Sept. 2, 1952 A. J. WEISS 2,609,138

CARTON AND CARTON BLANK

Filed Dec. 26, 1946

2 SHEETS—SHEET 1

Fig:1.

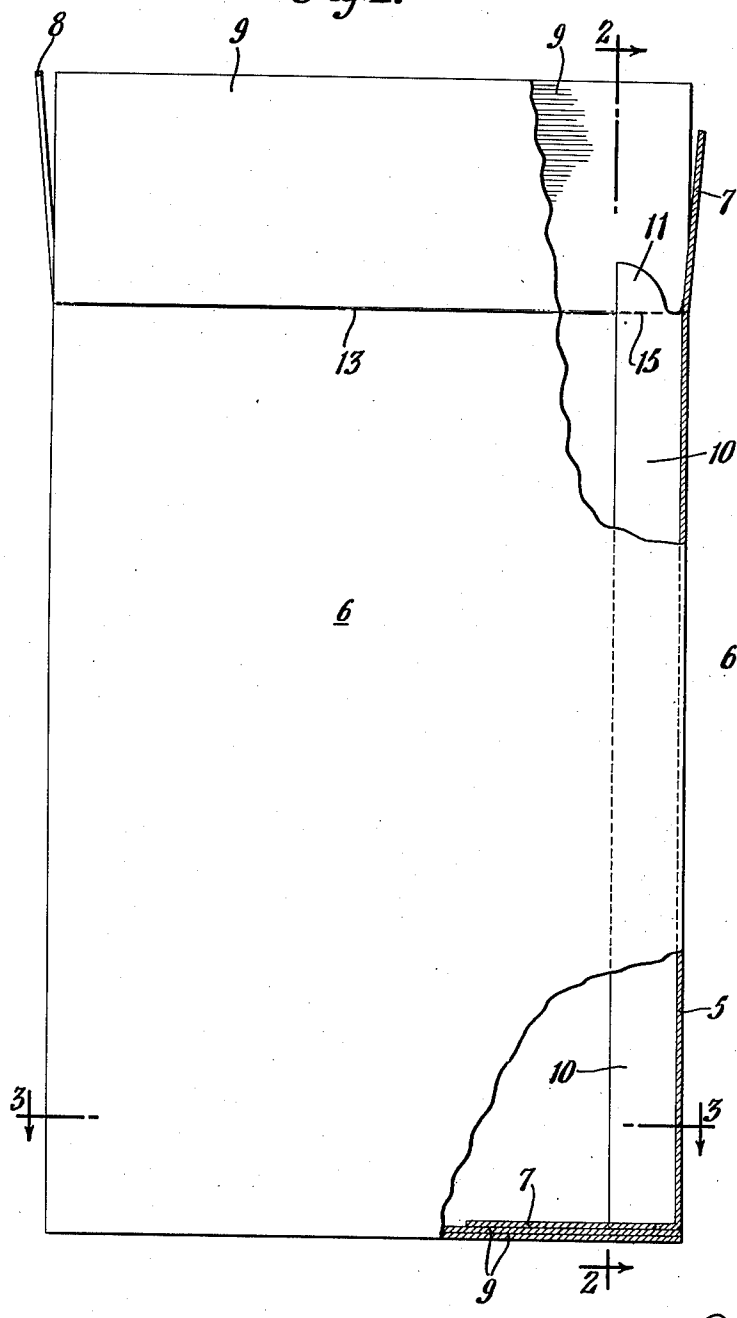
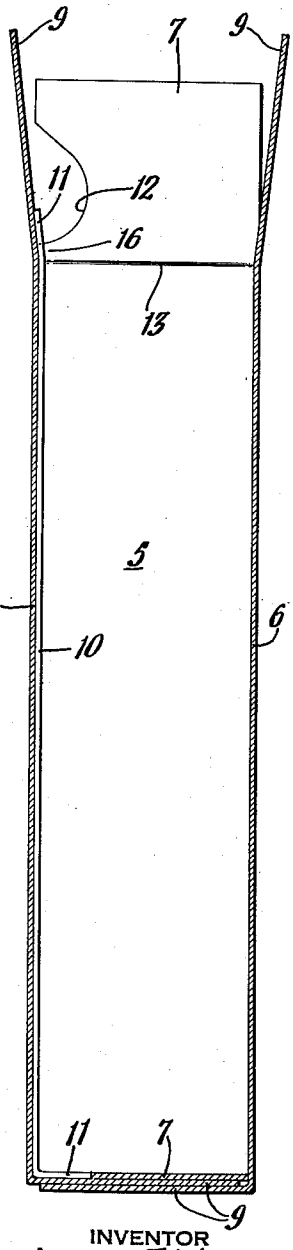


