

June 12, 1962

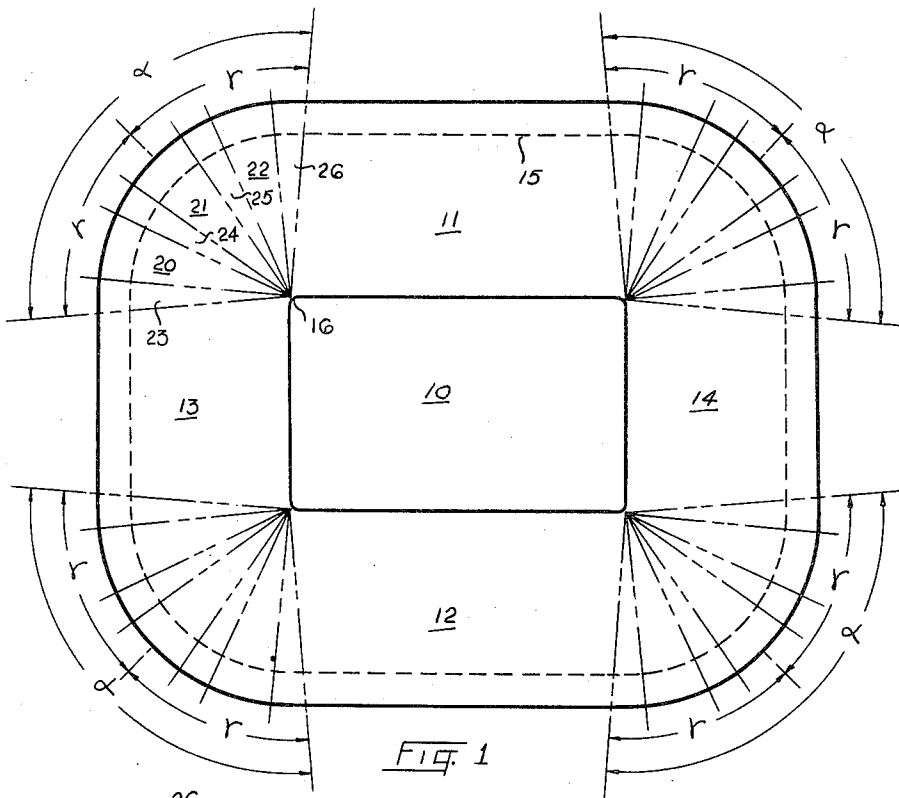
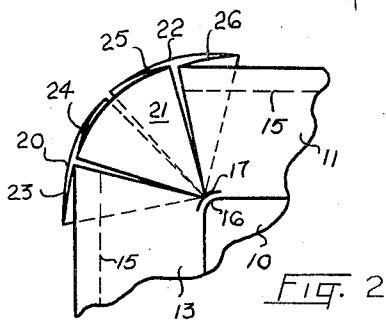
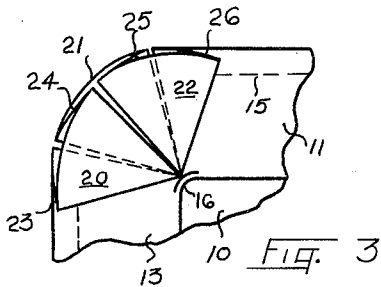
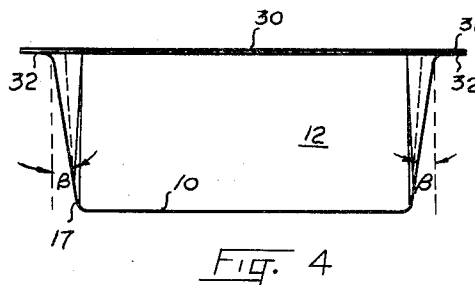
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3,038,634

