July 9, 1957 M. W. KUCHENBECKER 2,798,656

COLLAPSIBLE CARTON

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Fig. 1

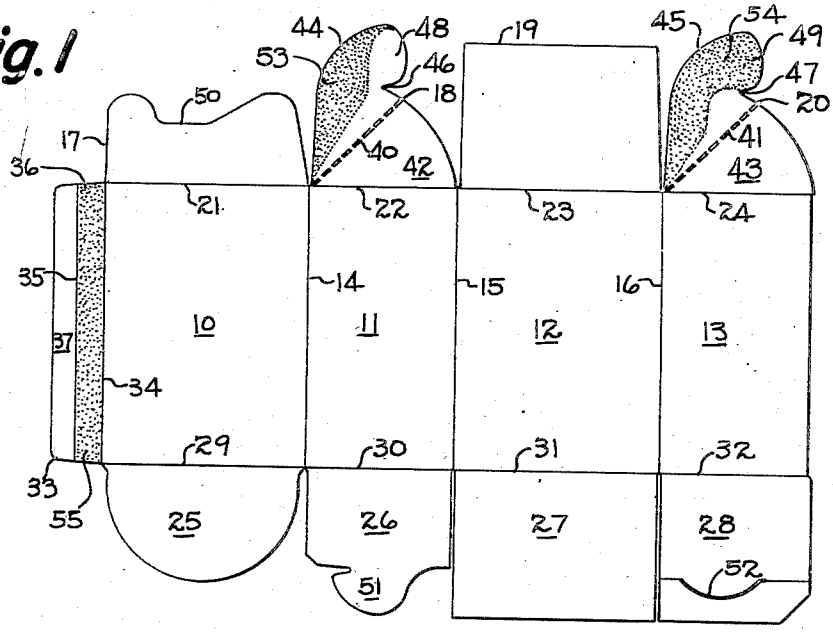


Fig. 2

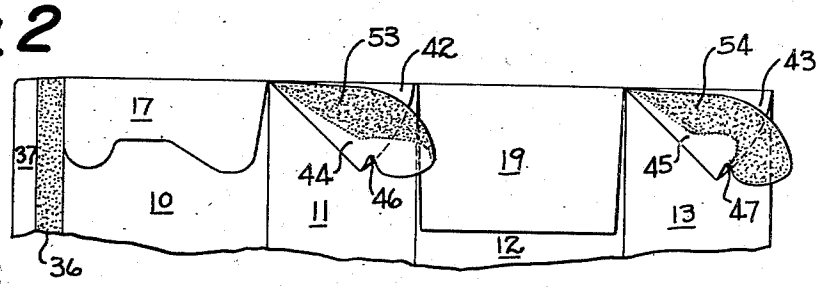
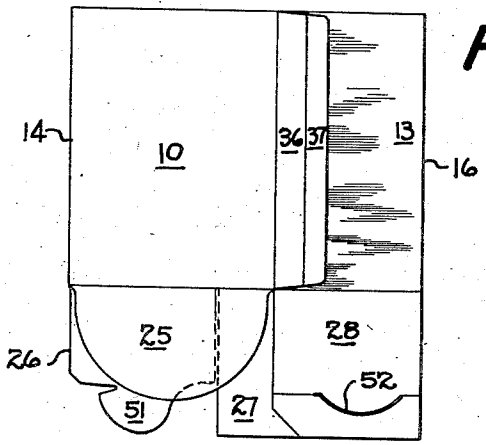


