

July 25, 1950

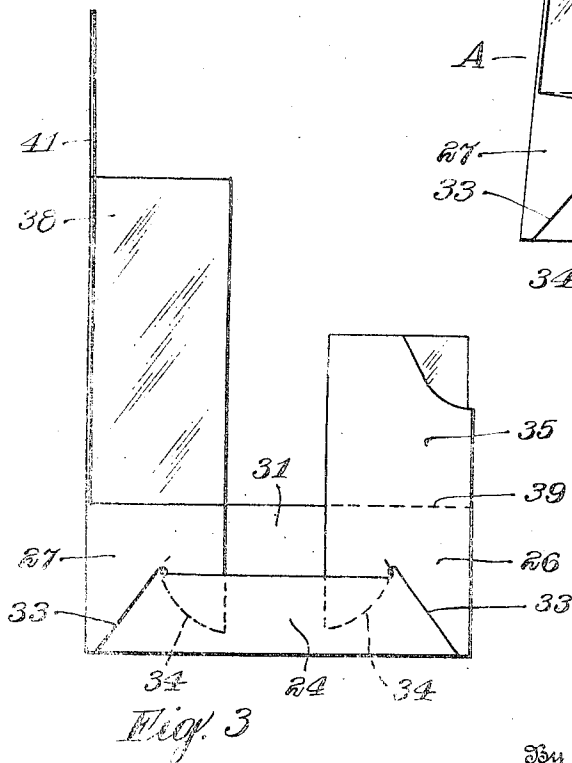
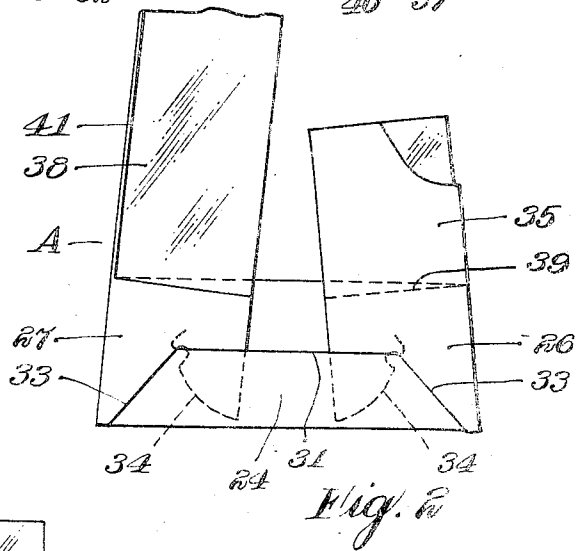
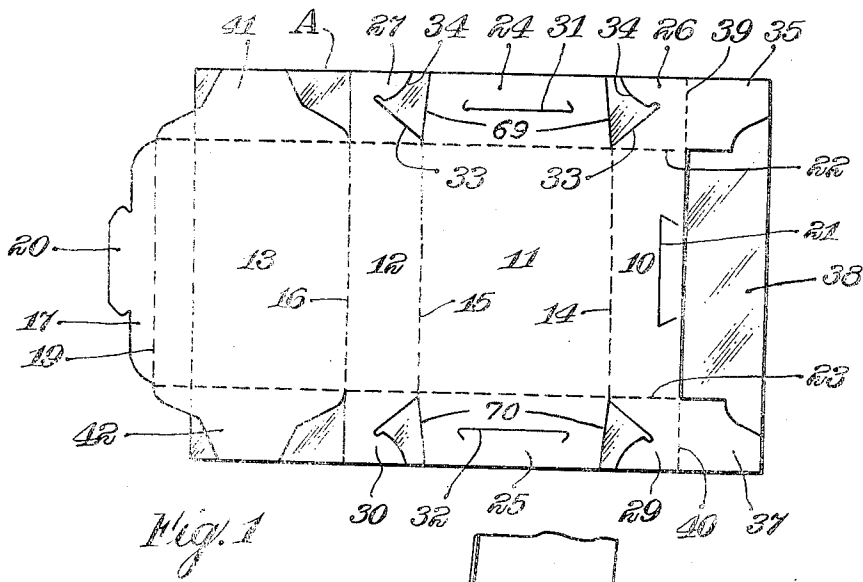
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METHOD AND APPARATUS FOR FORMING CARTONS

