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L. H. PHILLIPS

2,569,335

AUTOMATIC LOCK BOTTOM CARTON

Filed June 9, 1949

2 Sheets-Sheet 1

Fig. 1

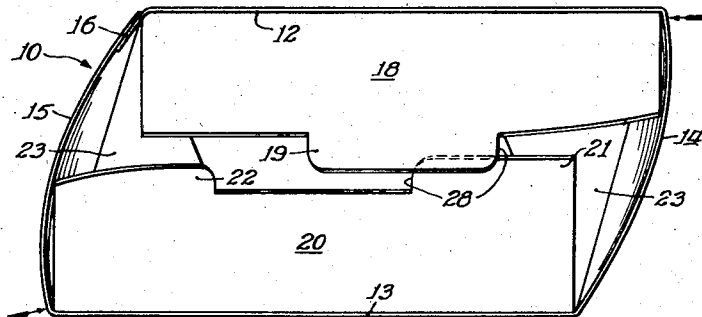


Fig. 2

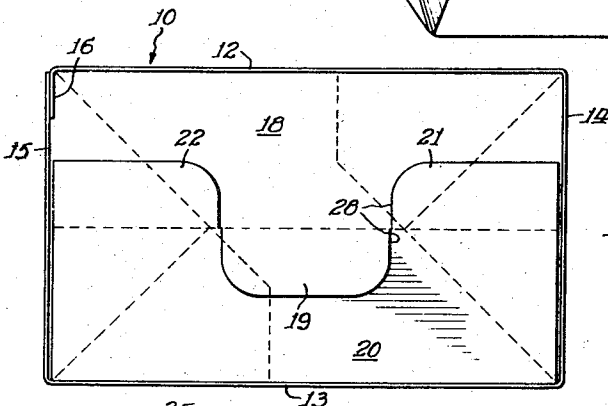
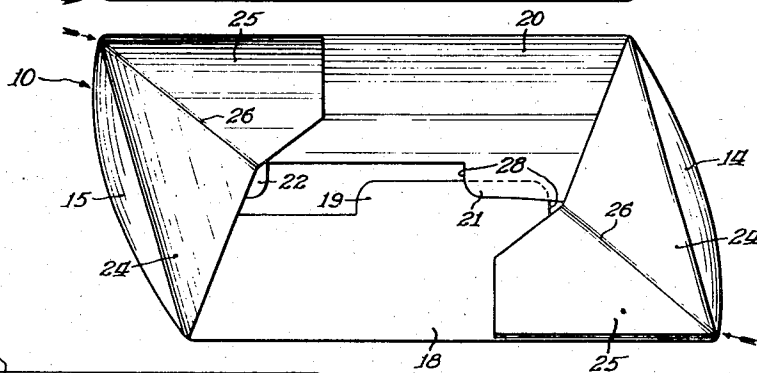