FLANGED CONTAINER HAVING CONTROLLED CORNER FOLDS

Filed Jan. 25, 1957

2 Sheets-Sheet 1



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FLANGED CONTAINER HAVING CONTROLLED CORNER FOLDS

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2 Sheets-Sheet 2

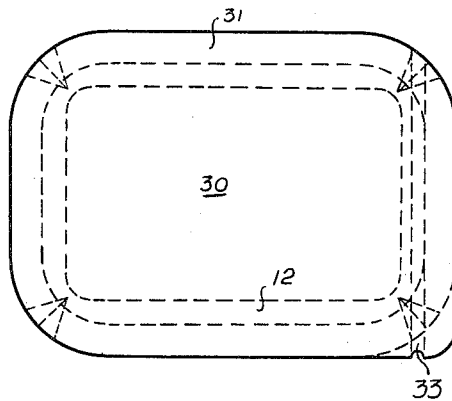


FIG. 5

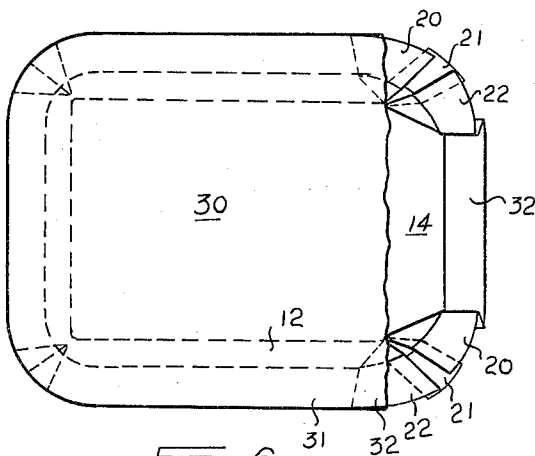


FIG. 6

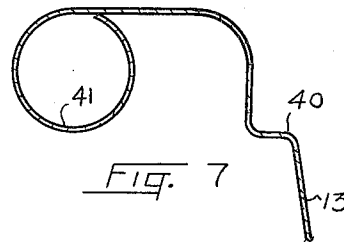


FIG. 7

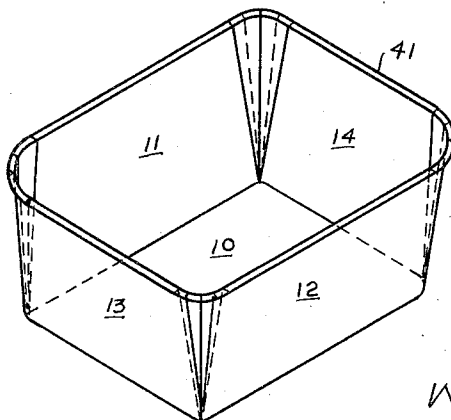


FIG. 8

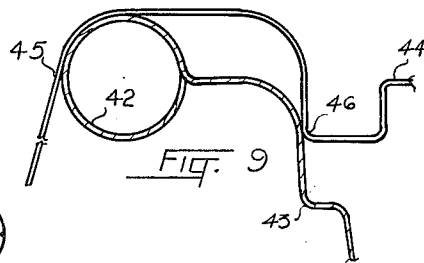


FIG. 9

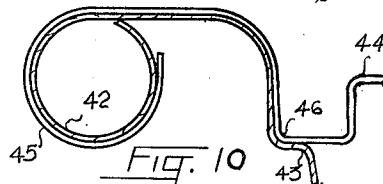


FIG. 10

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## FLANGED CONTAINER HAVING CONTROLLED CORNER FOLDS

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Filed Jan. 25, 1957, Ser. No. 636,388

1 Claim. (Cl. 220—62)

This invention relates to a new and improved one-piece container and, more particularly, to a container having a reinforcing flanged portion extending about its entire open perimeter and adapted to cooperate with a separate container cover. For purposes of illustration, the invention is disclosed as related to containers formed from a single thin sheet of aluminum foil, although, in its broader aspects, it may be employed with a wide variety of materials and sheet dimensions.

Heretofore, in the manufacture of shaped containers of this type, much difficulty has been experienced in providing an adequate flange for uniformly affixing the cover thereto and while simultaneously maintaining a smooth and attractive surface at the sides and corners of the container and at the same time avoiding the use of an inordinate amount of container material. Even when the container comprises a simple open top pan, the various factors of pan usage, such as filling, shipping, storage and the like, place a premium upon a flanged construction which provides stability to the article. With the introduction of tear strip container covers, the need for properly reinforced containers is emphasized all the more.

In general, one piece containers of this type, when having smooth side surfaces and using a minimum amount of sheet material, have heretofore had a discontinuous flange about their open perimeter, thus resulting in a lack of transverse stability; and when having a continuous flange, have employed a large amount of sheet material which is folded in somewhat random fashion adjacent the corners resulting in wrinkled side surfaces.