Filed Nov. 6, 1944

4 Sheets-Sheet 1



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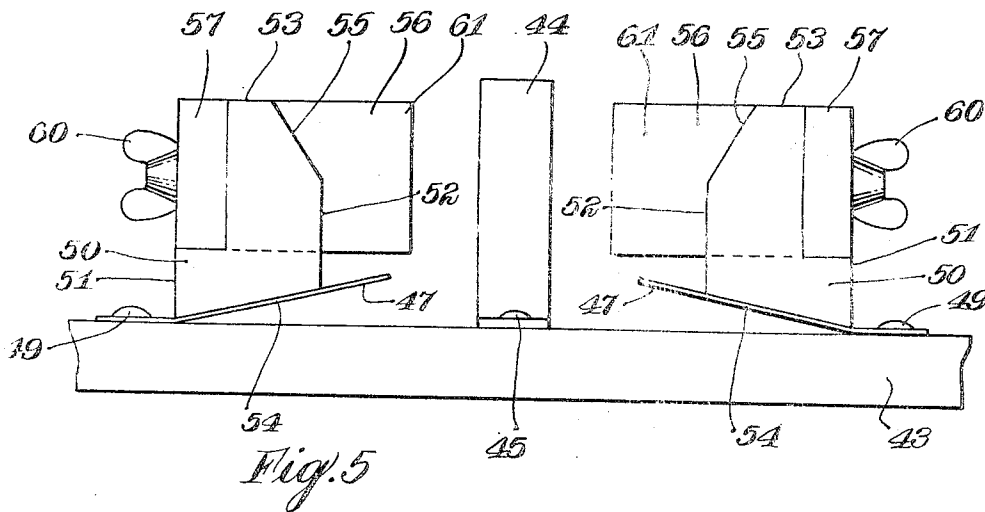
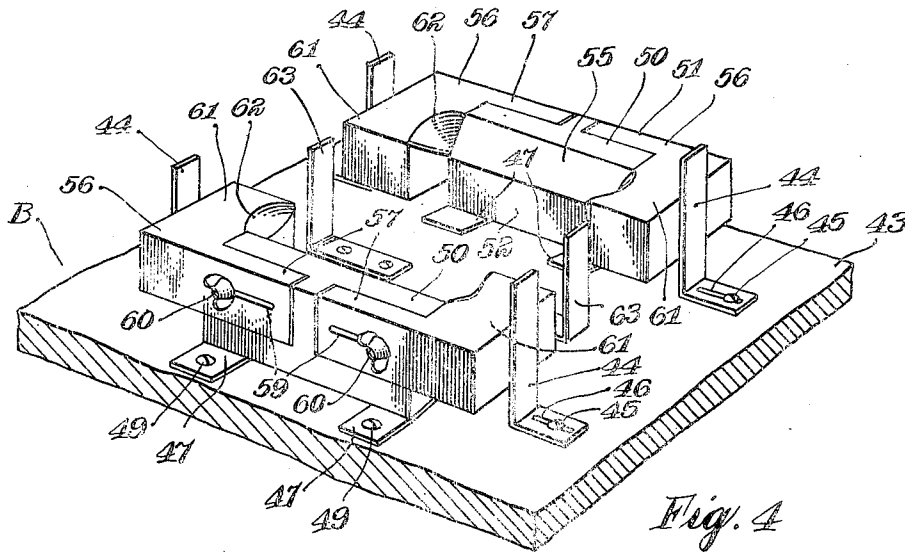
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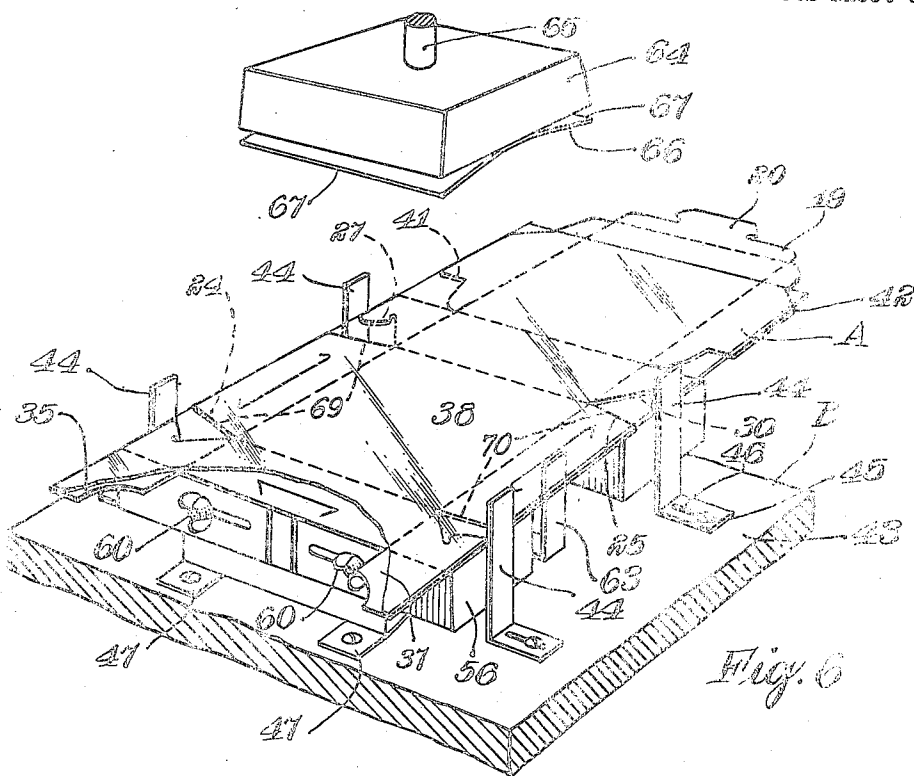