Fig. 3



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Fig. 4

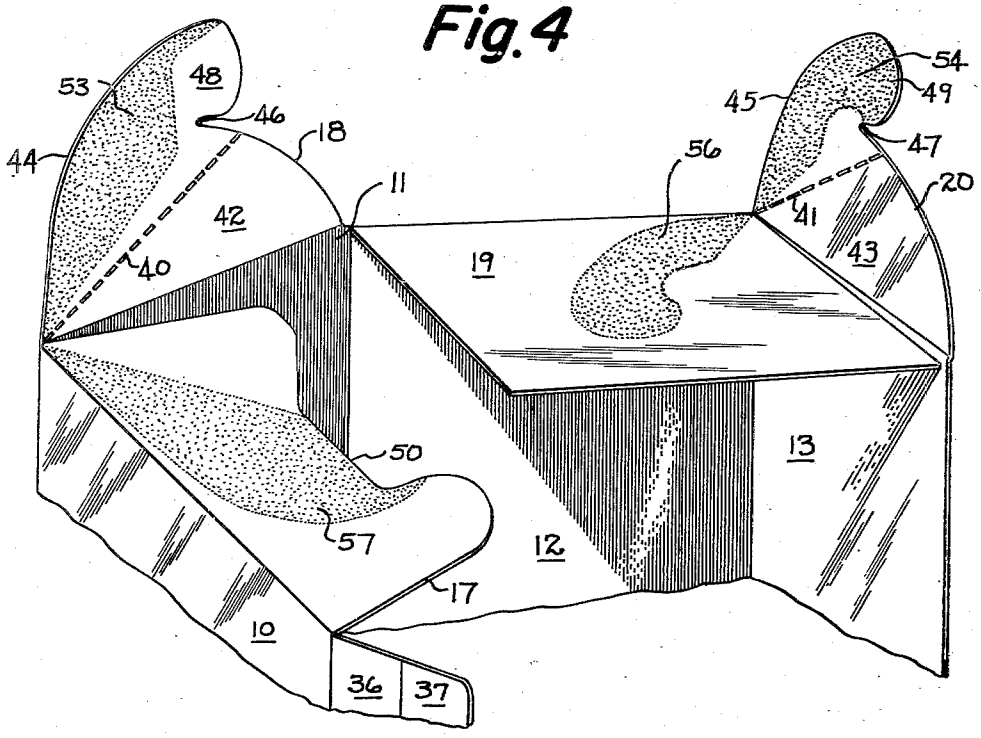
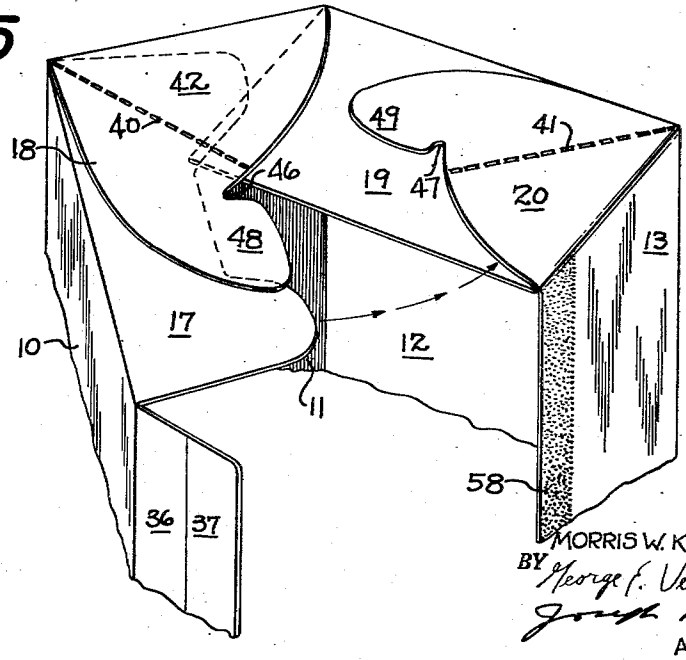