Fig:2.



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Fig. 3.

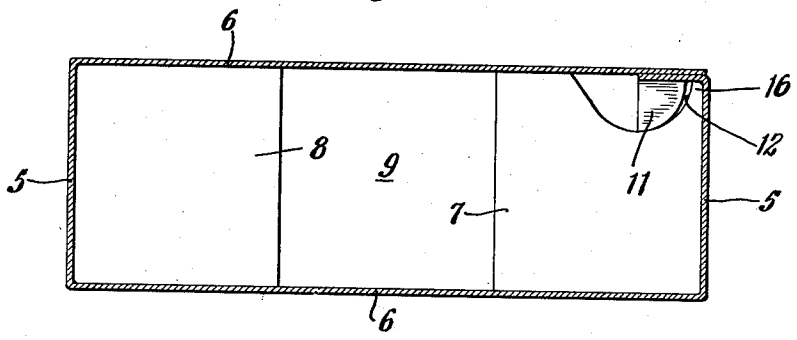
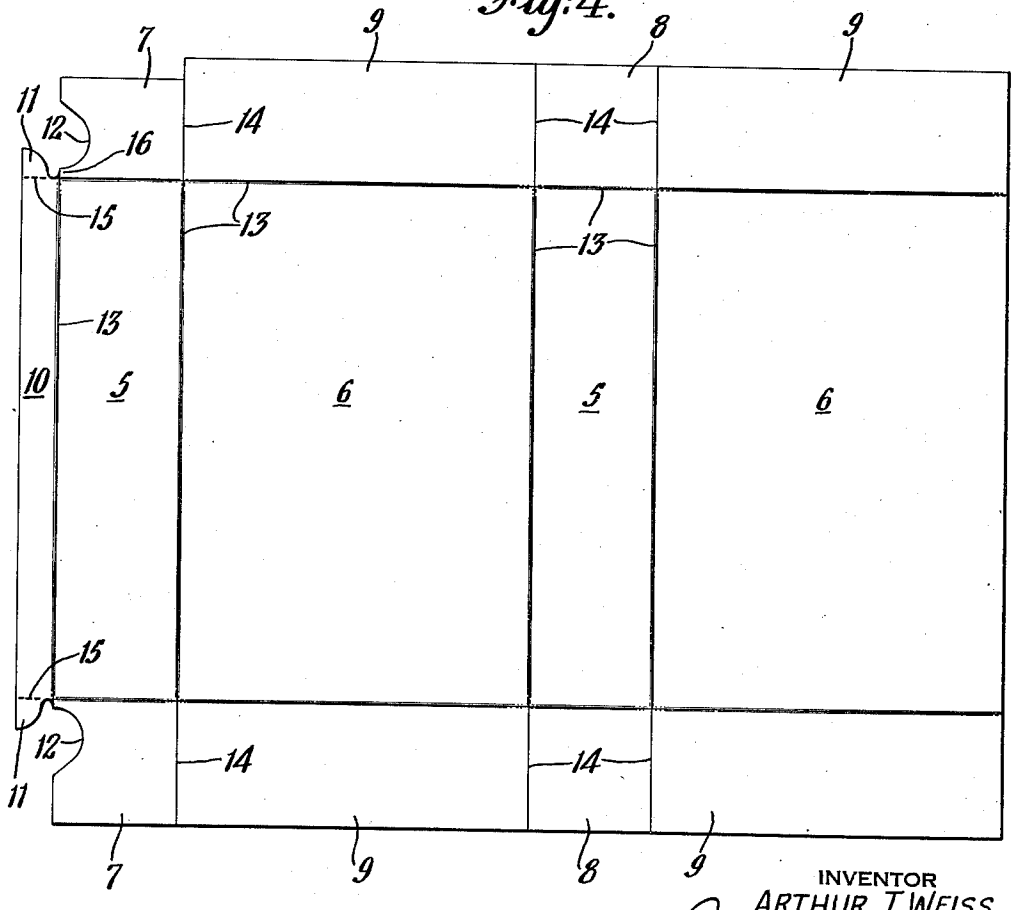


