member timed to operate the folding fingers sequentially during at least a portion of their side wall, flap, and tab folding movements, to avoid interference of the fingers and of the extended flaps and tabs on opposite sides of the machine during the in-folding procedure.

3. Apparatus for erecting and securing in operative condition a display container for example of the type which comprises a bottom panel, oppositely disposed side and end wall panels, and top flaps hinged to the edges of said side and end wall panels, the side wall connected top flaps being provided with hinged tabs projecting therefrom; said apparatus comprising a former head and a female die member through which said former head is adapted to push a planar container blank which is slit and scored to delineate the above named container parts,

guiding surfaces on said die member for erecting said end wall panels and said side wall panels with their flaps and tabs to substantially perpendicular position with relation to said bottom panel; pivoted folding fingers at opposite sides of the die member for progressive angular movement over and inwardly of the thus erected container for first contacting said tabs and folding them relatively to the side flaps to which they are hinged, then to fold the side flaps inwardly, and finally to bring the tabs to rest beneath said flaps; the folding mechanism being located beyond the die member; means to cause the former head to move sufficiently far to carry the erected container to folding position, stop means for limiting the movement of the blank at folding position, said stop means comprising a transverse slide having a pusher face at one end, and means for retracting the stop means at the end of the folding operation to permit the container to move into position in front of the pusher face, and then to propel the stop means forwardly to eject the finished container.

4. Apparatus for erecting and securing in operative condition a display container for example of the type which comprises a bottom panel, opposite the disposed side and end wall panels, and top flaps hinged to the edges of said side and end wall panels, the side wall connected top flaps being provided with hinged tabs projecting therefrom; this presenting a series of three successive areas of hingedly connected elements extending from each side of said bottom panel, namely, a side wall panel, a top flap, and a tab; the combined lengths of the side wall connected flaps and tabs on each side of the bottom panel being greater than one-half of the width of said bottom panel and thus of the completed carton; said apparatus comprising a former head and a female die member through which said former head is adapted to push a planar container blank which is slit and scored to delineate the above named container parts, guiding surfaces on said die member for erecting said end wall panels and said side wall panels with their flaps and tabs in planar alignment to substantially perpendicular position with relation to said bottom panel; pivoted folding fingers at opposite sides of the die member for progressive angular movement over and inwardly of the thus erected container for first contacting said tabs and bending them to a substantially right angle position relative to the flaps to which they are hinged, then to fold the flaps inwardly while the tabs are still projected as bent, and thus finally to bring the tabs to rest beneath said top flaps, the side margins of the former head being kerfed to permit passage of the folding fingers during their operative movements, and during the retraction of the head while the folding fingers are in operative position; driving means for the respective folding fingers on the opposite sides of the die member timed to operate the folding fingers sequentially during at least a portion of their movements, to avoid interference of the fingers and of the extended flaps and tabs during the in-folding procedure, and means provided for timing the movement of the former head to retract it while the folding fingers are at their positions where the tabs have been in-folded with respect to the top flaps.

5. The method of erecting, folding, and interlocking a display container from a blank which includes a bottom panel, oppositely disposed side and end wall panels, and a rudimentary top flap hinged to the outer edge of each of said side and end wall panels, each of said side wall connected flaps being provided with hinged bracing tabs projecting therefrom; thus presenting a series of three successive hingedly connected areas extending from each side of said bottom panel, namely, a side wall panel, a side-wall connected top flap, and its associated tab; the combined lengths of the side wall connected flap and associated tab on the respective sides of the carton being greater than one-half the width of the carton; said method comprising forcing said blank through a female die member by means of a plunger device to erect the end walls with their flaps and the side walls with their flaps and associated tabs to stand in planar alignment at substantially right angles to the bottom panel; bringing folding means to bear upon the extended tabs to in-fold each of them to a position substantially at right angles to the side wall connected flaps to which they are hinged; then causing the plunger device to retract; then continuing the in-folding operation until the side wall connected flaps and their angled tabs are moved to final position with the respective tabs contacting the bottom panel at an angle beneath the side wall connected flaps to which they are hinged; then applying folding means to the end wall connected flaps to fold them inwardly and interlock them with the side wall connected flaps; and finally returning all folding means to retracted positions; the in-folding of the respective combined side wall connected flaps and their tabs, after the initial in-folding of the tabs, being accomplished sequentially in order to avoid interference between the extended flaps and tabs, or the folding means on opposite sides of the carton during the in-folding procedure.

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