Fig. 6

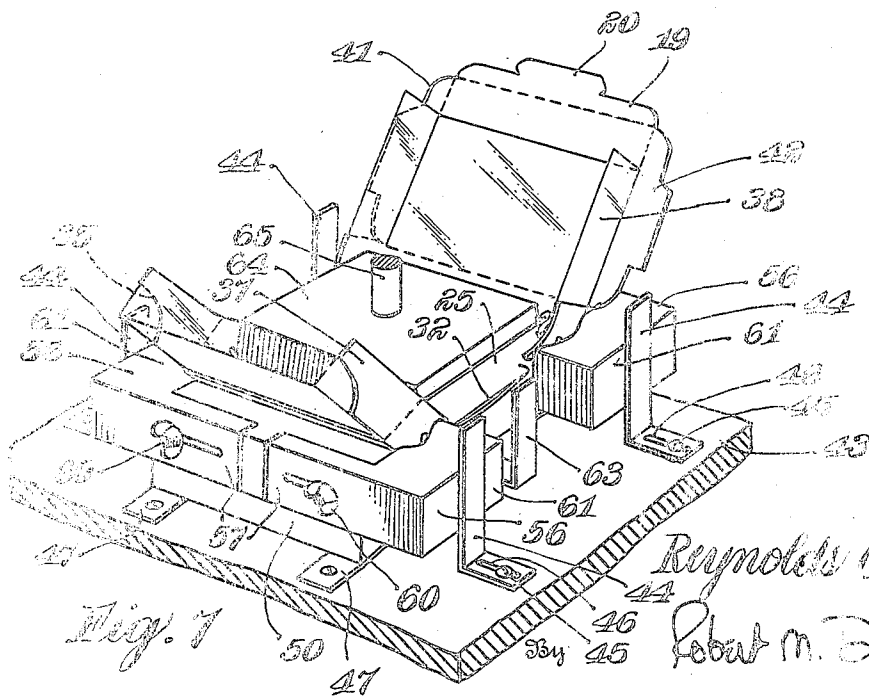


Fig. 7

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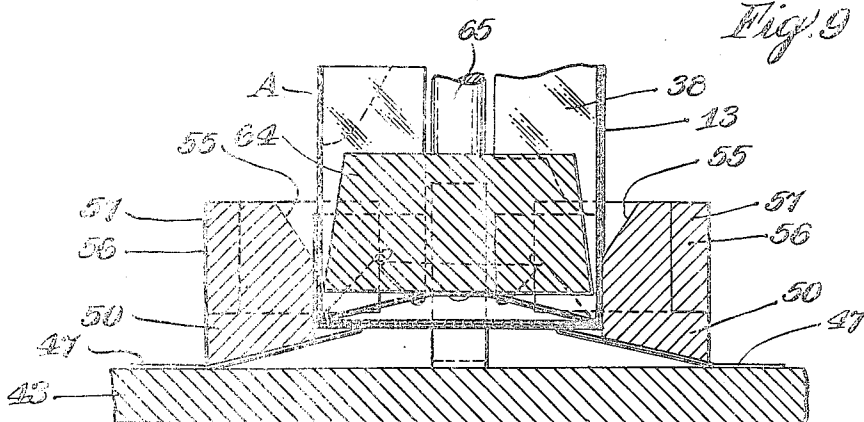
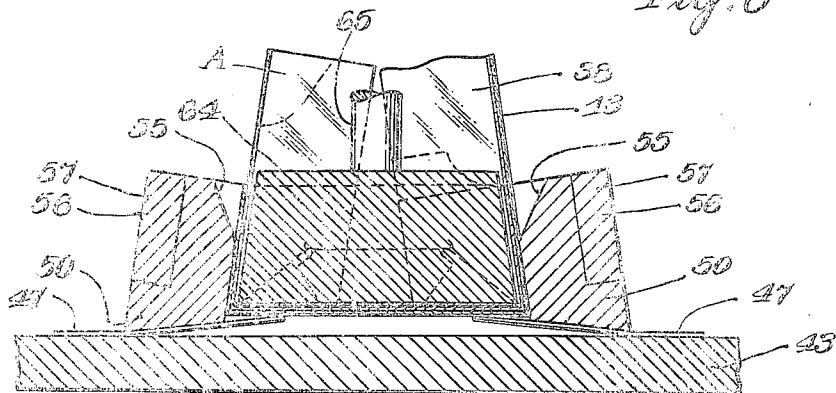
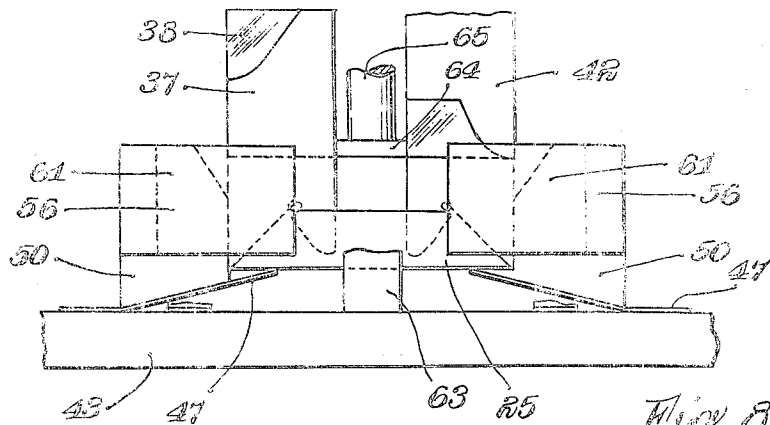
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METHOD AND APPARATUS FOR FORMING CARTONS