It is an object of my invention to overcome these and other characteristic disadvantages of one-piece containers formed from sheet material. For example, an object of my invention is to provide a container formed from a single sheet of material and having a continuous peripheral top flange and corner portions disposed in a prescribed overlapping fold pattern.

Another object is to provide a self-reinforcing container formed from a single sheet of material and adapted to insure a secure seat for a separate cover member.

Another object is to provide a container formed from a single sheet of material and folded at its corners in a manner to insure smooth surfaces at the sides of the container.

Another object is to provide a reinforced nestable container formed from a single sheet of material and employing a minimum of sheet material for a given container volume capacity.

Another object is to provide a container formed from a single sheet of material and having a continuous peripheral top flange seating a separate cover member, incorporating a tear strip, the flange providing a self-reinforcing action during the opening of the closed container.

Another object is to provide a container formed from a single sheet of material and having corner portions arranged in a prescribed overlapping fold pattern permitting a side wall of the container to be formed into a pouring spout following removal of a portion of a cover member for the container.

Other objects and advantages will become more apparent as the description proceeds and when considered

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in conjunction with the accompanying drawings showing a presently preferred form of container.

In the drawings,

FIG. 1 is a plan view of a blank of sheet material for forming the container.

FIG. 2 is a detail view in plan of a corner of the partially formed container showing one arrangement of fold.

FIG. 3 is a detail view in plan of a corner of the partially formed container showing a second arrangement of fold.

FIG. 4 is a side elevation of the container and its cooperating cover member, using a flat lateral flange.

FIG. 5 is a top view of the container of FIG. 4 showing one arrangement of tear strip for the container cover.

FIG. 6 is a top view of the container of FIG. 4 with the tear strip removed and the container corners partially unfolded to provide a pouring spout.

FIG. 7 is a detail view, to a larger scale showing a modified form of container flange;

FIG. 8 is a perspective view of a container employing the flange arrangement of FIG. 7;

FIG. 9 is a perspective view of an alternative flange arrangement with cover loosely seated thereon; and

FIG. 10 is similar to FIG. 9 with the cover shown crimped into place.

In carrying out my invention, I provide a blank of thin material suitably scored lightly at its corner regions and which may be properly registered in forming apparatus, such as dies. The blank may be, for example, an aluminum foil bearing printed matter on its outer surfaces destined to form the smooth sides of the finished container. The blank may also be a sheet comprising laminated sections and as used herein the terms, blank or sheet, are to be interpreted as being either a solid or laminated article. By means of a simple die operation upon the blank, the container is formed with sloping sides, folded corner panels, and a continuous flange extending about its open periphery. After being filled in conventional filling apparatus, a suitable cover member, preferably having a tear strip incorporated therein, as described in the co-pending application of William E. Cheeley, Serial No. 586,804 filed May 23, 1956, for Container and Easy Opening Cover Therefor, is affixed to the container flange.

Referring now to FIG. 1, a suitable blank for forming a rectangular shaped container may comprise a sheet of aluminum foil having a thickness in the order of 0.010 inch or less and including a rectangular central portion 10 for the bottom of the formed container. Side portions 11 and 12 and end portions 13 and 14 provide the material for the sloping sides of the container. Joining the adjacent sides are corner panel portions adapted to be folded in the controlled manner later to be described and forming a significant feature of my invention.

Merely as an example, a rectangular container is shown herein, although it will be understood that triangular, pentagonal or other polyside containers may also be formed without departing from the invention. It will be further understood that, in laying out the container blank from a much larger sheet of blank material, substantially all of the larger sheet is usefully employed and that a given blank is not required to be oversize in order to provide flange material at its corners, all of which contributes to reduction in waste and cost. As shown by the continuous dotted line 15 near the edge of the blank, all material lying inside that line is available for forming the inside surfaces of the container while all material outside that line is available for forming the container flange. Thus, the outer edges of each side and the entire base edge of the panels serve to define the container flange which is uninterrupted throughout its length.

As is known, in the shaping of thin sheets, particularly, rupturing stresses may be generated by the die operation when insufficient material is provided in various critical regions. I prefer therefore, in carrying out my invention, to employ the following practice in establishing a corner fold pattern, although other practices may be employed without departing from the spirit of the invention. As seen in FIG. 1, the intersecting edges of the container bottom are rounded as seen at 16 so that the apex of the folded panels will terminate slightly above the plane of the container bottom, as best seen at 17, FIG. 4.

