July 19, 1955 M. I. WILLIAMSON 2,713,452

WRAP-AROUND FOLDING BOXES

Filed Dec. 14, 1950 2 Sheets-Sheet 1

Fig. 1

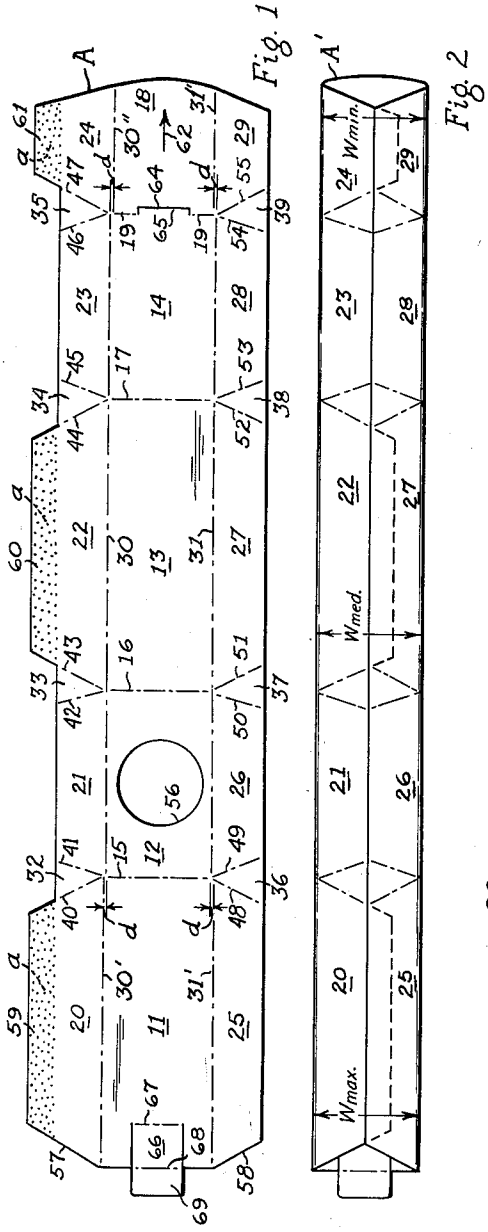

Fig. 2

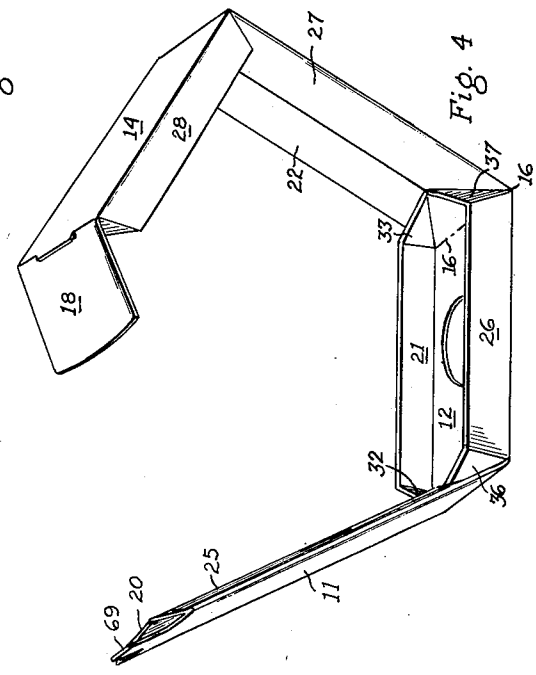

Fig. 4

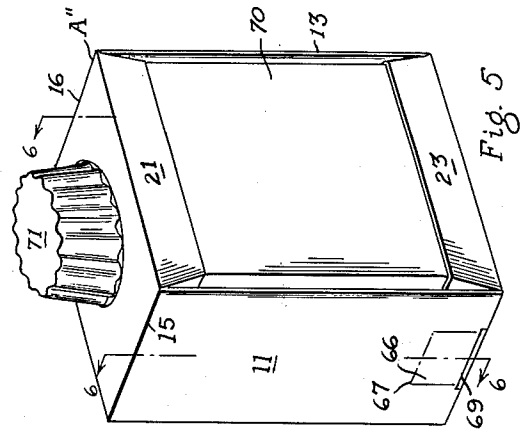

Fig. 5

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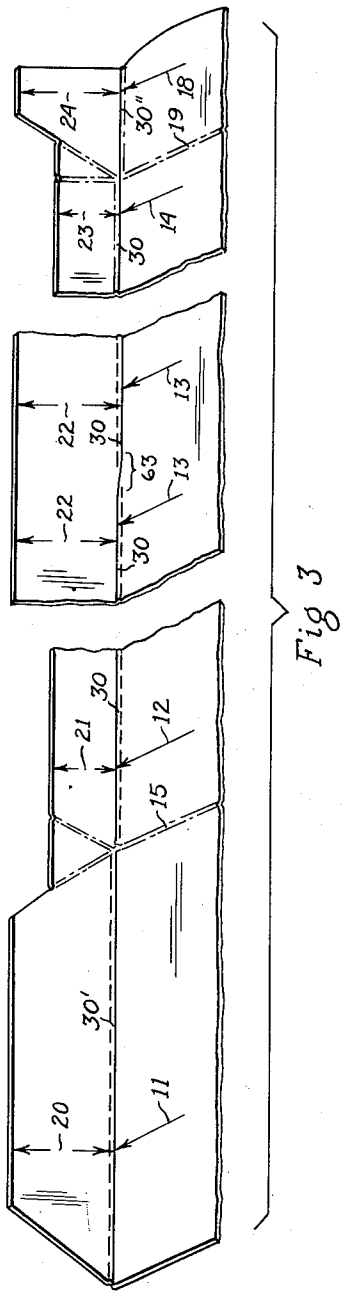

Fig 3

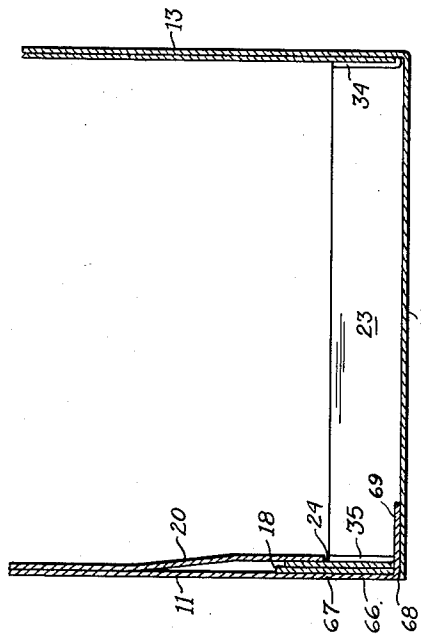

Fig 6

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WRAP-AROUND FOLDING BOXES

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Application December 14, 1950, Serial No. 200,745

2 Claims. (Cl. 229—40)

This invention relates to improvements in folding boxes made from foldable sheet material, such as paperboard, box board, or other foldable sheet stock.

The invention is directed to the type of folding boxes which serve not only as protection for the box contents in shipping, handling, storing and selling, but whose secondary and equally important purpose is to provide a visual display of the packaged merchandise.

The invention is more particularly directed to folding boxes of the wrap-around type. Such folding boxes consist basically of a plurality of enclosing wall panels which are articulated to one another in end-to-end relationship and enclose the box contents entirely, with the exception of two sides which, for convenient identification, may be compared to the front and back walls of a conventional folding box.

Flange panels are articulated to the side edges of the enclosing wall panels and are connected to one another along gusset folds which generally lie at the box corner fold lines at which two enclosing wall panels meet.

Certain of these flange panels extend at predetermined angles from the respective wall panels to which they are articulated, the angle being determined by the type of merchandise packaged, and the particular manner in which the merchandise is grasped in the box. In most instances the angle between the aforementioned certain flange panels and their respective wall panels ranges downwardly from 90 degrees. However, in specific instances, the angle may be greater than 90 degrees. The angular position of these flange panels is determined by the shape of the generally triangular, gusset panels which connect the upstanding flange panels with other flange panels which are folded-back upon the wall panels to which they are articulated and form multiple thickness side walls with the last mentioned wall panels.