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METHOD AND APPARATUS FOR FORMING
CARTONS

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16 Claims. (Cl. 93—51)

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My invention relates to an improvement in method and apparatus for forming a carton, wherein it is desired to produce a set up carton in a simple and efficient manner.

It is the object of the present invention to provide a carton blank in flat form and to form this carton into tray formation with four rectangularly arranged side walls upstanding and connected together in a single plunger operation. The carton blank may accordingly be fed into the carton forming apparatus in flat form. The plunger then forces the blank into the carton forming apparatus, and this apparatus automatically folds four carton side walls upwardly from the bottom panel and connects these sides together.

A feature of the present invention lies in the provision of a carton having a bottom panel and four side wall panels foldably connected thereto, and in providing locking tabs on two of the side walls designed to engage in cooperating slots on the remaining side walls. During the folding operation of the side walls the locking tabs are automatically inserted into their respective slots, thus producing a locked carton in a single operation.

A feature of the present invention resides in providing a carton with locking tabs on two opposed side walls which are designed to engage in cooperating slots on the remaining opposed side walls and to engage the locking tabs in their respective slots by folding the carton walls bearing the locking tabs beyond an upright position. This folding operation is accomplished while a plunger is positioned within the box and the side walls supporting the locking tabs are returned to their normal upright position by withdrawal of the plunger from the interior of the carton.

A further feature of the present invention lies in the provision of a carton of the type described which is equipped with a liner preferably of moisture-proof material such as cellophane or the like. This liner is not co-extensive with the side walls, but projects upwardly from certain of the side walls in folded position of the carton so that these upwardly extending liner portions may be folded over the contents of the carton after the same has been filled. As a result materials such as vegetables and the like to be frozen may be inserted within the carton and the carton may then be closed, the upwardly projecting portions of the moistureproof liner overlying the top of the contents so as to completely encircle the contents when the carton is closed.

A further feature of the present invention resides in the attachment of a moistureproof liner

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to the surface of a carton and the forming of the carton with its attached liner into an upright tray, the upright walls of which are attached together while the carton is folded into tray formation. The flat liner sheet is folded to form a water-proof bag into which the contents of the carton may be poured.

A further feature of the present invention lies in the method of plunging a carton blank into a carton forming mechanism by means of a plunger which expands in width when pressure is applied thereby against the carton. The plunger is equipped with a resilient blade or hinged blade which normally is of predetermined width, but which expands in effective width when pressure is applied thereupon.

These and other objects and novel features of my invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of my specification:

Figure 1 is a diagrammatic view showing the carton blank.

Figure 2 shows the blank of Figure 1 in partially set up form.

Figure 3 shows the blank of Figure 1 when the setting up operation has been completed.

Figure 4 is a perspective view of a carton forming mechanism.

Figure 5 is an elevational view of the mechanism shown in Figure 4.

Figure 6 shows the mechanism of Figure 4 with a carton blank resting in position thereon ready for the forming operation.