Fig. 5



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COLLAPSIBLE CARTON

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Fig.6

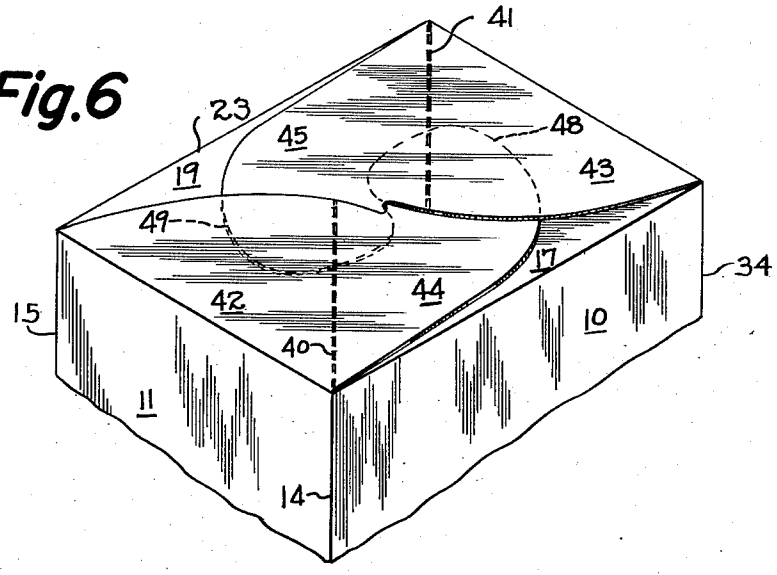


Fig. 7

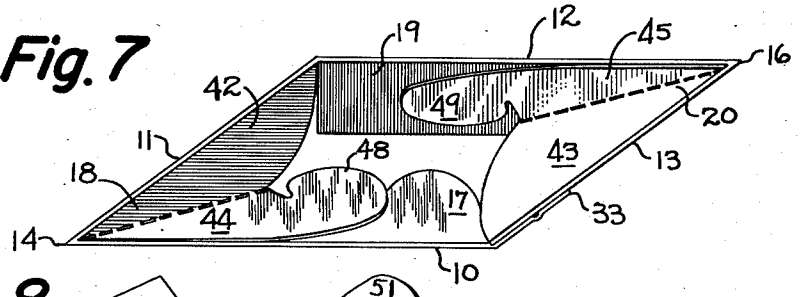


Fig.8

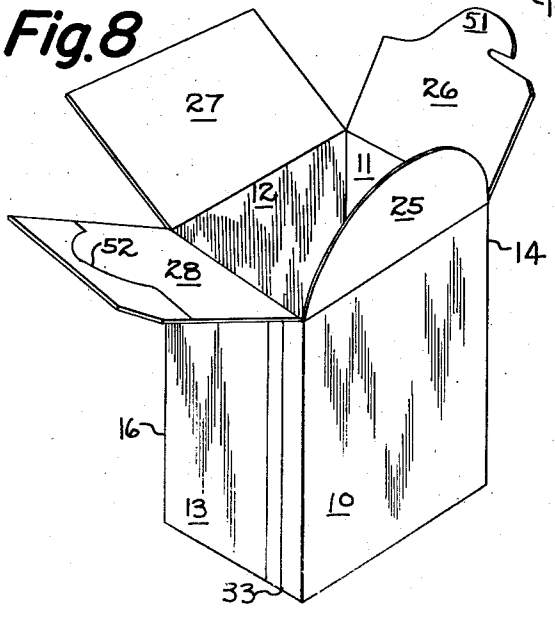
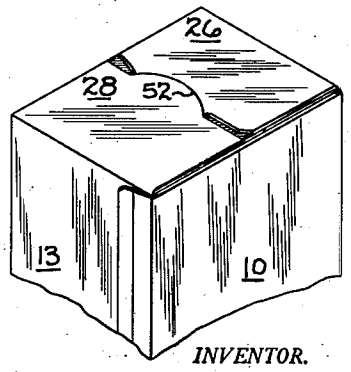


Fig.9



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2,798,656

COLLAPSIBLE CARTON

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Application February 16, 1954, Serial No. 410,552

5 Claims. (Cl. 229—41)

This invention relates to collapsible paperboard cartons, of the type having what is known as an "automatic" bottom. In this construction, one end, such as the bottom, is so formed that when the carton is shaped from its collapsed shipping form into tube form for receiving a product to be contained, the bottom of the carton automatically assumes the position to close the end of the carton. Such construction eliminates the need for automatic machinery to close that one end of the carton, or on the other hand speeds up hand erection of the carton by eliminating the need for separately closing one end of the carton. Due to these advantages, cartons of this sort, having an "automatic" bottom, have found wide use and acceptance, particularly in the ice cream industry.