Fig. 4.



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CARTON AND CARTON BLANK

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2 Claims. (Cl. 229—16)

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The invention relates to carton construction.

The usual form of paperboard carton has four side or body panels with adjoining end flaps which fold inwardly and are glued together to form the top and bottom of the carton. The paper blank from which the carton is made is formed in one flat piece of stock, the four side panels being joined along the edges which will be the vertical edges of the carton (assuming that it is standing upright). A glue lap extends from one of the side panels at the edge of the blank and is adhesively secured to the edge of the side panel which lies at the opposite side of the blank. This completes the formation of the carton except for setting it up and closing the bottom end flaps, which usually is done as a part of the carton filling operation.

I am speaking here of the type of box or carton which is in general use for the packaging of most household consumer products such as breakfast cereals, flour, crackers, soap powders and flakes, etc. My invention is concerned with improvements in this type of container which probably represents in the neighborhood of eighty or ninety percent of the package manufacturing business today.

A difficulty frequently encountered in the use of the ordinary carton of the class described is that it is not sealed tightly enough to prevent a certain amount of spilling or "sifting" of its contents during shipment and handling. This sifting may occur for example in cases where the cartons lie on their sides during shipment, one above another. Jouncing of the truck or freight car causes intermittent squeezing of the sides of the cartons under the pressure of those above them, producing a bellows-like action which squirts finely powdered contents through minute cracks or openings at the top corners of the cartons. Losses of contents running as high as 20% to 30% have been recorded in testing cartons under conditions simulating those encountered in shipment. Previous efforts to solve this difficulty have not been very successful, and it has been the primary object of my invention to provide a more adequate solution.

A further object of my invention has been to provide an improved carton construction which makes it easier to obtain a tight seal at the top end flaps, and which makes it possible to effect a satisfactory seal even when slight inaccuracies occur in setting up the packaging machinery.

Other objects and advantages of my invention will appear as the description proceeds.

It is believed that further discussion of the sifting problem and my solution of this problem will be simplified by setting forth definitions of a few of the leading terms employed herein. As

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used in this specification and in the accompanying claims:

"Carton blank" is defined as the cut and slitted blank from which the carton is to be formed. It may be scored or otherwise prepared for bending along lines which are to be the edges of the carton, and it may be either flat or partly folded along one or more score lines.

"Carton" is defined as a carton blank which has been glued or otherwise fastened together along one edge, irrespective of whether any of the end flaps have been glued and irrespective of whether the sides are flattened together as for shipment or whether they have been set up in box form. Thus the term includes both flat folded and glued cartons and cartons which have been set up.

"Glue lap" is defined as an extension of a side panel which is secured or is to be secured to an edge of the carton blank to form a carton. The securing means usually is glue, but other adhesives may be substituted, and the term therefore is used in its broad significance in the art as applied to the marginal securing flap which extends along one edge of the carton blank.