Figure 7 is a view similar to Figure 6 showing the forming operation partially completed.

Figure 8 is an elevational view showing a subsequent step in the carton forming operation.

Figure 9 shows the next step in the carton forming operation, Figure 9 being a sectional view through the carton and forming apparatus.

Figure 10 shows the final step in the formation of the carton.

The carton blank A illustrated in Figure 1 of the drawings includes a front panel 10, a bottom panel 11, a rear wall panel 12, and a top panel 13 connected along parallel fold lines 14, 15, and 16. A front closing flap 17 is connected to the top panel 13 along the fold line 19. The closing flap 17 is provided with a projecting tab 20 which may be accommodated in the slot 21 in the front panel 10.

The carton blank is scored along parallel fold lines 22 and 23 which separate the various panels

described from their respective side panels and closing flaps.

Side wall panels 24 and 25 are secured to the bottom panel 11. These side wall panels 24 and 25 are held in upright position in erected condition of the box by locking tabs secured to the front and rear panels 10 and 12. Locking panels 26 and 27 are secured to the panels 10 and 12 along the fold line 22. Similar locking tabs or flaps 29 and 30 are connected to the panels 10 and 12 along the fold line 23. These locking tabs are adapted to engage into a slot 31 or 32 in the side walls 24 or 25 respectively.

The locking tabs or flaps are all of substantially similar shape. The flaps extend diagonally along lines 33 and terminate in rounded projections 34. These rounded projections extend into the slots 31 and 32 in the manner disclosed.

The tabs or flaps 26 and 29 are provided with projecting flaps 35 and 37 secured thereto along aligned fold lines 39 and 40. These flaps 35 and 37 project beyond the ends of the blank but dove tail with the projecting flap portions 17 and 20 of the next adjacent blank. This permits a considerable number of blanks to be cut from a single sheet of material.

The side edges of the flaps 24 and 25 do not extend vertically in upright position of these panels. The flaps 24 and 25 taper from a largest dimension along the fold lines 22 and 23 to a narrower edge at their extremity. This tapering of the flaps 24 and 25 permits the folding of the front and rear walls 10 and 12 beyond vertical position, as will be later described.

The top panel 13 is provided with opposed side locking flaps 41 and 42 which are the full length of the panel 13 at the fold lines 22 and 23, but which are considerably narrower in their outer extremity so as to readily fit into the slots 31 and 32 when the box is closed. A front locking flap 17 bearing the locking projection 20 has been previously described to fit into the slot 21. In order to provide a liner for the carton A, a sheet of moistureproof material such as cellophane or the like is secured to one surface of the sheet. The cellophane preferably extends to the ends of the projecting flaps 35 and 37, these flaps extending to the corners of the cellophane sheet. The sheet of cellophane is also secured to the locking tabs or flaps 26, 27, 29 and 30, the attachment of the cellophane to these flaps being limited to the area bounded by the diagonal line 33, the adjacent fold line 22 or 23, the adjoining straight edge of the flap. The cellophane may also be attached to the flaps 41 and 42 and to the flaps 24 and 25 outwardly of the slots 31 and 32. The end of the cellophane sheet opposite the end connected to the projecting tabs 35 and 37 is adjacent the flaps 41 and 42 and may be covered thereby in preferred form of the construction.

In the formation of the carton I employ an apparatus best illustrated in Figures 4 and 5 of the drawings. The mechanism illustrated is typical of a type of device which will serve the intended purpose. I provide a base 43 having a pair of angular guides 44 mounted thereupon to project upwardly therefrom. The guides 44 are held in place by any suitable means such as screws or bolts 45 extending through slots 46 in the base portions of the angular guides. The guides 44 are intended merely to hold the carton blank in proper relation relative to the forming apparatus.

Two pairs of spaced springs 47 are secured

to the base 43 by any suitable means such as bolts or screws 49. The springs of each pair are in spaced parallel relation and are opposed to the spaced springs of the other pair. A forming block 50 is supported by each pair of springs 47, each block having substantially parallel vertical upright outer and inner walls 51 and 52, a substantially horizontally extending top wall 53 and an angularly extending bottom wall 54. The bottom wall 54 extends at the same angle from the base as the unattached ends of the springs 47, as best illustrated in Figure 5 of the drawings, the springs 47 extending beyond the inner walls 52 of the blocks 50. Each of the blocks 50 is provided with an inclined or beveled surface 55 connecting the vertical inner wall 52 to the top wall 53. This beveled or inclined edge 55 assists in the folding of the front and rear walls 10 and 12 respectively of the carton blank A.

