

May 2, 1933.

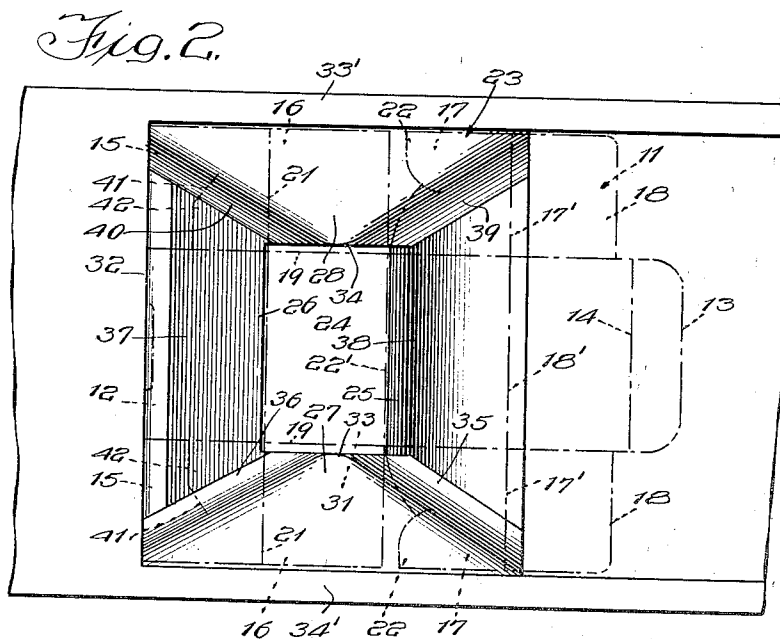
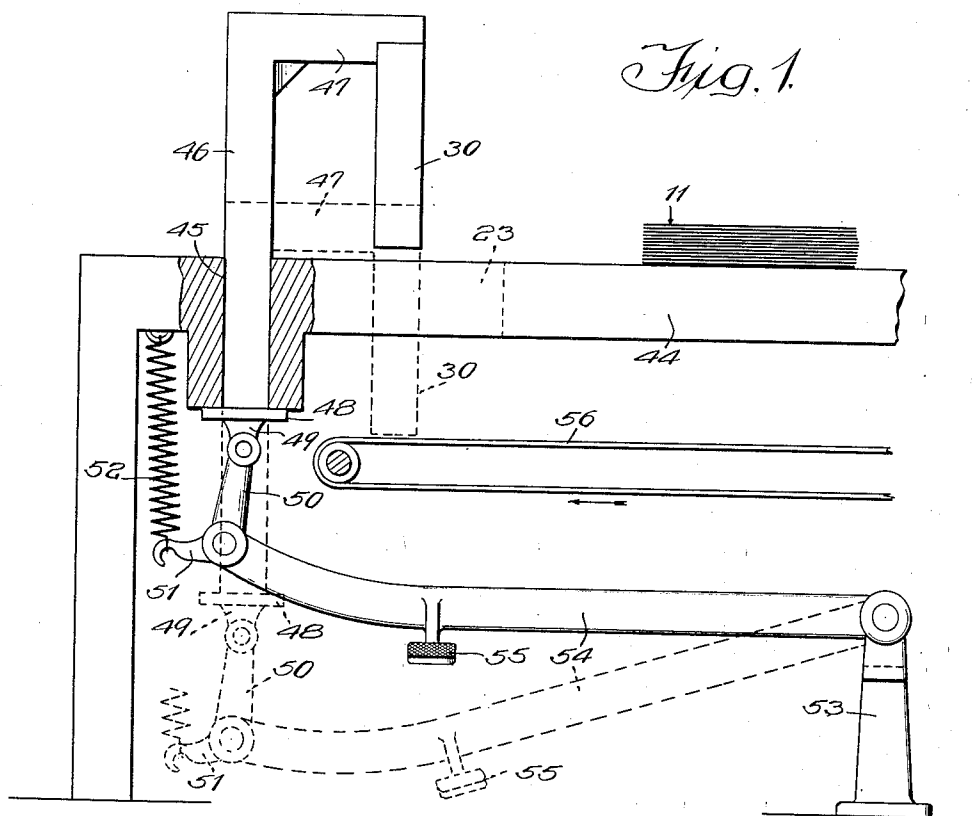
O. C. SCHULZ