Since wrap-around folding boxes lack full front and back walls, only marginal flanges being present where normally full front and back panels are found in a conventional folding box, it is necessary to reinforce the box structure in certain ways to compensate for the rigidity which normally would be imparted to the box by the full front and back panels.

While the basic structure of a wrap-around box provides excellent resistance to crushing and compression, the resistance to warping and twisting must be imparted to the box by special structure.

A great amount of resistance to warping and twisting is imparted to wrap-around folding boxes by a telescoping connection between the endmost wall panels of the blank.

The telescoping connection comprises a tuck flap at one end of the box blank insertable between two thicknesses of a wall panel which may either be of double walled, or tubular, construction.

A secure telescoping lock and maximum reinforcement against twisting is only obtained, if the telescoping fit between the tuck flap and the tubular, or double walled,

side wall is within relatively close tolerances. It is easily apparent that too tight a fit creates difficulties in filling and closing of the box, and that too loose a fit brings with it the danger of opening of the box together with insufficient rigidity.

It is for this reason desirable to manufacture the box from a blank which has a slightly tapered sequence of wall panels, so that the blank is narrowest at the tuck flap end, and widest at the end into which the tuck flap is to be inserted.

Basically the production of tapered wall panels is, of course, conventional box maker's practice. It is usually done by setting the respective scoring rules in non-parallel position in the cutting and scoring die, so that the rules are farther apart at one end of the blank than at the other. Such practice generally entails the use of specially made "furniture," which are spacer blocks used for spacing and locking the rules and knives in the die in a predetermined accurately defined spaced relationship. In mass production the preparation of special furniture for box blanks is cumbersome and costly and it is difficult to maintain uniformity between several dies, even between the several portions of the die, which, as a rule is a multiple die comprising a plurality of box blank outlines. Deviations from closely set tolerances are also likely to occur since it is customary to make such special furniture from wood.

According to the invention the preparation of special furniture is made unnecessary, and it is possible to produce blanks of extremely accurate taper by use of conventional parallel-sided metal furniture which is readily available and widely used in the printing and box-making trade.

The invention is based on the observation that box stock may crease at a score line in one of three ways. The board may crease at one extreme side of the score line, or it may crease at the other extreme side of the score line. As a third possibility, the board may crease down the center of the score line. This behavior of the box stock is normally a source of annoyance to box makers since it is likely to introduce errors which are difficult to control. The present invention turns this commonly undesirable behavior of the board into a virtue by introducing controls which cause the box boards to crease, in a predetermined manner, to one side of a score line at a certain blank portion, to the other extreme side of a score line at another blank portion, and down the center, or diagonally across the center of the score line, at still another portion of the blank.

As a result a tapered blank for wrap-around folding boxes can be produced with conventional parallel-sided furniture in the cutting and scoring die. The blank thus produced is far more accurate and more uniform within close tolerances than a blank cut and scored on a die employing tapered furniture because the possibility of the board creasing at the critical score lines in other than the desired and predetermined way is automatically eliminated.

The various objects, features and advantages of this invention will appear more fully from the detailed description which follows, accompanied by drawings, showing, for the purpose of illustration, a specific application of the invention. The invention also consists in certain new and original features of construction and combination of elements hereinafter set forth and claimed.

Although the characteristic features of this invention which are believed to be novel will be particularly pointed out in the claims appended hereto, the invention itself, its objects and advantages, and the manner in which it may be carried out may be better understood by referring to the following description taken in con-

nection with the accompanying drawings forming a part of it in which:

Figure 1 is a plan view of a flat blank from which a box embodying the present invention may be made;

Figure 2 is a plan view of the blank after an initial folding and gluing operation prior to shaping into box form;

Figure 3 is a perspective view, on an enlarged scale, of portions of the box blank of Figure 1 in the process of folding, illustrating the controlled creasing of the stock leading to the formation of a tapered prefolded blank;

Figure 4 is a perspective view of the box blank of Figure 2 in the process of shaping into box form;

Figure 5 is a perspective view of a box for packaging a bottle, the box being made from the blank shown in Figures 1 and 2; and

Figure 6 is a sectional view of the bottom portion of the box shown in Figure 5, the section being taken in plane 6—6—6 in Figure 5.