Several difficulties exist in many of these automatic bottom constructions. In some instances the construction provided falls short of being substantially leakproof, which is a prime requirement in the case of many products to be contained, such as ice cream. In other cases, the bottom of the carton tends to collapse into the folded position quite as easily as it was set up into the open position, which in the case of high-speed filling operations is a serious drawback, an incident of a collapsed carton causing considerable slowing of the entire filling line operation. In other instances, particular bottom constructions may present protruding structural elements which are easily snagged on machinery or the like, thus fouling the operation and ruining the packaged product, or resulting in a weakened package which may later fail; or the construction may not provide the desired neat and attractive appearance which has become such an important factor in modern packaging. U. S. Patent 2,655,304, issued October 13, 1953, illustrates an automatic bottom carton of the type upon which my invention provides the decided improvements which from the above are obviously desirable. However, that patent does provide a sort of means tending to maintain the set-up position of the carton, means utilizing a frictional or sliding contact, rather than the positive-locking interengagement of elements which is an element of my invention.

My invention provides a construction which results in a firm and strong carton bottom of a substantially leakproof and snagproof nature, and which is markedly neat and attractive as presented to the purchaser of a product to be contained therein.

In particular, my invention further provides an automatic bottom which definitely locks in the set-up position when the carton is erected, thereby positively eliminating any possibility of collapse of the carton unless sufficient force is exerted to cause substantial mutilation of the carton material.

The objectives and cited advantages of my invention will be readily apparent from the following description and accompanying drawings in which:

Figure 1 is a plan view of the paperboard blank from which my carton is formed, viewing that surface of the blank which will become the inner surface of the finished carton,

Figure 2 is a plan view, partially cut away, similar to Figure 1, but with certain portions of the blank in folded position,

Figure 3 is a side elevation of the finished carton in collapsed condition,

Figure 4 is a perspective view, partially cut away, showing the method of assembly of my carton,

Figure 5 is a perspective view, partially cut away, showing in part the interengagement of the bottom closure elements of my carton,

Figure 6 is a perspective view, partially cut away, showing my carton with the bottom of the carton in set-up condition,

Figure 7 is a bottom elevation view of my carton, showing a stage in the erection of the collapsed carton illustrated in Figure 3 into the finished carton of Figure 8,

Figure 8 is a perspective view of my carton in position for filling with the product to be packaged, and

Figure 9 is a perspective view, partially cut away showing the top end of the carton, opposite of the end shown in Figure 6, with the carton in completely set-up position and the top closed.

Referring first to Figure 1, it is seen that my carton is formed from a single blank of paperboard or like material, suitably cut and scored into a number of walls, panels, flaps and tabs, including side walls **10**, **11**, **12** and **13** hinged together along score lines **14**, **15** and **16**, respectively. In the carton-erected condition, these side walls will form a rectangular sleeve (see Figures 8 and 9). Bottom end flaps **17**, **18**, **19** and **20** are hingedly connected to walls **10**, **11**, **12** and **13** along score lines **21**, **22**, **23** and **24**, all respectively.

Top end flaps **25**, **26**, **27** and **28** are hinged to the opposite end edges of walls **10**, **11**, **12** and **13** along score lines **29**, **30**, **31** and **32**, all respectively. Tear flap **33** is hingedly connected to the free side edge of side wall **10** along score line **34**, and is divided by longitudinal score line **35** into an inner panel **36** and an outer panel **37**.

Bottom end flaps **18** and **20** are diagonally divided as by substantially parallel perforated score lines **40** and **41** into inner panels **42** and **43** and outer glue panels **44** and **45**, all respectively. The corresponding side edges of glue panels **44** and **45** have notches **46** and **47** cut therein, providing hook-like portions **48** and **49** at the remote end edges of bottom end flaps **18** and **20**, all respectively. The free end edge of the bottom end flap **17** has a cut out portion therein as at **50**.

A male closing element or tab **51** is formed on the remote end of top end flap **26**, and a complementary female locking slit **52** is formed in the interior portion of top end flap **28**. These top closure elements are presently well known in the art, and serve to close the top end of the filled container in a known manner, and so need not be described in further detail here.

The remote portions of the upper surface (Figure 1) of glue panels **44** and **45** have a suitable adhesive applied thereto as at **53** and **54**, which operation may be performed by conventional automatic machinery. A similar adhesive is applied to inner panel **36** of tear flap **33** as at **55**. This adhesive may be of any of the well-known types suitable for the intended purpose.