A pair of L-shaped attachments 56 are secured to each of the blocks 50 as best illustrated in Figure 4 of the drawings. These L-shaped blocks 56 include an arm 57 which overlaps the rear surface of the block 50, or preferably engages in a notch in the rear surface of the block 50 as shown. Slots are provided in the arms 57, these slots being indicated by the numeral 59. Studs extend through the slots 57 and wing nuts 60 are provided on these studs. By tightening the wing nuts 60 the attachments 56 may be held in desired adjustment relative to the block 50.

The attachments 56 also include ends 61 which extend at right angles to the arms 57. These arms or ends 61 are notched or rounded along the inner and upper edges at 62, these notches 62 tending to fold the various locking tabs into engagement with their respective slots. Angular supports 63 secured to and projecting upwardly from the base 43 engage the carton flaps 24 and 25 outwardly of the slots 31 and 32, tending to open these slots 31 and 32 as the carton blank is forced into the carton forming mechanism designated in general by the letter B.

As illustrated in Figure 6 of the drawings a plunger 64 operated by any suitable plunger rod 65 is arranged to press down upon the carton blank A while the same is resting upon the carton forming mechanism B. The plunger 64 is of a size slightly smaller in external dimension than the interior of the carton in set up position. The undersurface of the plunger 64 is of substantially similar area as the carton bottom panel 11. A leaf spring 66 is centrally secured to the undersurface of the plunger 64 and is spaced somewhat from this undersurface of the plunger along opposite edges 67 of the spring. This leaf spring is slightly wider than the undersurface of the plunger 64 when flattened out, but is normally confined within the dimensions of the bottom of the plunger in the bent formation illustrated in Figure 6.

In the operation of forming the carton A into a set up box as illustrated in Figure 3 of the drawings, the carton blank is first rested upon the forming mechanism B as illustrated in Figure 6 of the drawings, the blank being held in place by suitable guides such as the guides 44. The plunger 64 is then depressed, the leaf spring 66 engaging the carton bottom panel 11 near opposed edges thereof. Downward pressure upon the plunger causes the front and rear walls 10 and 12 to fold upwardly along the fold lines 14 and 15, as the walls 10 and 12 are supported by the blocks 50

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while the bottom panel 11 of the carton is free to travel downwardly. Simultaneously the flaps 24 and 25 are bent upwardly both by the ends 61 of the attachments 56 and by the supports 63. The flaps 24 and 25 fold along the parallel fold lines 22 and 23.

Figure 7 of the drawings shows the carton in partially formed position with the carton flaps or side walls 24 and 25 folded against the ends of the plunger 64 and the front and rear panels 10 and 12 in partially folded condition. The beveled edges 55 of the blocks 50 permit a somewhat slower folding of the front and rear walls 10 and 12 while the unbeveled ends of the attachment elements 61 fold the flaps 24 and 25 almost immediately when the carton blank is pushed downwardly.

As noted in Figure 7 of the drawings the locking tabs 26, 27, 29 and 30 are swung toward the side wall panels 24 and 25 engaging into the slots 31 and 32 therein. The length of these slots and the tendency for the portion of the paper beneath the slots to return to horizontal or flat condition produces an outward bowing of the material beneath the slots so as to provide an easy means of entry for the various locking tabs.

From the position shown in Figure 7 of the drawings the carton moves into the position shown in Figure 8 thereof. In this position the front and rear walls 10 and 12 of the carton extend vertically and the locking tabs are at least partially inserted into the slots 31 and 32. However, to insure the proper locking of these tabs in the respective slots the front and rear carton walls 10 and 12 are folded beyond vertical position into the position shown in Figure 9. Downward pressure of the plunger 64 causes the bottom of the carton to engage against the inwardly projecting ends of the springs 47, thus bending the springs and causing the blocks 50 to tilt inwardly, causing the front and rear walls 10 and 12 of the carton to fold against the tapered walls of the plunger 64. This pivoting of the front and rear walls beyond vertical position is made possible by the beveling of the wall panels or flaps 24 and 25 at 69 and 70 respectively.

With the carton walls pivoted into the position shown in Figure 9, it is only necessary to swing the carton walls back into upright position. This action is obtained by the removal of the plunger 64 from within the carton. When the plunger 64 is moved upwardly the pressure upon the springs 47 is released and the blocks 50 returned into their normal upright position. The leaf spring 66 also returns to its normal shape. The plunger 64 may then be pulled vertically from the carton, the natural tendency of the carton to return to flat condition causing the walls to return to vertical position as illustrated in Figure 3 of the drawings.