1,906,283

CARTON FOLDING DEVICE

Filed March 21, 1930

3 Sheets-Sheet 1



Witness:

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By

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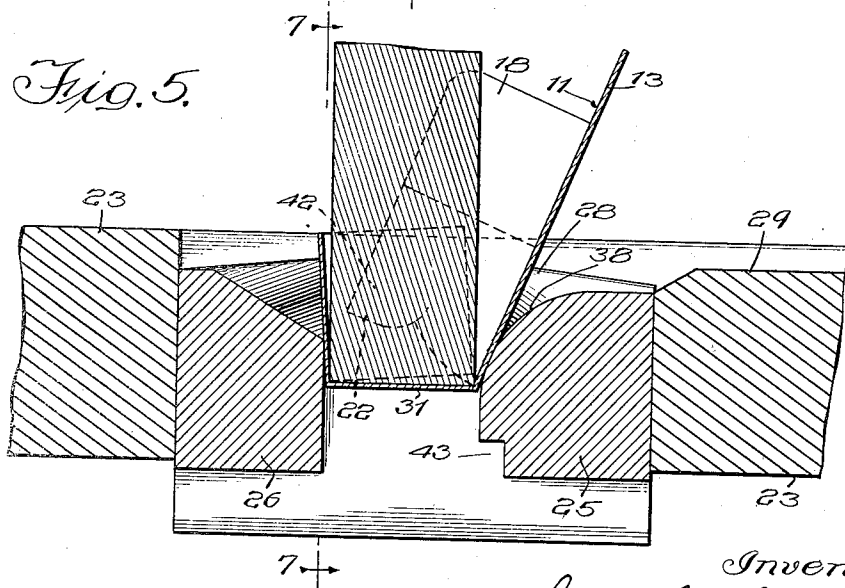
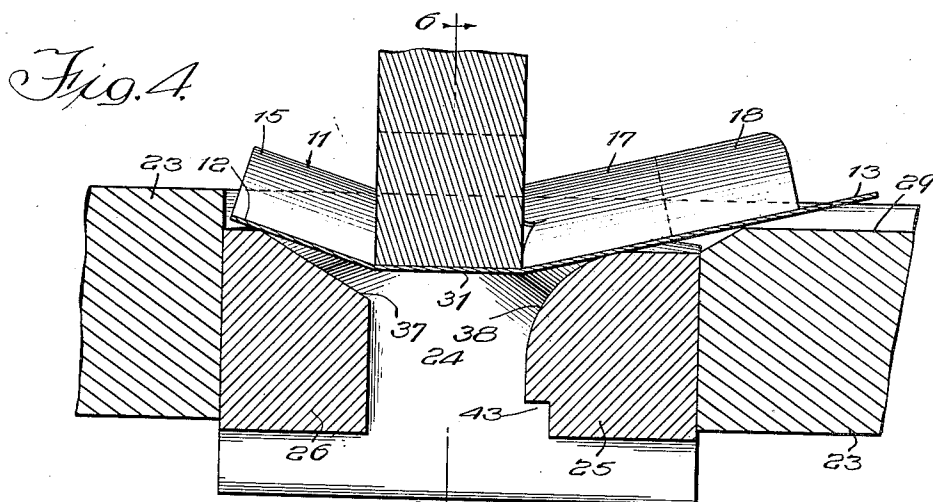
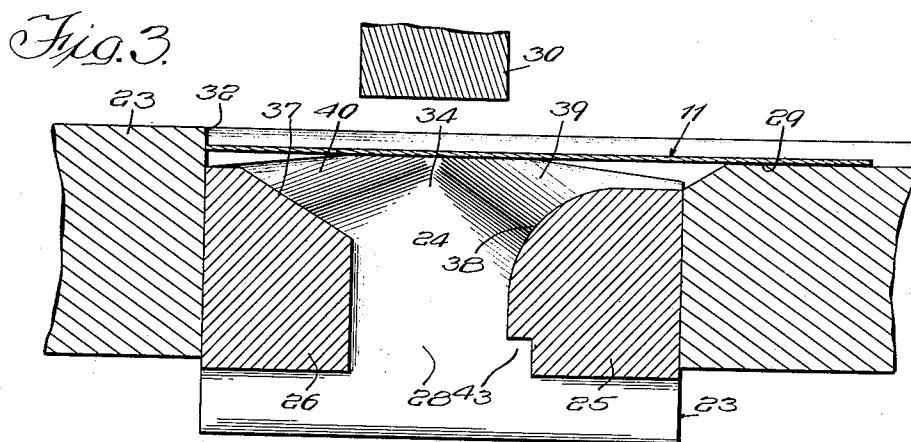
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CARTON FOLDING DEVICE