The initial step in the folding and adhering of my carton is illustrated in Figure 2. Bottom flaps **17**, **18**, **19** and **20** are folded upwardly and inwardly to overlie the upper surfaces of walls **10**, **11**, **12** and **13**, respectively. As will be recalled, this upper surface of the blank is that surface which will eventually comprise the inner surface of the finished carton. Glue panels **44** and **45** are then folded upwardly and outwardly along score lines **40** and **41** to overlie what was originally the bottom surfaces of inner panels **42** and **43**, all respectively, thus again posi-

tioning upwardly the adhesive surfaces of panels 44 and 45, as seen in Figure 2.

Wall 13, carrying with it flaps 20 and 28, is then folded upwardly and inwardly to overlie wall 12, thus bringing the adhesive surface 54 of glue panel 45 into contact with the exterior surface flap 19 in the area indicated at 56 in Figure 4. Wall 10, carrying with it end flaps 17 and 25 and tear flap 33, is then folded upwardly and inwardly to overlie wall 11 and the nearer portion of wall 12, thus bringing the exterior surface of bottom end flap 17 indicated at 57 in Figure 4 into contact with the adhesive surface 53 of glue panel 44. Also, this latter folding brings tear flap 33 into overlying relationship with what was originally the bottom surface of wall 13 adjacent the free edge of that wall, and brings the adhesive surface 55 of inner panel 36 into contact with side wall 13 immediately adjacent the free edge of that side wall as at 58 (Figure 5). Pressure can then be applied to the thus-folded carton blank to obtain a secure adhesive bond at the contact points of the various adhesive surfaces previously mentioned. The adhesive connections between the various bottom end flaps are further illustrated in Figures 4 and 5 and the result of the operation just described is illustrated in Figure 3, which shows the collapsed carton as it is usually constructed by the carton manufacturer for shipment to the packer of the product to be packaged.

Referring to Figures 6, 7 and 8, the collapsed carton shown in Figure 3 is set up into position for receiving the product to be packaged by applying compressive pressure at the corners of the carton along score lines 14 and 16. With particular reference to Figure 8, as this pressure is applied, the distance between walls 12 and 13 and between walls 10 and 11 tends to increase, whereupon the truss construction created by the connection of flap 19 to flap 20 and of flap 17 to flap 18 causes the exercise of forces tending to pull those bottom flaps from their flat position within the collapsed carton into a position perpendicular to the side walls to close the bottom end of the carton. The dimensions of these bottom flaps are such that flaps 18 and 20 lie principally to the exterior of the erected carton, flap 17 in an intermediate position, and flap 19 to the interior of the carton. Flap 19 is of such dimensions that it closely fits the interior of the squared or set-up carton, thereby substantially sealing the bottom end of the carton, flap 19 being restrained from outward collapse due to the weight of the contained product by the interrelated support of the other three bottom flaps.

As the carton is being erected (Figure 7) hook-like portion 48 of flap 18 underrides flap 20, and hook-like portion 49 of flap 20 underrides flap 18. As erecting pressure is continued to the final erected condition as shown in Figure 6, hooks 48 and 49 positively engage with each other at the notches 46 and 47, thus providing a positive and effective interengagement of flaps 18 and 20. The proportions of flaps 18 and 20 are such that during erecting of the carton locking interengagement of notches 46, 47, and hooks 48, 49 is smoothly performed, but an attempt at reversal of the opening motion carries a naturally attendant slight repositioning of the flaps, such that the positive engagement of hooks 48 and 49 absolutely prevents collapse of the carton unless the carton material is mutilated. It will be clear that the interengagement of hooks 48 and 49 depends upon the facts of the hooks oppositely and mutually extending beyond a line parallel to score lines 40 and 41, about which collapse of the carton centers.

Cutaway 50 in flap 17 is provided to reduce the possibility of interference of flap 17 with glue flap 45 during the erecting operation, and additionally to reduce the number of plies of carton material in the erected carton in the area of glue flap 45.