In the following description and in the claims various details will be identified by specific names for convenience. The names, however, are intended to be as generic in their application as the art will permit. Corresponding reference characters refer to corresponding parts in the several figures of the drawings.

In the drawings accompanying, and forming part of this specification, certain specific disclosure of the invention is made for the purpose of explanation of broader aspects of the invention, but it is understood that the details may be modified in various respects without departure from the principles of the invention, and that the invention may be applied to other structures than the ones shown.

The blank A shown in Figure 1 may be cut and scored, in multiple, from rolls or sheets of paperboard, cardboard, or other flexible sheet material. Only one side of the board need be imprinted or otherwise decoratively finished, since only one side of the blank is exposed to view in the finished box. The blank comprises a series of enclosing wall panels **11**, **12**, **13** and **14** of substantially equal width. The wall panels are articulated to one another in end-to-end relationship along box corner fold lines **15**, **16** and **17**. A tuck panel **18** is articulated to the wall panel **14** along a box corner fold line **19**.

Flange panels **20**, **21**, **22**, **23**, **24**, and **25**, **26**, **27**, **28**, and **29** are articulated to opposite edges of the wall panels along parallel score lines **30'**, **30**, **30''** and **31'**, **31**, **31''**. The score lines **30'** and **31'** are parallel and outwardly offset with respect to, the score lines **30** and **31** and the score lines **30''** and **31''** are parallel and inwardly offset with respect to, the score lines **30** and **31**. The amount of offset *d* depends on the character and the caliper of the box stock and may be of the order of 1/32 of an inch, resulting in a total of 1/8 of an inch adding the four off-sets. As will be seen, however, the total taper of the creased blank is likely to be somewhat less than 1/8 of an inch.

The flange panels are articulated to one another in end-to-end relationship along gusset folds **32**, **33**, **34**, **35** and **36**, **37**, **38** and **39**. Each gusset fold comprises two crease lines running from the end of a corner fold line across the flange panel stock. These crease lines are numbered **40**, **41**; **42**, **43**; **44**, **45**; **46**, **47**; **48**, **49**; **50**, **51**; **52**, **53**; and **54**, **55**. For reasons which hereinafter will become apparent the crease lines of the gusset folds are preferably so laid out, that they form an angle with respect to the respective corner fold lines running towards them, as is also clearly apparent from the drawing.

The wall panels may be provided with apertures through which portions of the box contents may protrude, one such aperture being shown in the panel **12** at **56**.

A shallow U-cut **64** forms a tongue **65** on the wall

panel **14** adjacent the corner fold line **19**. The tuck tab **66** is cut from the stock of the wall panel **11** and is articulated thereto along a fold line **67**. The tab **66** has a further crease **68** and extends beyond the end of the wall panel **11** at **69**.

The ends of the flange panels are preferably cut at an angle as shown at **57** and **58** to fit corner folds in the finished box, as will later appear.

Glue laps **59**, **60**, and **61** extend from the flange panels **20**, **22**, and **24** respectively to overlap with the flange panels **25**, **27**, and **29**.

The blank A may be formed into box shape substantially as follows:

Adhesive *a* is first applied to the glue laps **59**, **60** and **61**. The blank is then folded along the side fold lines to fold the flange panels over the respective wall panels to which they are articulated, thereby adhering flange panels **20** and **25**; **22** and **27**; and **24** and **29** together. This is conveniently done by passing the blank through a gluing and folding machine, preferably in the direction indicated by the arrow **62** with the tuck panel **18** leading and the wall panel **11** trailing.

Figure 3 illustrates the manner in which the creases **30'**, **30** and **30''** are caused to break. Starting with the tuck panel **18**, it is seen that the score **30''** is caused to break on the outside with respect to the panel **18** so that substantially all of the score remains in the plane of the panel **18** whereas the panel **24** includes no portion of the score area. The score **30''** is caused to break in this manner because of the biasing influence of the panels **14** and **23** joined along the score **30**. The board naturally creases along the line of least resistance. This line runs on the outside of the score **30''** and on the inside of the score **30**.