The foregoing definitions are believed to be in harmony with the best current usage in the packaging business, and are adopted here in the interest of clarification.

As a thorough understanding of the sifting problem will be of assistance in describing the purposes and advantages of my invention, I shall now describe how sifting occurs in standard cartons and what has been done to prevent it. For illustration, we can take a conventional carton such as used for powdered detergents, a rectangular carton having two broad side body panels and two narrow ones, with end flaps joining each of these side panels. Inasmuch as the bottom end flaps are closed and sealed before the carton is filled, it is usually possible to obtain an effective seal by the use of a mandrel which is inserted in the open end of the box so that pressure can be exerted from both sides of the flaps. Consequently attention here is directed primarily to the sealing of the top end flaps.

In this standard form of carton it is customary to have the glue lap attached to one of the broad side panels. With the inside of the blank facing upwardly, this side panel is folded over, adhesive is applied to the glue lap, and the narrow side panel at the other end of the blank is then folded over so that its edge comes down on the glue lap. When this operation is performed with the highest degree of accuracy, the end flaps which lie adjacent the glued joint will be brought into exact alignment and it is possible to obtain a carton which is relatively siftproof.

However in the normal operation of setting up the packaging machinery, such exact alignment of the end flaps is not possible in all cases, with the result that the end flaps adjacent the glued joint may be slightly separated at one or both ends of the carton. When this occurs and the carton has been closed and sealed by first folding in the narrow end flaps and then the wide ones, an opening is left at the glue lap corner which allows sifting of the contents under the conditions I have described above. The difficulty is aggravated by the circumstance that there is no way of firmly supporting the top end flaps from the inside during the gluing operation with the result that some of the contents may sift between the flaps and thus more readily reach the opening left at the glue lap corner. This is objectionable not only from the standpoint of loss of part of the contents, but primarily because the spilled or sifted contents frequently spread over the outside of the package, creating an unsightly appearance distasteful to purchasers. Soap powders and materials having abrasive characteristics are particularly harmful in this respect, for the rubbing of the sifted material between the faces of adjacent packages during transit and in handling defaces the package label.

It is possible under ideal conditions to avoid separation of the end flaps adjacent the glued joint by squeezing the outer edges of the folded blank just tightly enough to bring the edges of the end flaps into exact alignment. However, if the edges are squeezed too tightly, the end flaps will overlap at the glued joint so that the flap adjoining the narrow side panel (or in the case of a square carton, the inner end flap) will project slightly beyond the side of the carton when set up, in which case this flap cannot be folded inwardly without interfering with the adjacent outer end flap. Therefore, in setting up the packaging machine, operators must be careful not to squeeze the edges of the folded blank too tightly and are inclined to err on the side of not squeezing it tightly enough to avoid separation of the end flaps adjacent the glued joint as I have described.

One of the attempts which has been made to solve the sifting problem is to extend the glue lap beyond the ends of its adjoining panel so that it can be adhesively secured to both the meeting side panel and its adjoining flaps. That is, the extension of the glue lap extends beyond the fold line of the narrow or inner end flaps for half an inch or so, and this extension is stuck to the end flaps. The theory of this construction is that in case of slight separation of the edges of the flaps at the glued joint, the resulting clearance between the edge of the inner end flap and the adjacent side of the carton will be closed by the glue lap extension. However this is only a partial solution because there remains a channel between the outer end flap and the projecting part of the glue lap extension. Consequently under the conditions I have described, where the cartons lie on their sides during shipment one above the other, jouncing of the truck or freight car causes intermittent squeezing of the sides of the cartons under the pressure of those above them, producing a bellows-like action which squirts finely powdered contents through the channel above the glue lap extension.