When the plunger 64 has been removed it will be noted that a carton has been completed with upright side and end walls and with a liner of cellophane or other material lining the walls and bottom of the carton. The folding of the box in the manner specified creates diagonally creased corner folds in the moisture-proof sheet, thereby forming a tray which will actually hold water or the like, thus permitting the carton to be filled with material having a relatively high moisture content without danger of leakage as long as the carton is not tipped. This arrangement makes the carton particularly useful for containing material such as frozen foods, and the cartons may be readily held in upright position until after the

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freezing operation at which time the liquid within the carton is in a frozen condition.

In accordance with the patent statutes, I have described the principles of construction and operation of my method and apparatus for forming a carton, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that obvious changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. The method of forming a carton having a bottom panel, side wall panels foldably connected thereto, and locking panels on certain of said side wall panels designed to engage in slots in the next adjacent panel, said slots extending substantially parallel to the fold lines connecting the slotted panels to said bottom panels, the method consisting in simultaneously bending upwardly the side walls of the carton, the bending of the slotted panels opening said slots, and simultaneously folding the locking tabs into engagement with the cooperable opened slots.

2. The method of forming a carton having a bottom panel, side wall panels articulated thereupon, and closure tabs foldably connected to certain of said side walls and engageable in slots in adjacent side walls, said slots extending substantially parallel to the fold lines connecting the slotted panels to said bottom panel, the method consisting of simultaneously bending the side walls to a position substantially at right angles with respect to the bottom panel, the bending of the slotted panels opening said slots, and simultaneously guiding the locking flaps into engagement with the corresponding opened slots.

3. The method of forming a carton having a bottom panel, side wall panels articulated thereupon, and locking flaps secured to certain of said side walls to engage slots in others of said walls, said slots extending substantially parallel to the fold lines connecting the slotted panels to said bottom panel, the method consisting in folding the side walls, said other of said side walls being folded into substantially right angular relationship with said bottom wall, and said certain of said walls being folded past vertical position, the bending of the slotted panels opening said slots, simultaneously guiding the locking tabs into their corresponding opened slots, and folding the latter two side walls back into substantially vertical relation to the bottom wall.

4. The method of forming a carton having a substantially rectangular bottom wall panel and side wall panels foldably connected thereto along the four edges thereof, two opposed side walls having locking flaps foldably secured thereto, and the second pair of opposed side walls having slots therein to accommodate said locking tabs, said slots extending substantially parallel to the fold lines connecting the slotted panels to said bottom panel, the method consisting in folding said second pair of side walls into substantially vertical relation relative to said bottom wall, the bending of the slotted panels opening said slots, folding the first mentioned pair of side walls upwardly, and simultaneously guiding said locking tabs into the opened slots of said second pair of side walls.

5. The method of forming a carton having a substantially rectangular bottom wall panel and side wall panels foldably connected thereto along the four edges thereof, two opposed side walls

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having locking flaps foldably secured thereto, and the second pair of opposed side walls having slots therein to accommodate said locking tabs, said slots extending substantially parallel to the fold lines connecting the slotted panels to said bottom panel, the method consisting in folding said second pair of side walls into substantially vertical relation relative to said bottom wall, the bending of the slotted panels opening said slots, folding the first mentioned pair of side walls upwardly, and simultaneously guiding said locking tabs into the opened slots of said second pair of side walls, said first pair of side walls folding beyond vertical position to engage said locking tabs in their respective notches.

6. The method of forming a carton having a substantially rectangular bottom wall panel and side wall panels foldably connected thereto along the four edges thereof, two opposed side walls having locking flaps foldably secured thereto, and the second pair of opposed side walls having slots therein to accommodate said locking tabs, said slots extending substantially parallel to the fold lines connecting the slotted panels to said bottom panel, the method consisting in folding said second pair of side walls into substantially vertical relation relative to said bottom wall, the bending of the slotted panels opening said slots, folding the first mentioned pair of side walls upwardly, and simultaneously guiding said locking tabs into the opened slots of said second pair of side walls, said first pair of side walls being folded beyond vertical position to engage said locking flaps in their respective slots, said first side walls then being folded back into substantially right angular relation with said bottom wall.

7. The method of forming a carton having a substantially rectangular bottom panel, side wall panels connected to the edges of said bottom panel, and locking flaps on certain of said side walls engageable in slots in the next adjacent side wall, and a liner secured at intervals to said blank, the method consisting of folding the side walls upwardly from said bottom panel and folding said locking tabs outwardly of the adjacent side wall panels, said liner being secured to said locking flaps so as to create diagonal folds in the liner between said locking flaps and the portions of the adjacent walls which they overlie, engaging said locking flaps through slots in the adjacent walls to lie between the inner surface of the wall and the liner, folding the side walls bearing the locking flaps beyond erected position to draw the liner taut, and folding the last mentioned side walls back to erected position.