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3 Sheets-Sheet 2



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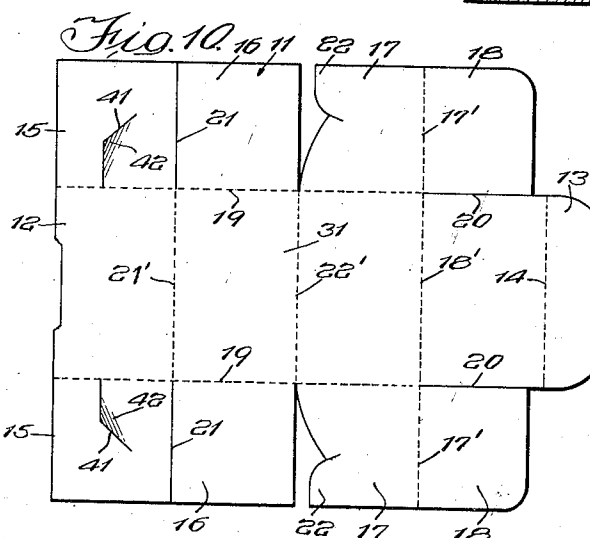
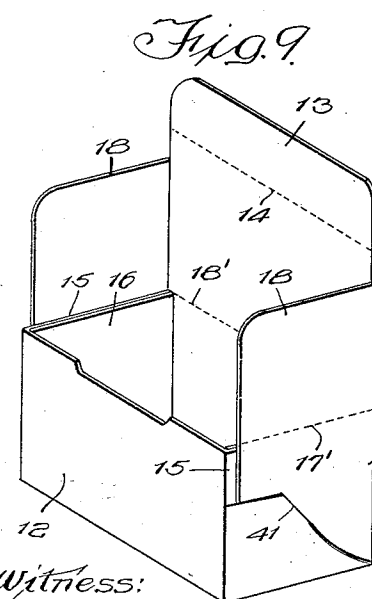
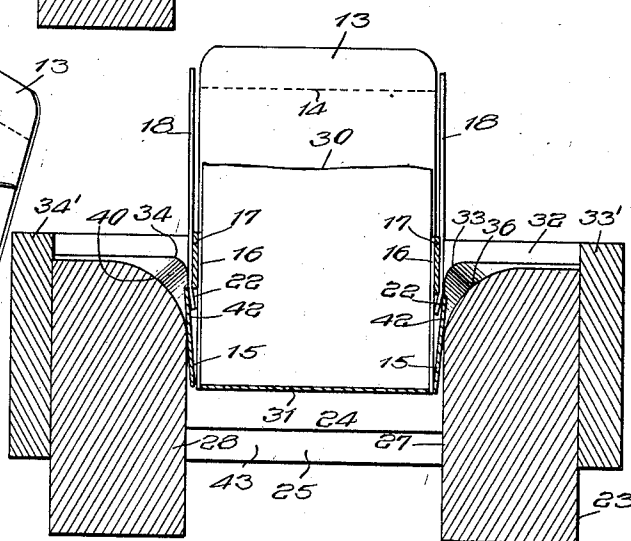
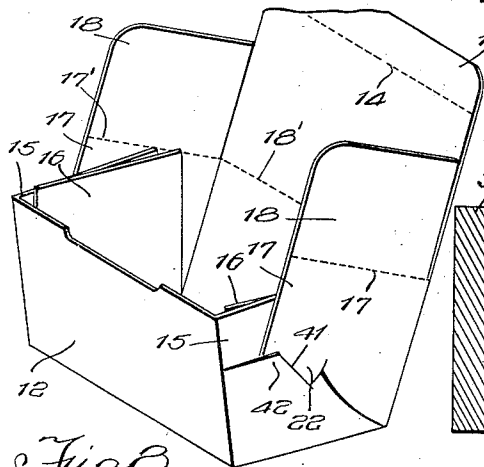
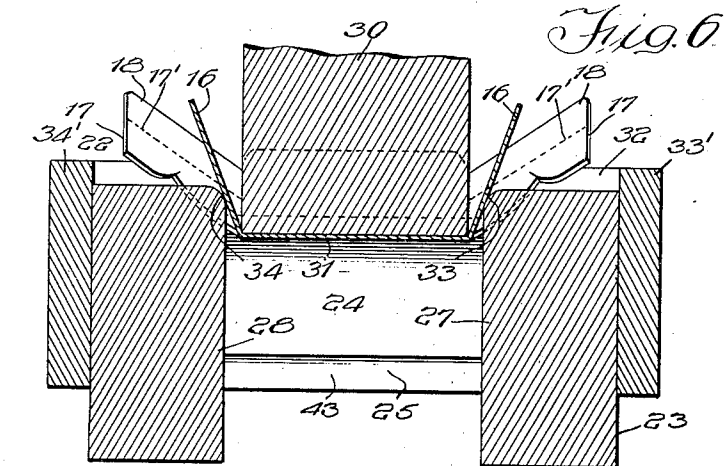
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CARTON FOLDING DEVICE