Fig. 3

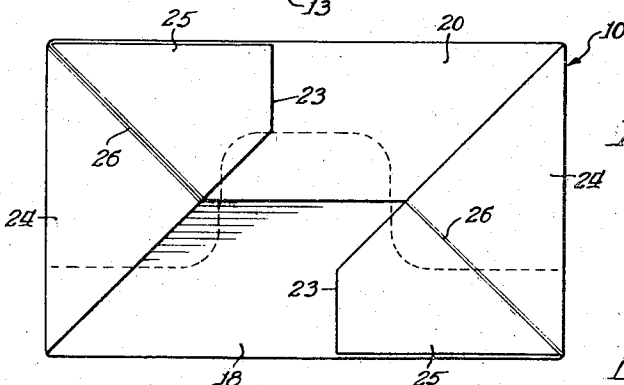


Fig. 4

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Fig. 5

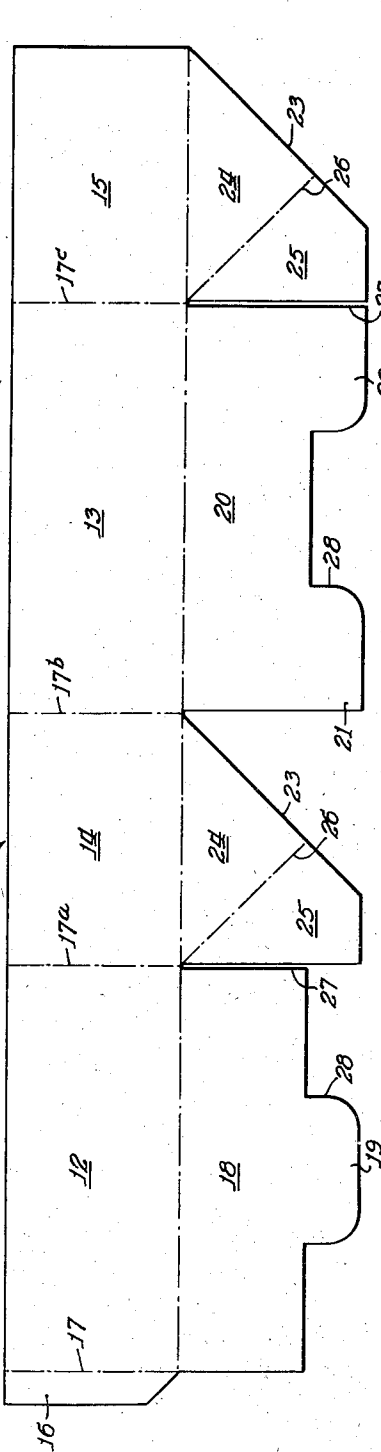


Fig. 6

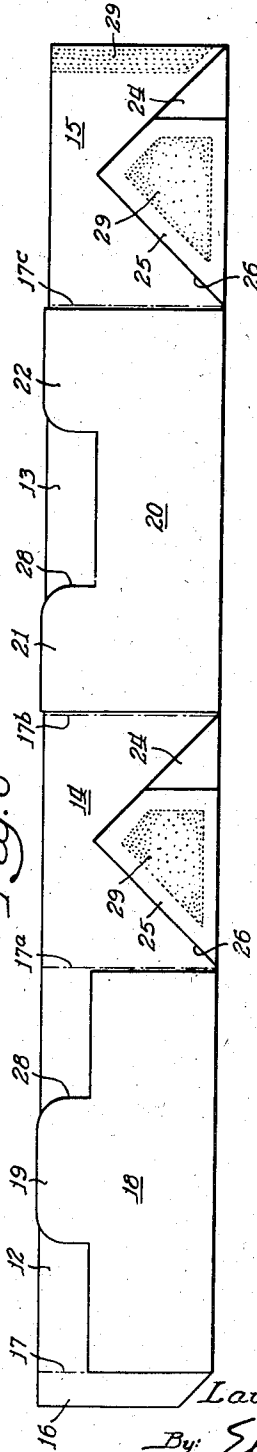
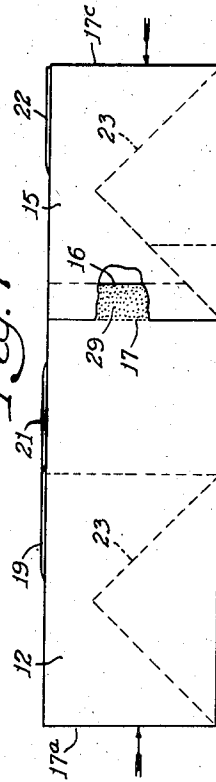


Fig. 7



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UNITED STATES PATENT OFFICE

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AUTOMATIC LOCK BOTTOM CARTON

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Application June 9, 1949, Serial No. 98,103

2 Claims. (Cl. 229—39)

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The present invention relates to an automatic lock bottom carton, a type of carton having a bottom so constructed that its elements lie between the walls of the container in its collapsed state and are automatically moved to closure-forming position and locked upon spreading of the walls to set up the container. The invention relates especially to a positive, non-jamming lock for such a carton.

Such cartons are furnished in flattened or collapsed condition, for economy and convenience in shipment and storage, and are set up to the desired container form when the contents are to be inserted. Particularly in cases where smooth, rapid flow of a packing line is desirable, but also in smaller-scale operations, it is important that the cartons be easily and rapidly set up, but it is even more important in avoiding costly delays that each and every carton set up properly, and that it be positively locked in set up or erected condition. That is, each setting up operation must result in a fully erected carton which is positively prevented from collapsing. Automatic lock bottom cartons of prior constructions have sometimes failed in these respects because the elements of the bottom have jammed during the erecting operation, or because the locking elements have not actually engaged sufficiently to prevent collapse of the carton although it might remain erected temporarily.

The carton of the present invention is constructed of folding boxboard or other suitable sheet material with locking tongues so disposed on the main bottom panels and having locking edges so formed that they will be positively prevented from jamming during erection of the carton, and at the same time will be positively moved to locking position as the carton is brought to erected condition. Each setting up operation therefore results in a perfectly set up and positively locked carton.