The pattern of adhesive placement on glue flap 44 is such that the glue area will conform with the boundary of flap 17. It would not necessarily be serious should the glue area not precisely conform with this boundary, although for the sake of economy it is unnecessary to have glue on an area of flap 44 which will not be in contact with flap 17, and for strength of the glued connection it is desirable that substantially the entire overlapping portions of flaps 44 and 17 be adhered together. The same principles govern the application of the glue to the flap 45, although it is necessary that a sufficient area of flap 45 adjacent score line 41 and notch 47 be left unadhered to flap 19 so that proper entry of hook 48 under flap 20 is permitted.

With particular reference to Figures 5, 6 and 7, it will be noted that flaps 18 and 20 lie completely to the exterior of the erected carton, except for hooks 48 and 49 which respectively underlie flaps 20 and 18. Flap 17 lies interiorly of flaps 18 and 20 except a slight overlapping of the side edge of hook 49 on flap 20. Flap 19 completely underlies (interiorly of the carton) the other three bottom end flaps 17, 18 and 20, and is supported thereby. As previously noted, flap 19 is of dimension to fit snugly the bottom of the erected carton, thereby to practically and effectively provide a leakproof bottom closure.

Figure 8 shows my completed carton in the upright position ready to receive the product to be packaged. Figure 9 shows the upper end of the carton with the top closure flaps closed, tab 51 on flap 26 being engaged with slit 52 in flap 28. It is readily observed that my carton thus provides a neat and attractive as well as strong packaging medium. Referring also to Figure 5, it will be seen that tear flap 33 provides a convenient means of opening the package. After opening the interlocked end flaps 26 and 28, the non-adhered outer panel 37 of tear flap 33 may be readily grasped for breaking loose the adhesive connection between inner panel 36 and side wall 13. Walls 10 and 11 are then swung together on hinge line 15, thereby fully exposing the contents of the carton. Of course, the top end of the carton may be opened as illustrated in Figure 8 as an alternative means of access to the packaged material.

It will be particularly noted from Figures 6 and 7 that my invention provides a bottom construction which has an exceptionally neat and attractive appearance as a result of the eurythmical though asymmetrical relation of the two halves of the bottom lying to either side of any straight line passed through the geometric center of the bottom. Also, since the hooks 48, 49 are respectively positioned under flap panels 43—45 and 42—44, there are no externally extending carton elements which might readily snag with disastrous effects on the carton or disruption of the packaging operation. The side boundary lines of flaps 18 and 20 are so gently curved and firmly anchored that they present no practical danger of snagging.

Further referring to Figure 6, it will be seen that flap panel pairs 42—44 and 43—45 each presents an uninterrupted printing surface, thus permitting the easy application thereto of a printed message as has become so widely used and important in modern competitive markets.

It should be noted that in the normal automatic machine line used to make cartons from the blanks of Figure 1, the adhesive is not applied as at 53, 54 and 55 until after the blank has been initially folded into the position shown in Figure 2.

It will be obvious that a number of variations in detail might be availed of without departing from the spirit of my invention. It is accordingly to be understood that no limitations upon the scope of my invention are intended except as are specifically set forth in the appended claims.

I claim:

1. A collapsible carton formed from a one-piece paperboard blank, the carton comprising side walls hingedly connected together to provide a tubular sleeve of rectangular cross-section, each of the side walls having a bottom flap extending integrally from its lower edge and defined therefrom by a score line forming a hinge con-

nection between the side wall and the flap, one of one opposed pair of said flaps being of dimension to substantially close the bottom of the rectangular sleeve, the flaps of the other opposed pair being identical to each other and each divided by a diagonal score line extending from an end of the hinge connection of the flap to the side wall, the diagonal score lines being parallel to each other and dividing each of said bottom flaps into an inner panel hinged to a side wall and an outer panel integrally hinged only to the inner panel along said diagonal score line, each of said outer panels extending toward a different one of the flaps of said one opposed pair and adhered to the exterior surface thereof, said other pair of opposed flaps folding inwardly about said diagonal score lines upon collapse of the sleeve, the side edge of each of said outer panels remote from the hinge connection of the flap of said one opposed pair to which it is adhered having a notch cut therein forming a hook-like portion on each of said outer panels, said hook-like portions in carton-erected condition oppositely extending beyond a line parallel to said diagonal score lines to mutually positively engage each other at said notches upon erection of the sleeve from collapsed condition, whereby the carton is positively maintained in erected and collapse-free condition except upon mutilation of said hook-like portions, the remote end of each outer panel underlying the opposed inner panel of said other opposed pair, whereby in erected condition said one of said one opposed pair of flaps lies interiorly of and substantially closes the bottom of the sleeve and the flaps of said other opposed pair lie substantially entirely exteriorly of the carton and present an appearance of eurythmical though asymmetrical relation of the two halves of the bottom lying to either side of any straight line through the geometric center of the bottom.