Filed March 21, 1930

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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CARTON FOLDING DEVICE

Application filed March 21, 1930. Serial No. 437,670.

This invention relates to carton folding devices and among the generic objects are to provide a device of simple construction embodying a minimum number of moving parts for the performance of the folding operation; a device embodying folding forms particularly shaped to properly fold the carton blank; and a device in which a carton will be stripped from the movable portions of the device after the folding thereof.

A selected embodiment of the invention is illustrated in the accompanying drawings wherein:

Fig. 1 is a side view of my improved folding device showing the means for moving the movable portions of the device;

Fig. 2 is a plan view of the folding forms;

Fig. 3 is a transverse sectional view of the folding forms with the blank disposed thereon;

Fig. 4 is a view similar to Fig. 3 showing the first step in the folding operation;

Fig. 5 is a view similar to Fig. 4 showing an intermediate step in the folding operation;

Fig. 6 is a view taken substantially on the line 6—6 of Fig. 4;

Fig. 7 is a view taken substantially on the line 7—7 of Fig. 5;

Fig. 8 is a perspective view of the carton when folded into the condition illustrated in Figs. 5 and 7;

Fig. 9 is a perspective view of the carton folded in the illustrated embodiment of my invention; and

Fig. 10 is a plan view of the blank of the carton folded in the embodiment of the invention illustrated.

Referring to the drawings wherein a selected embodiment of my invention is illustrated, 11 generally indicates the blank of the carton to be folded in my device. The blank includes a main body portion 12, Fig. 10, having a tab 13 at one end thereof defined by the fold line 14. Along the longitudinal edges of the main body 12 are the locking side tabs 15—15, 16—16, 17—17, and 18—18. The tabs 15—15, 16—16, and 17—17, are joined to the main body 12 by the fold lines 19—19, but the tabs 18—18 are separated from

the main body 12 by the slits 20—20 which are extensions of the fold lines 19—19. The tabs 15—15 are separated from the tabs 16—16 by slits 21—21. The overlying side tabs 17—17 along the edges juxtaposed to the liner side tabs 16—16 are cut to define ears 22—22, which ears have the edges thereof spaced from the edges of the tabs 16—16. A fold line 21' extends across the main body portion 12 in alinement with the slits 21—21. A fold line 22' extends across the main body portion 12 parallel to the fold line 21' and in alinement with the edges of the tabs 16—16 juxtaposed to the tabs 17—17. Fold lines 17'—17' join the tabs 18—18 to the tabs 17—17 and a fold line 18' extends across the main body 12 in alinement with the fold line 17'—17' and parallel to the fold lines 21' and 22' and also parallel to the fold line 14.