In accordance with my invention the glue lap is placed at one edge of the blank and adjoining a narrow side panel rather than adjoining a broad side panel as in the conventional construction. Or in the case of a carton having four side panels of equal width, the glue lap is formed as an extension of a side panel which adjoins an inner end flap. With this construction, it is possible to squeeze the sides of the folded carton blank tightly during the gluing operation so as to insure that there will be no separation between the edges of the flaps adjacent the glued joint. If the blank is squeezed so tightly as to cause the edges of these end flaps to overlap, no harm is done because it will be the outer end flap which projects beyond the side of the carton and this cannot interfere with the operation of folding in the end flaps for sealing.

Another important feature of my construction is the extension of these glue laps in a manner to prevent "peeling" of the glued joint during the operation of setting up the carton to retain its form. Thus when the finger of the packaging machine enters between the end flaps to break open the carton to rectangular form, pressure applied to the inside of the outer end flap by this finger is transmitted first to the glue lap extension and then to the glue lap proper, avoiding a tendency to pull the side panel away from the glue lap.

A still further feature of my construction is that the side of the inner end flap adjacent the extension of the glue lap has a recess to receive said extension when the end flaps are closed. This avoids formation of the sifting "channel" to which I have referred above and additionally provides an interlock with the narrow or inner end flap which further guards against sifting as will appear more fully in the following description of my preferred construction as illustrated in the drawings.

Fig. 1 is a face view of a rectangular carton set up with the bottom end flaps closed and top end flaps open. Portions of the top and bottom corners are broken away in vertical cross-section to show the construction at the glue lap.

Figs. 2 and 3 are vertical and horizontal cross-sectional views of the same carton, taken as indicated at **2—2** and **3—3**, respectively, in Fig. 1.

Fig. 4 is a view of the carton blank from which the carton on Figs. 1 to 3 is formed, the blank being shown to a somewhat smaller scale.

Referring first to Fig. 4, my improved carton blank comprises four side panels **5**, **5**, **6**, **6**, end flaps **7**, **8**, **9**, **9** adjoining the side panels, each end flap being of a width substantially coextensive with its respective side panel, a glue lap **10** at one edge of the blank, said lap extending from side panel **5** which adjoins inner end flaps **7**. The glue lap **10** extends beyond the end of its adjoining panel **5** as at **11** for attachment to outer end flaps **9**, and the sides of the inner end flaps **7** adjacent the extensions **11** of the glue lap have a recess **12** to receive said extensions when the end flaps are closed. The blanks are cut from a single piece of paperboard stock which preferably is scored or otherwise prepared for bending along lines **13** which are to be the edges of the carton. Slits **14** in line with the longitudinal scores **13** divide the top and bottom portions of the blank into the respective end flaps **7**, **8**, **9**, **9**. Scores or perforations **15** may be provided where the extensions **11** adjoin the glue lap **10** along what are to be the fold lines of the extensions when the end flaps are closed.

End flaps **7**, **8** are foldable inwardly to form inner end flaps and the two remaining end flaps are foldable inwardly outside of the folded inner end flaps to form outer end flaps. If de-

sired, the end flaps 7 and 8 may be made wider than the end flaps 9, 9 but it is essential in every case that the glue lap 10 and its extensions 11 be so formed as to extend from a side panel which adjoins the inner end flaps 7. Also, if desired, the extension 11 and recess 12 of the adjacent end flap may be formed at the top end only of the carton. In my preferred construction the recess 12 is of arcuate form as shown and the glue lap extension is correspondingly curved. Also it will be observed that the recess 12 is spaced from the edge of the adjoining side panel 5, leaving a portion 16 extending to a point substantially in line with the score 13 between side panel 5 and glue lap 10.

As shown best at the lower end of Fig. 2, the end flaps in closed position bring the extension 11 of the glue lap into substantially the same plane as the recessed end flaps 7. In this closed position (referring now to Fig. 3), it will be observed that the recess 12 has an interlocking engagement with the extension 11 of the glue lap.