The arrows in Figure 3 illustrate the width of the several panels, width being measured to the actual line of creasing. It is thus seen that the width of the panel **14** does not include any portion of the score, but that the width of the flange panel **23** includes all of the scored portion **30**, at least immediately adjacent the score line **19**, so that the scored area **30** lies in the plane of the flange panel **23**.

Turning now to the other end of the blank, the score **30'** tends to break on the inside, so that the scored area **30'** lies in the plane of the flange panel **20**, while the wall panel **11** contains no portion of the scored *d* area. The breaking of the score **30'** is controlled by the biasing influence of the panels **21** and **12** articulated along the score line **30** with respect to which score line **30'** is offset. The stock again creases along the line of least resistance which is the inside of score **30'** and the outside of score **30**. Thus the panel **12** contains all of the scored area **30** adjacent the score line **15** while the flange panel **21** includes no portion of the scored area.

Turning finally to the intermediate wall panels bordered by the score **30** it is seen that the score breaks at the outside adjacent the fold line **15** and at the inside adjacent the fold line **14**. From this it naturally follows that at some intermediate point or portion, the crease must extend diagonally across the center of the score. This point or portion is indicated at **63**.

The folding operation thus produces a tapered tubular blank A', illustrated in Figure 2. The tubular blank has its greatest width w_{max} at one end and its smallest width w_{min} at the other end. The mean width is indicated at w_{med}.

Actually the amount of taper is less than the total offset of 1/8 of an inch, using the figures given in the above example. Theoretically the amount of taper is 1/8 of an inch less twice the width of the scoring rules, since the scores **30'** and **30''** as well as the scores **31'** and **31''** do not break down the center, but one-sidedly.

It is thus possible to control the amount of taper with great accuracy by appropriate selection of the amounts of offset *d*, in connection with the known width of the

scoring rules. As a result blanks of great uniformity and accuracy are produced which provide precisely the desired tightness or looseness of the telescoping closure.

The prefolded and preglued blank A' shown in Figure 2 may be shipped and stored in flat collapsed condition requiring only a minimum of space. The blank is ready for assembly with, or folding about, box contents which in the illustrated example is a bottle **70**, but obviously could be any other piece or pieces of mechandise occupying substantially the same space as the bottle **70**.

The assembly of the box blank about the bottle is most easily accomplished by first creasing the blank A' at the corner fold lines **15** and **16** whereby the flange panels **21** and **26** are automatically erected with respect to the top wall panel **12**. The bottle may then be inserted, cap **71** first, through the aperture **56** causing the flange panels **21** and **26** to overlie the sides of the bottle. The folding of the box blank along the corner fold lines **15** and **16** causes the gussets at the corner to form by reason of the fact that the flange panels **20, 25** and **22, 27** are adhered together and form a tubular structure with the wall panels **11** and **13**. Thus double thickness side walls are formed at **11** and **13**. The bottom flange panels **23** and **28** are erected by folding of the blank at the corner fold lines **17** and **19**. This folding operation is preferably performed with the box contents, the bottle **70**, in place so that, in effect the blank A' is wrapped around the contents.

The upright flange panels positively retain the box contents in the box and, in addition, form a decorative border or frame about the contents. Since the crease lines bordering the gusset folds are not in line with, but extend at an angle with respect to, the corner fold lines towards which they run, the upright flange panels have a certain inward bias thereby grasping the bottle **70** snugly instead of bellying outwardly as they would, if the crease lines were not arranged at an angle.

The flange panels **24** and **29** overlie the tuck panel **18** and form a double thickness tuck flap therewith. This tuck flap is insertable into the space between the endmost wall panel **11** and its flange panels **20** and **25**. The tuck flap **18, 24, 29** has a snug telescoping fit with the end of the double thick box wall **11, 20, 25**. This telescoping fit serves a double function of first frictionally and securely connecting the ends of the box blank together to complete the box assembly as shown in Figures 5 and 6. Secondly, the telescoping fit imparts a considerable amount of rigidity and resistance to twisting to the completed box A''. This feature is of particular importance in instances where a plurality of units or pieces of merchandise are packaged in a single box.