The carton blank 11 is folded into box formation in the folding block generally indicated by 23 which includes a centrally located opening 24 along opposite edges of which are folding forms 25 and 26 and along other opposite edges of said opening are the folding forms 27 and 28. As best illustrated in Figs. 2 and 3, the upper edges of the folded forms 27 and 28 and a surface 29 on the block 23 outwardly of the folding form 25 provides supports disposed in substantially the same horizontal plane on which the unfolded blank may be disposed. Alined with the opening 24 is a plunger 30 which is intended to be reciprocated through said opening to perform the folding operation. The portion of the blank 11 which provides the bottom of the folded carton is indicated by 31, and is bounded by the fold lines 19, 22', 19 and 21'. When the blank is disposed in the horizontal position on the folding block 23, as above described, this portion 31 is disposed below the plunger 30 in alinement with the opening 24, the edge of the blank 11 adjacent to the fold line 21 abutting an edge 32 in the block 23 adjacent the folding form 26 to so locate the portion 31. As best illustrated in Fig. 2, rim portions 33' and 34' extend along the edges of the folding block 23 past the folding forms 27 and 28 and these rim portions 33' and 34' serve to transverse-

ly aline the blank 11 with the block 23 to properly dispose the portion 31 relative to the opening 24. When the plunger 30 moves downwardly and engages the portion 31 this portion is similarly moved as illustrated in Figs. 4 and 6. By reason of the disposition of the upper edges of the folding forms 27 and 28 in the plane on which the unfolded blank is rested and, by reason of the small radii of the rounded corners 33 and 34 on these folding forms on the edges thereof adjacent the opening 24, the tabs 16—16 are quickly folded inwardly. As shown in Fig. 2, the edges 33 and 34 are of less extent than the extent of the opening 24. The edges 35 and 36 at the ends of the edge 33 extend angularly toward the outer edges of the block and the edge 36 is rounded downwardly toward the inclined upper edge 37 of the folding form 26, and the edge 35 is rounded downwardly toward the rounded edge 38 of the folding form 25. The upper edges of the folding forms 25 and 26 are disposed in a plane below the plane of the upper edges of the folding forms 27 and 28. The edges 39 and 40 extend angularly outward from the edge 34, and the edge 39 is rounded downwardly toward the edge 38, and the edge 40 is rounded downwardly toward the edge 37. This inclination of the edges 35 and 36 and 39 and 40 relative to the disposition of the edges 33 and 34 causes the next stage in the folding which is as follows:

The formation of the edges 36 and 40 is such that the tabs 15—15 will be folded inwardly with portions thereof overlying the tabs 16—16 which will be disposed in the relatively severe angular positions illustrated in Fig. 6. The edges 35 and 39 will act on the tabs 17—17 to fold these tabs toward the tabs 16—16 but outwardly of the tabs 15—15. In the tabs 15—15 the slits 41—41 are formed which define tongues 42—42. Prior to the time the blank 11 is disposed in the horizontal position of Fig. 3, the tongues 42—42 will be folded outwardly; that is, when the blank 11 is disposed in the position depicted in Fig. 3 these tongues will be inclined downwardly. Therefore, as the tabs 17—17 move over the outer surfaces of the tabs 15—15 the ears 22—22 will pass inwardly of the outwardly folded tongues 42—42 through the slits 41—41 in the manner clearly illustrated in Fig. 8, the blank 11 being arranged relative to the various folding forms at this stage of the operation in a position substantially similar to that shown in Figs. 5 and 7. During the foregoing operation, the surface 37 will have been acting on the portion of the main body 12 outwardly of the fold line 21' to fold this portion upwardly, and the surface 38 will have been acting on the portion of the main body 12 outwardly of the fold line 22' to fold this portion upwardly. Continued downward