8. The method of forming a carton having a bottom panel of rectangular shape, side panels connected to the edges of said bottom panels, and locking tabs on certain of said side walls engageable in slots in the next adjacent side wall, and a liner secured at spaced intervals to one surface of the carton blank, the method consisting of folding the side walls relative to the bottom panel, the folding of the side walls creating a diagonal corner tray of said liner, said locking tabs extending over the outer surface of the adjacent wall and portions of the liner being secured to said locking tabs so as to cause the diagonally folded corner portions of the liner to extend between the locking tabs and the outer surface of the adjacent side wall, engaging said locking tabs in their respective slots, folding the side walls bearing the locking flaps beyond erected position to draw the liner taut,

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and folding the last mentioned side walls back to erected position.

9. The method of forming a carton having a bottom panel substantially rectangular in shape, side walls foldably connected to said bottom panel, and locking flaps on certain of said side walls engageable in slots in the others of said side walls, and a liner secured to said side walls near the upper extremities thereof, the method consisting in folding the side walls upwardly with respect to the base and folding the locking flaps outwardly of the adjacent walls, engaging said locking flaps through their respective slots so that portions of the locking flaps lie between the inner surface of the side wall and the outer surface of the liner, folding the side walls bearing the locking flaps beyond erected position to draw the liner taut, and folding the last mentioned side walls back to erected position.

10. The method of forming a carton having a bottom wall, side walls foldably connected thereto and locking flaps on certain of said side walls engageable in slots in others of said side walls, the method consisting of supporting the side walls of the carton blank in flat formation of the blank, exerting a downward pressure on the center portion of the blank to fold the side walls relative thereto, and exerting an inward pressure on said certain of said side walls to cause the same to fold past vertical position and simultaneously engaging said locking flaps thereon into said slots.

11. The method of forming a carton consisting of a bottom panel of substantially rectangular shape, side walls foldably connected to the side thereof, and locking flaps on two opposed side walls engageable in cooperable notches in the others of said side walls, the method consisting of supporting the flat carton blank by the side walls thereof, exerting a downward pressure on the unsupported bottom panel to cause the side walls to fold relative thereto, exerting an inward pressure on said two opposed side walls to fold the same past vertical position and simultaneously engaging said locking flaps in said cooperable notches.

12. The method of forming a carton having a bottom panel of substantially rectangular shape, side walls foldably connected thereto, and locking panels on certain of said side walls, the method consisting of supporting the flat carton blank by the side walls thereof, exerting a force against the unsupported bottom panel to cause the supported side walls to fold relative thereto, and exerting an outward force against the fold lines along two edges of said bottom panel inwardly of the side walls thereon to cause the same to fold along the proper fold lines.

13. A carton forming apparatus for use in conjunction with a carton having a substantially rectangular bottom panel and side walls foldably connected thereto, the apparatus comprising a base, a pair of folding guides pivotally supported in substantially parallel relation to said base, and engageable with two opposed side walls on opposite sides of the bottom panel of a carton, means for forcing the carton against said folding guides to pivot the same and means on said folding guides engageable with the remaining side walls of a carton, to fold the remaining side walls relative to said base.

14. A carton forming apparatus for use in conjunction with a carton having a substantially rectangular bottom panel and attached side wall panels, the apparatus comprising a base, a pair

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of spaced blocks mounted on said base for engagement with two opposed side walls of the carton blank, spring means hingedly connecting said blocks to said base, means for forcing the carton between said blocks to pivot the same, and means on said blocks engageable with the remaining side walls of said carton to fold the same relative to said base.

15. A carton forming apparatus for use in conjunction with a carton having a substantially rectangular bottom panel and attached side wall panels, and locking tabs foldably connected to two opposed side wall panels and engageable with the remaining side wall panels, the apparatus comprising a base, a pair of spaced blocks mounted on said base for engagement with said two opposed side walls of the carton blank, means hingedly connecting said blocks to said base, folding arms connected to each end of said blocks and engageable with said locking tabs to fold the same, and means for forcing said carton between said blocks to pivot said blocks.

16. A carton forming apparatus for use in conjunction with a carton having a substantially rectangular bottom panel and attached side wall panels, two opposed side wall panels having locking tabs foldably connected to the ends thereof and the remaining opposed panels having slots therein into which said locking panels may engage, the apparatus comprising a base, means

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on said base engageable with said remaining panels to fold said panels upwardly from said base, a pair of spaced blocks mounted on said base for engagement with said first named opposed side walls of the carton blank, means hingedly connecting said blocks to said base, means on the ends of said blocks engageable with said locking tabs for folding said tabs into said slots, and means for forcing the carton between said blocks to pivot the blocks and the folding arms connected thereto.

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