The tuck closure is illustrated in section in Figure 6. The tuck flap **18, 24** lies between the panels **11** and **20** and the tuck tab **66, 69** provides a safety latch, so to speak, for the telescoping closure, the extension **69** being inserted through the aperture formed by the U-shaped cut **64**.

The invention thus provides a novel and highly adaptable type of package which may be constructed from a surprisingly small amount of board, is highly versatile and serves not only as a protective enclosure, but also as a decorative display box. The illustrated example shows a specific use of the novel and improved box, but it is apparent that the shapes, sizes and types of merchandise which may be packaged in the novel box are numerous and that the basic structure hereinbefore described may be adapted to other forms of mechandise by simple changes. For this reason various modifications, additions, omissions, substitutions and other changes may be made without departing from the spirit or essence of this invention.

What is claimed is:

1. A wrap-around type folding box for the visual packaging of contents, the box comprising a series of enclosing wall panels and a tuck panel articulated along box corner fold lines in end-to-end relationship; flange panels articulated to opposite side edges of each of said wall panels and of said flap panel, said flange panels being articulated to one another along gusset folds in end-to-end relationship, each gusset fold comprising two crease lines running from the end of a corner fold line across the stock of the flange panel, certain of the gusset folds including two crease lines both of which form angles with the respective corner fold line toward which they run, considering the structure in flat blank condition, the flange panels articulated to certain wall panels extending at an angle with respect to said certain wall panels and forming box contents engaging flanges, the remaining flange panels lying flat against the respective wall panels from which they extend, the flange panels articulated to the tuck panel being folded thereover to form a tuck flap therewith at least partially of double thickness, said tuck flap being inserted between the endmost wall panel and the flange panels folded thereover, the scores of the flange panels of the tuck panel being parallel to, and inwardly offset with respect to, the scores of the flange panels of intermediate wall panels and the scores of the flange panels of the endmost wall panel being parallel to, and outwardly offset with respect to, the scores of the flange panels of said intermediate wall panels, the flange panels being folded along their scores with the scores broken in an irregular, but controlled way to form a slightly tapered wall structure narrowest at said tuck flap and widest at said endmost wall panel.

2. A wrap-around type folding box for the visual packaging of contents, the box comprising a series of enclosing wall panels and a tuck panel articulated along box corner fold lines in end-to-end relationship; flange panels articulated to opposite side edges of each of said wall panels and of said flap panel, said flange panels being articulated to one another along gusset folds in end-to-end relationship, each gusset fold comprising two crease lines running from the end of a corner fold line across the stock of the flange panel, certain of the gusset folds including two crease lines both of which form angles with the respective corner fold line toward which they run, considering the structure in flat blank condition, the flange panels articulated to certain wall panels extending at an angle with respect to said certain wall panels and forming box contents engaging flanges, the remaining flange panels lying flat against the respective wall panels from which they extend, the flange panels articulated to the tuck panel being folded thereover to form a tuck flap therewith at least partially of double thickness, said tuck flap being inserted between the endmost wall panel and the flange panels folded thereover, the scores of the flange panels of the tuck panel being parallel to, and inwardly offset with respect to, the scores of the endmost wall panel, the flange panels being folded along their scores with the scores broken in an irregular, but controlled way to form a slightly tapered wall structure narrowest at said tuck flap and widest at said endmost wall panel.

References Cited in the file of this patent

UNITED STATES PATENTS

574,894	Ferry	Jan. 12, 1897
1,065,398	Scudder	June 24, 1913
1,833,419	Grossen	Nov. 24, 1931
1,943,762	Harris	Jan. 16, 1934
1,971,197	Ottinger	Aug. 21, 1934
1,994,541	Spiking	Mar. 19, 1935
2,033,526	Kinkenon	Mar. 10, 1936
2,247,870	Chalmers	July 1, 1941
2,358,790	Carruth	Sept. 26, 1944
2,395,558	Lighter	Feb. 26, 1946
2,548,985	Lighter	Apr. 17, 1951
2,610,781	Metzger	Sept. 16, 1952