movement of the plunger 30 will completely form the carton into the condition shown in Fig. 9, the rounded edge 38 serving to fold the portion of the main body 12 outwardly of the fold line 22' into engagement with the plunger 30, Fig. 5 illustrating the beginning of such movement. After the plunger 30 has advanced beyond the portion shown in Figs. 5 and 7 to bring about the last described operation, the parts will be substantially in the positions illustrated in Fig. 9 and, as the edges of the various folding forms are vertical in the portion of the extent through which the carton will now be passing, these edges serve to bring about a creasing along the fold lines which causes the retention of the parts in the positions illustrated. Downward movement of the plunger 30 will be continued and the now completely folded carton will be moved from the block 23. A rabbeted groove 43 is provided in the lower edge of the folding form 25 adjacent the opening 24 and the tab 13 will pass into this rabbeted groove when the plunger 30 has been moved downward sufficiently to aline this groove and tab. Engagement of this tab in this groove will prevent the folded carton from moving upwardly with the plunger 30 when said plunger is so moved and, therefore, the folded carton will be stripped from the plunger.

Any desired type of mechanism may be provided for operating the plunger 30 and one such form of mechanism is illustrated in Fig. 1 wherein the block 23 is mounted in the top 44 of a suitable table structure. A bearing 45 is provided in this top 44 and a bar 46 is extended through this bearing. An arm 47 extends from the upper end of the bar 46 and the upper end of the plunger 30 is connected to this arm. At the lower end of the bar 46 is a plate 48 on which a bearing 49 is provided. A link 50 is pivotally connected to the bearing 49 and said link includes a hook projection 51 to which one end of a spring 52 is connected, the other end of said spring being connected to the top 44. A bracket 53 is provided and a lever 54 is pivotally mounted on this bracket and is connected to the link 50. A foot treadle 55 is provided on the lever 54. When the foot treadle 55 is depressed to move the lever 54 into the dotted line position in Fig. 1, the link 50, bar 46, arm 47, and plunger 30 are moved into the dotted line positions of Fig. 1 expanding the spring 52 which spring returns the parts to the full line position when pressure is removed from the treadle 55, the engagement of the plate 48 with the lower end of the bearing 45 limiting the action of the spring 52. A suitable conveyor, such as the belt 56, may be arranged below the lowermost position of the plunger 30 to carry away the folded cartons stripped from said plunger. If desired, the top 44 may be of a

size sufficient to permit a stack of the blanks 11 to be stored thereon, as illustrated in Fig. 1.

It is manifest from the foregoing description that I have provided a carton folding device which embodies but one moving part and which includes properly disposed suitably shaped folding forms which cooperate with the moving part to bring about the folding of the carton from a blank which has been previously properly scored and slotted.

While I have illustrated and described a selected embodiment of my invention, it is to be understood that this is capable of variation and modification to meet the requirements of particular cartons without departing from the purview of the invention as set forth in the following claims.

I claim:

1. A carton folding device including a carton folding member having an opening therein, folding forms disposed about said opening, said folding forms having shaped surfaces thereon on the upper edges thereof on the portions around said openings, the medial portions of the shaped surfaces on oppositely disposed of said folding forms having relatively short radii and being disposed in a plane above the plane of other of said shaped surfaces thereon, said other surfaces having radii longer than the radii of the first-named surfaces, and means for passing a carton blank over said shaped surfaces and through said openings.

2. A carton folding device including a carton folding member having an opening therein, folding forms disposed about said opening, said folding forms having shaped surfaces on the upper edges thereof, the shaped surfaces on folding forms at opposite edges of said opening having the medial portions thereof positioned adjacent said opening disposed in a plane higher than the other portions thereof, said last named portions of said surfaces being inclined outwardly from the ends of said medial portions and toward and merged with shaped surfaces on the folding forms along the other edges of said opening, and means for passing a carton blank over said surfaces and through said opening.