Formation of the carton from the blank shown in Fig. 4 may be accomplished as follows: With the inside of the blank uppermost as viewed in Fig. 4, the side panel 5 with adjoining glue lap 10 is folded inwardly about the score line 13 so as to lie against the adjacent side panel 6, with all end flaps remaining extended. Glue or other adhesive means is applied to the lap 10 and extensions 11 thereof, either before or after the folding step just described. Next the remaining side panel 6 is folded inwardly about the score line 13 so as to lie against the adjacent panels 5 and 6. As the edge of the overlying panel 6 is pressed against the glue lap, the sides of the folded blank are firmly squeezed to bring the end flaps into close alignment at the glued joint. (Even a slight overlap of these end flaps is permissible when the carton is constructed as I have described.) The carton has now been completed and is in flattened form, or what is known to the trade as "K. D. F." (knocked down flat) condition. If desired, the carton can be shipped in this condition, or it can be set up with the bottom end flaps closed and glued.

In setting up the K. D. F. carton, a finger of the packaging machine enters between a pair of end flaps 9, spreading them and the side panels 6 apart, so as to set the carton up into its rectangular shape. The bottom end flaps 7 and 8 are folded inwardly and glue applied to their outer surfaces. Next the bottom end flap 9 to which the glue lap extension 11 is secured, is folded inwardly, bringing this extension into interlocking engagement with the recess 12 of the adjacent inner end flap 7. Glue is applied between the folded end flap 9 and the remaining end flap 9, and the latter is then folded and pressed into place preferably with pressure applied from the inside of the carton as well as from the outside, as by means of a mandrel inserted therein. After the carton has been filled, closing of the top end flaps is performed in a similar manner except that no mandrel is employed.

Tests performed on cartons constructed as I have described show that sifting of the contents is much more effectively prevented than with conventional cartons or with cartons having ordinary extended glue laps. Peeling of the glued joint during the operation of setting up the cartons is prevented and there is no sifting channel such as encountered heretofore in cases where the end flaps at the glued joint did not meet exactly. This is so because in my construction there is no particular harm in squeezing the folded carton tightly enough during gluing to insure that the end flaps will be brought together or even into a slightly overlapping relationship. Finally there is provided an interlock between the glue lap extension and the recessed end flap which provides additional insurance against sifting.

The terms and expressions which I have employed are used in a descriptive and not a limiting sense, and I have no intention of excluding such equivalents of the invention described, or of portions thereof, as fall within the purview of the claims.

I claim:

1. A carton comprising four side panels forming in cross section an elongated rectangle, an end flap adjoining each of the side panels and of a width substantially coextensive with its respective side panel, the two narrower end flaps being foldable inwardly to form inner end flaps and the remaining two end flaps being foldable inwardly outside of the folded inner end flaps to form outer end flaps, a glue lap extending from one of the narrower side panels, said glue lap extending beyond the end of its adjoining panel to form an extension of predetermined shape, said glue lap and extension being adhesively secured to the inner edge of a wider side panel and its adjoining end flap respectively, and the side of said inner end flap of said last-named narrower side panel having a recess receiving said extension when the end flaps are closed during the operation of sealing the carton.

2. A carton comprising four side panels forming in cross section an elongated rectangle, an end flap adjoining each of the side panels and of a width substantially coextensive with its respective side panel, the two narrower end flaps being foldable inwardly to form inner end flaps and the remaining two end flaps being foldable inwardly outside of the folded inner end flaps to form outer end flaps, a glue lap extending from one of the narrower side panels, said glue lap extending beyond the end of its adjoining panel to form an extension of predetermined shape, said glue lap and extension being adhesively secured to the inner edge of a wider side panel and its adjoining end flap respectively, and the side of said inner end flap of said last-named narrower side panel having a recess receiving said extension with said extension and recess in substantially edge-contacting relationship when the end flaps are closed during the operation of sealing the carton.

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