The construction and operation of the carton of this invention are explained and the principles made clear in the following description of one embodiment of the invention, reference being had to the accompanying drawings, in which:

Fig. 1 is a view of the interior of a carton embodying the invention, showing the position of the bottom parts at one stage of the setting up of the carton, as seen from above the carton;

Fig. 2 is a view showing the parts in the same position as in Fig. 1 as seen from below the carton;

Fig. 3 is a view similar to that of Fig. 1, but at the final or locked stage of the setting up operation;

Fig. 4 is a view similar to that of Fig. 2, but showing the parts in the final or locked position;

Fig. 5 is a plan of a blank for the carton of Figs. 1 to 4 inclusive;

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Fig. 6 is a plan view of the blank of Fig. 5 partly folded; and

Fig. 7 is a view of the carton in collapsed condition resulting from completion of the folding and gluing of the blank of Fig. 5.

Referring to the drawings, the carton 10 is formed from the blank 11 shown in Fig. 5, which comprises side wall panels 12 and 13 serially alternated with end wall panels 14 and 15, one of the terminal panels, in this case panel 12, having hinged thereto a securing flap 16. Hinge lines 17, 17a, 17b, and 17c define the panels. A bottom panel 18, having a width half that of the carton, is hingedly connected to the bottom edge of the side wall panel 12, and has a tongue 19 extending from its free edge substantially centrally thereof. A bottom panel 20 of the same width as the panel 18 is hinged on the bottom of the other side wall panel 13, and has extending from its free edge a pair of tongues 21 and 22, with their inner ends spaced apart a distance corresponding substantially to the length of the tongue 19. Each of the end wall panels 14 and 15 has hinged to its bottom edge a bottom flap 23, which is divided into a triangular portion 24 and a securing portion 25 by a fold line 26. The panels 18 and 20 are preferably of substantially the same length as the panels 12 and 13, and may have their ends 27 adjacent the securing portions 25 substantially in alignment with score lines 17a and 17c, as shown, or cut away at a slight angle to reduce interference with the adjacent end wall during the setting up operation. Each of the tongues 19 and 21 has formed on its end adjacent or directed toward the securing portion 25 of the adjacent flap 23, that is, its right-hand end as viewed in Fig. 5, a locking edge 28. The locking edges 28 are formed to extend perpendicularly relative to the bottom edges of the side walls 12 and 13. The corners of the tongues may be rounded if desired, but not sufficiently to substantially eliminate the locking edges 28 as described.

The carton 10 in collapsed tubular condition is formed from the blank 11 by first folding the bottom panels and flaps over their respective wall panels and folding the securing portions 25 back upon the portions 24 of the flaps, as shown in Fig. 6. Adhesive 29 is applied to appropriate areas, for example as shown in Fig. 6, and the blank then folded on the lines 17a and 17c. The carton then is complete, in the collapsed flattened form shown in Fig. 7. The folding and gluing of the blank may be accomplished by any suitable means, and may be performed somewhat differently than as described, as will be clear to those skilled in the art. Although adhesive is preferred as the means for securing the parts of the carton, other securing means may, of course, be employed.

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In the flattened condition of the carton shown in Fig. 7, the bottom panels 18 and 20 lie against the walls 12 and 13, respectively, and each of the flaps 23 in its reversely folded condition is disposed between the end wall on which it is hinged and one of the bottom panels. The securing flap 16 may lie on either the inside or outside of the carton, as desired, but as shown is on the inside.

In erecting the carton 10, it is only necessary to apply pressure to the flat collapsed form just described at the ends thereof, defined by the hinge lines 17a and 17c, as indicated by the arrows in certain of the figures. This moves each of the walls 12, 13, 14 and 15 toward right angular relation with the adjacent walls, and this spreading movement of the walls causes opening or unfolding of the portions 24 and 25 of the flaps 23 toward positions in a common plane. As the end wall 15 and side wall 13 swing away from each other, the wall 15 draws the attached portion 24 of one flap 23 in one direction while the wall 13 draws the securing portion 25 in an opposed direction, because of the connection therebetween provided by the panel 20. The other flap 23 is similarly acted upon by the walls 12 and 14 and the bottom panel 18. At the same time that the flaps 23 are unfolded by the walls and bottom panels, they draw the panels 18 and 20 toward substantially the same plane by means of the portions 25. It is, of course, obvious that the flaps 23 when fully open or flat lie substantially in the plane of the bottom edges of the side and end walls, and in assuming that position swing the panels 18 and 20 about their connections with the side walls 12 and 13 downwardly to close the bottom of the carton. As the panels 18 and 20 approach each other in this movement, they also move laterally relative to each other. The positions of the parts during the erection of the carton are clearly shown in Figs. 1 and 2.