3. A carton folding device including a carton folding member having an opening therein, folding forms disposed about said opening, said folding forms having shaped surfaces on the upper edges thereof, the shaped surfaces on folding forms at opposite edges of said opening having the portions thereof positioned adjacent said opening and substantially medially thereof rounded with relatively small radii and having the remaining portions thereof rounded with longer radii and inclined outwardly toward the ends of the folding forms along the other edges and away from the ends of the medial portions, the shaped surfaces on the folding forms along

other edges of said opening being of more gradual contour than said last named shaped surfaces, and means for passing a carton blank over said surfaces and through said openings.

4. In a device for folding a carton embodying locking side tabs having slits therein providing outwardly extending tongues and overlying side tabs having ears thereon adapted to engage in said slits inwardly of said tongues, a folding member having an opening therein, stationary folding forms disposed about said opening and mounted relative to each other, and means for moving a carton blank through said opening and past said folding forms, certain of said folding forms having shaped surfaces thereon for bending said locking tabs inwardly, and other of said folding forms having shaped surfaces thereon for bending said overlying tabs toward said locking tabs and outwardly thereof whereby the ears on said overlying tabs are passed into the slits in said locking tabs.

5. In a device for folding a carton embodying liner side tabs, locking side tabs, and overlying side tabs, a folding member having an opening therein, and stationary folding forms disposed about said opening and mounted relative to each other, and means for moving a carton blank through said opening past said folding forms, certain of said folding forms having shaped surfaces thereon for folding said liner side tabs inwardly as the first step in the carton folding operation and having other shaped surfaces thereon for folding said locking tabs inwardly over said liner tabs and having still other shaped surfaces thereon for folding said overlying tabs over said locking tabs and for connecting said overlying tabs to said locking tabs to thereby retain said carton in folded position.

6. In a device for folding a carton having liner side tabs, locking side tabs having slits therein defining outwardly projecting tongues, and overlying side tabs having ears thereon, a folding member having an opening therein, and stationary folding forms disposed about said opening and mounted relative to each other, and means for moving a carton blank through said opening past said folding forms, certain of said folding forms having shaped surfaces thereon for folding said liner side tabs inwardly as the first step in the carton folding operation and having other shaped surfaces thereon for folding said locking tabs inwardly over said liner tabs and having still other shaped surfaces thereon for folding said overlying tabs toward said locking tabs whereby the ears on said overlying tabs engage said tongues to be passed into said slits in said locking tabs to thereby retain said carton in folded position.

7. In a device for folding a carton embodying a bottom portion having end tabs along opposite edges thereof, liner side tabs along

the other edges thereof, locking side tabs, overlying side tabs, a folding member having an opening therein, stationary folding forms disposed about said opening and mounted
5 relative to each other, and means for moving a carton blank through said opening past said folding forms, certain of said folding forms having shaped surfaces thereon for folding said liner side tabs inwardly as
10 the first step in the carton folding operation and having other shaped surfaces thereon for folding said end tabs inwardly toward said liner tabs and having other shaped surfaces thereon for folding said
15 locking tabs over said liner tabs, and still other shaped surfaces thereon for folding said overlying tabs over said locking tabs and for connecting said overlying tabs to said locking tabs whereby said carton is
20 retained in folded position after passage thereof through said opening past said folding forms.

8. In a device for folding a carton embodying a bottom portion having end tabs along
25 opposite edges thereof, liner side tabs along the other edges thereof, other side tabs having slits therein defining outwardly projecting tongues, and overlying side tabs having ears thereon, a folding member having an
30 opening therein, stationary folding forms disposed about said opening and mounted relative to each other, and means for moving a carton blank through said opening past said folding forms, certain of said folding
35 forms having shaped surfaces thereon for folding said liner side tabs inwardly as the first step in the carton folding operation and having other shaped surfaces thereon for folding said end tabs inwardly toward said
40 liner tabs and having other shaped surfaces thereon for folding said locking tabs over said liner tabs and still other shaped surfaces thereon for folding said overlying tabs over said locking tabs and for passing said ears
45 inwardly of said tongues and into said slits to retain said carton in folded condition after passage thereof through said opening past said folding forms.

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