2. A collapsible carton formed from a one-piece paperboard blank, the carton comprising side walls hingedly connected together to provide a tubular sleeve of rectangular cross-section, each of the side walls having a bottom flap extending integrally from its lower edge and defined therefrom by a score line forming a hinge connection between the side wall and the flap, the flaps of one opposed pair thereof being each divided by a diagonal score line extending from an end of the hinge connection of the flap to the side wall, the diagonal score lines dividing each of said bottom flaps into an inner panel hinged to a side wall and an outer panel integrally hinged only to the inner panel along said diagonal score line, each of said outer panels extending toward a different one of the flaps of the other opposed pair and adhered to the exterior surface thereof, said one pair of opposed flaps folding inwardly about said diagonal score lines upon collapse of the sleeve, the side edge of each of said outer panels remote from the hinge connection of the flap of said other opposed pair to which it is adhered having a notch cut therein forming a hook-like portion on each of said outer panels, said hook-like portions in carton-erected condition oppositely extending beyond a line parallel to said diagonal score lines to mutually positively engage each other at said notches upon erection of the sleeve from collapsed condition, whereby the carton is positively maintained in erected and collapse-free condition except upon mutilation of said hook-like portions

and the flaps of said one opposed pair lie substantially entirely exteriorly of the carton.

3. A collapsible carton according to claim 2, further characterized by the fact that the flaps of said one opposed pair are identical to each other and the diagonal score lines dividing those flaps are parallel to each other to present in the carton-erected position an appearance of eurythmical though asymmetrical relation of the two halves of the carton bottom lying to either side of any straight line through the geometric center of the bottom.

4. A collapsible carton according to claim 3, further characterized by the fact that one of said other opposed pair of bottom flaps is of dimension to substantially close the bottom of the rectangular sleeve in the carton-erected position and the remote end of each outer panel underlies the opposed panel of said one pair.

5. A paperboard blank for forming a collapsible carton comprising a unitary blank suitably cut and scored to provide alternate pairs of carton side walls arranged to form a rectangular sleeve when folded and connected, a bottom flap extending integrally from the bottom end edge of each of said side walls and defined therefrom by a score line forming a hinge connection between the side wall and the flap, said bottom flaps being adapted to form a bottom closure for the carton when the side walls are secured together to form a sleeve, each of one alternate pair of said bottom flaps being scored diagonally and in the same direction by a score line extending from adjacent an end of the hinge connection between the flap and the wall to which it is connected to provide an outer glue panel integrally hinged only to a bottom flap along such diagonal score line, each of said glue panels extending toward a different one of the other alternate pair of bottom flaps and having an adhesive applied to the upper surface thereof and adapted to be adhered to the bottom surface of the flap toward which it extends, the side edge of each of said outer glue panels remote from the hinge connection of the bottom flap to which it is adapted to be adhered having a notch cut therein to provide a hook-like portion on said panel adapted to engage the hook-like portion of the other of said outer glue panels when the blank is assembled to form said sleeve and the sleeve is erected to form a carton, said hook-like portions in carton-erected position extending oppositely and mutually beyond a line parallel to the diagonal score lines in said one alternative pair of bottom flaps, one of the bottom flaps of the other of said alternate pairs being of dimension to substantially close the bottom end of the rectangular sleeve when the blank is erected to form a carton, whereby said sleeve when assembled and erected into such carton will be positively maintained in erected position by the interlock of said hook-like portions.

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