Before the free edges of the panels 18 and 20 reach the center line of the bottom, the tongues 19 and 21 projecting from such edges come into engagement with each other, and because of the combined approaching and lateral movement of the panels 18 and 20, which of course is shared by the tongues, push against each other, bending backwardly and upwardly, and simultaneously slide past each other. Since each of the tongues 19 and 21 in effect increases the width of its panel to more than half the width of the carton 10 as long as the carton is not opened to its full width at the time of engagement of the tongues, the angle between the tongues 19 and 21 when they come into engagement is such that neither tongue will slip beneath the other. Instead, as already stated, both tongues are forced up and back. Thus the tongue 21 cannot jam in the angle between the panel 18 and the adjacent portion 24, nor can the tongue 19 enter under the panel 20, as the tongues slide past each other. The disposition of the tongue 21 adjacent the free end of the panel 20, that is, the end which is not secured to the flap 23, aids in this jam-avoiding action because of greater flexibility and resilience of the parts, as fully explained hereinafter.

As the tongues move past each other, the tongue 19 moves into overlapping relation with the panel 20 between the tongues 21 and 22, while the tongues 21 and 22 move into position overlapping the panel 18 at each end of the tongue 19. As shown in Figs. 3 and 4, in this position of the parts the carton is in fully set up condition. It is also locked in that position by the locking

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edges 28, which are the trailing end edges of the tongues 19 and 21 in their movement past each other during erection of the carton. The locking edges 28 opposingly engage each other to hold the parts against movements reverse to those in the setting up of the carton, or in other words, to prevent collapsing of the carton 10. This will be quite clear from Fig. 3. The resilience of the material and the bias resulting from the forming of the blank 11 into the collapsed form of the carton tend to spring the parts back toward collapsed position. This collapsing tendency holds the locking edges 28 firmly engaged, and is checked by that lock. The locking edges, of course, also prevent collapse due to the application of external forces tending to return it to its collapsed form. In the form illustrated collapse is also resisted by the engagement of the side edges of panels 18 and 20 with end walls 14 and 15, respectively.

If the tongues 19 and 21 for any reason did not move into positions overlapping the panels 20 and 18 as explained above, it is obvious that the edges 28 would not be in locking engagement and the carton would be subject to collapse. This might result either from a tongue slipping beneath the opposed panel and jamming against the flap 23 secured thereto, or by the tongues not being moved into proper locking position with their locking edges 28 opposingly engaged. These difficulties often occur with prior constructions, but are avoided in the carton of this invention.

The prevention of jamming by the present construction has already been explained. The carton of the present invention also avoids the second difficulty, failure to lock, because the structure positively assures that the locking edges 28 will be brought into locking engagement. The stresses imposed by the tongues 19 and 21 on each other during their sliding engagement as described above are, of course, relieved as the edges 28 pass each other, and the tongues react by flipping or snapping past each other into the desired relation. This reaction due to the resilience of the carton material when added to the pull exerted by the flaps 23 on the panels 18 and 20 carrying the tongues results in ample force being applied to the panels and tongues to bring them into the desired position to be locked by the edges 28. The disposition of the tongue 21 adjacent the free end of the panel 20 and the perpendicularity of the edges 28 relative to the bottom edges of the side walls also aid in this positive locking action, as hereinafter pointed out.

Although the erection of the carton 10 and the action and movement of the parts have been described in something of a detailed, step-by-step manner, this has been done only in the interest of clearness. In actual use, cartons embodying the invention are set up by a light, quick thrust or blow against one or both ends of the collapsed carton, and the parts move into the described positions too quickly for the eye to follow.

It is an important feature of the invention that one of the locking tongues is disposed adjacent the free end of its panel. Not being stiffened and restrained by the attachment of the flap 23, as is the case with the secured end of the panel, the free end is more flexible and resilient. It will flex readily when the tongues 19 and 21 come into engagement in the erecting movement of the carton. In the remote event of the tongues interfering with each other, this ready flexing results in the tongue 21 yielding to the tongue

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19 sufficiently to overcome the interference and prevent the tongues jamming against each other. In the usual event of no interference between the tongues, the additional flexibility facilitates the bending of the tongues to prevent jamming under the panels, as explained above. Further, upon disengagement of the tongues as they slide past each other, the snap action of the tongues which assures positive locking as previously described is enhanced by reaction of the free end of the panel upon release from its flexed condition, in addition to the resilient reaction of the tongue 21.

Another important feature is the formation of the locking edges 28 so that they are perpendicular to the bottom edges of the respective side walls, or in other words so that each edge 28 lies in a plane normal to the side walls. It will readily be appreciated that this formation of the locking edges permits instantaneous snapping of the tongues 19 and 21 into the locking position as they disengage in the erecting movement of the carton, or in other words as the locking edges 28 move past each other. The proportions and positions of the parts are such that this point is reached as the carton comes to fully erected condition. It is therefore unnecessary to strain and force the walls toward each other after they have reached their set up positions, as might be necessary if the tongues had the locking edges flaring from their junctions with the panels. On the other hand, the tongues are not eased toward locking position by means of a gently angled or curved edge or edges, which might cause dissipation of the force of resilience of the tongues and so result in the tongues failing to reach locking position.

Both of the features of construction and the resulting actions pointed out cooperate to assure a non-jamming and positive locking of each carton by a single, quick, and easy setting up operation.

It will be understood that the embodiment of the invention illustrated and described is exemplary, and that the invention is not limited to this particular embodiment. Various modifications of and alterations in the illustrative construction may be made without departing from the principles and spirit of the present invention. For example, the flaps 23 may be formed without the fold lines 26 and secured to the panels 18 and 20, appropriate fold lines then being provided in these panels to permit upward folding of the bottom elements. Also, specific designations of certain parts of the carton are for convenience in description and are not employed by way of limitation. For example, the carton might be square, so that the arbitrary designations used are helpful in distinguishing one pair of walls from the other.

I claim:

1. A rectangular lock bottom carton having two pairs of opposed side walls and a bottom comprising a pair of substantially rectangular panels each hinged on the bottom edge of a wall of one of said wall pairs and having a length substantially that of the carton and a width half that of the carton, a locking tongue projecting from the central portion of the free edge of one of said panels, a locking edge on one end of said tongue lying in a plane normal to the walls of said one wall pair, a pair of tongues projecting from the free edge of the other panel and having the inner ends thereof spaced apart a distance corresponding to the length of said lock-

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ing tongue, a locking edge on the inner end of one of said pair of tongues extending in a plane normal to said one pair of walls and adapted to opposingly engage the locking edge on said locking tongue in extended condition of the bottom upon erection of the carton to prevent collapse thereof, the tongues having locking edges being at least as long at their bases as at their free edges, a pair of flaps each hinged on the bottom edge of a wall of the other wall pair and having a portion secured to one of said panels adjacent one end thereof, and a fold line in each connected panel and flap permitting upward folding thereof and extending along a line substantially bisecting the corner angle between the walls on which said connected panel and flap are hinged, the secured end portion of said one panel being that adjacent the locking edge of said locking tongue and the secured end portion of said other panel being that opposite the end portion adjacent said one of said pair of tongues having a locking edge.

2. A rectangular lock bottom carton having two pairs of opposed side walls and a bottom, said bottom comprising a pair of substantially rectangular panels each of substantially carton length and half the carton width and hinged on the lower edge of a wall of one of said wall pairs, a pair of flaps each hinged on the lower edge of a wall of the other wall pair, a pair of tabs each hinged to one of said flaps along a line substantially bisecting an adjacent corner angle of the carton and secured to an end portion of one of said panels, whereby the carton may be erected from flattened condition with said bottom parts folded upwardly between said walls to erected condition with said bottom parts extended to close the space defined by the walls and with the free edges of said panels lying along one center line of the carton, a locking tongue projecting from the central portion of the free edge of one of said panels and having a locking edge at the end thereof adjacent the secured end of said one panel, and a pair of tongues projecting from the free edge of the other panel and having their inner ends spaced apart a distance corresponding to the length of said locking tongue, one of said pair of tongues carried by said other panel having a locking edge at its inner end, each of said locking edges extending in a plane normal to the walls of said one wall pair, the tongues having said locking edges being adapted to yieldingly engage during erecting movement of the carton to urge each other upwardly against movement beneath a panel and each of said tongues having locking edges being at least as long at its base as at its free edge, and said locking edges being adapted to opposingly engage each other in erected condition of the carton to provide a lock substantially on said center line but spaced from the transverse center line of the bottom of the carton to hold the carton against collapse.

LAWRENCE H. PHILLIPS.

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