From a focal point at the theoretical intersection of the edges of the bottom, at each corner, an arc is struck having a suitable radius, preferably a radius which will form an arc tangent to the outer edges of the adjacent sides of the container. This arc forms the base of a plurality of major and minor fan shaped panels adapted for the controlled pattern of folding, thus to provide the corners of the container and to have sufficient sheet material available at the panel bases to form a reinforced integral flange.

Score lines, as indicated, are lightly impressed in the appropriate surfaces of the blank at each corner to facilitate the controlled folding. The total area comprising the panel portions is subtended by angle  $\alpha$  in each corner, the value of that angle depending upon the slope angle  $\beta$  (FIG. 4) of the container sides and the amount of reinforcing desired by the overlapping of the several panels. Preferably, all angles  $\alpha$  are equal and all angles  $\beta$  are equal for a given container. Merely as an example, in one satisfactory form of a small container, sufficient flange material was available when  $\alpha$  equalled  $97\frac{1}{2}^\circ$  and  $\beta$  equalled  $9^\circ$ .

The amount of corner material subtended by angle  $\alpha$  preferably is divided into three equal sized, major panels 20, 21 and 22, respectively, having minor wing panels 23, 24; 24, 25; and 25, 26. For optimum reinforcement with a given amount of blank material, I prefer to have each of the wing panels approximately half the size of the major panel so that when folded as shown in FIGS. 2 and 3, the adjacent folded edges abut against each other. Accordingly, each of the angles  $\gamma$  subtended by the midline of central major panel 21 and the outermost edges of the wing panels 23 and 26 are equal and represent one-half of angle  $\alpha$ .

With the foregoing in mind, reference now is made to FIGS. 2 and 3, showing two arrangements for folding the corners and prior to the formation of the integral flange. As seen in FIG. 2, the partially formed container has a sloping side 11 closely abutting against central major panel 21 and a sloping side 13 abutting against the same major panel. In this arrangement, the outermost wing panels 23 and 26 lie outside the respective sides 13 and 11 of the container and when the flange forming operation occurs, the container sides are bent outwardly over those wing panels.

As an alternative, in FIG. 3 the major panels 20 and 22 are arranged interiorly of the container and the central major panel is disposed outwardly. In this arrangement the outermost wing panels 23 and 26 lie inside the respective sides 13 and 11 and when the flange forming operation occurs, the major panels 20 and 22, as well as the wing panels 23 and 26, are bent outwardly over the container sides 11 and 13.

Following the controlled folding as exemplified by either of these arrangements, the container blank material lying beyond dotted line 15 (FIG. 1) is bent outwardly. Due to the self-adjusting action permitted by the overlapping panel sections, no wrinkling or deformation occurs on the container sides 11, 12, 13 and 14 with the result that a smooth surface is insured. This is particularly desirable when those sides contain printed material. It has also been found that containers of this type have greater sales appeal and that when wrinkling is avoided,

the contents may be more effectively removed from the container.

As the flanging operation occurs, any stretching stresses at the base of the several panels are relieved by the tendency of panels to shift relative to each other. When a simple lateral flange of the type seen in FIG. 4 is formed, the flange extending from the container sides is continued around the corners of the container as an integral section and the flange formed by the overlapped major and minor panels is triply reinforced at four points in each corner, as, for example, the three fold layer of side wall 11, wing panel 26 and major panel 22, which forms one of these reinforced points. Accordingly, a container having remarkable transverse stability is achieved.

As seen in FIGS. 4 and 5, the thus described container may be readily fitted with a container cover 30 having a peripheral portion of relatively wide dimension 31 and which may be affixed to the relatively wide flange 32 of the container by any suitable sealing or crimping means. The cover conveniently may include a tear strip 33 which strip may be of the type disclosed in my aforementioned application, said strip being shown as disposed transversely of the long axis of the container adjacent one end. In the event that the container contents are flowable, after detaching the tear strip and a portion of the cover 30 associated therewith, the remainder of the cover may be left in place and the end wall 14 of the container pulled outwardly to form a pouring spout as seen in FIG. 6.

While the simple lateral flange 32 of the thus described container is satisfactory for many usages, I prefer to employ a container having an inwardly rolled flange or bead of the general type shown in FIG. 7 to a larger scale. The material at the edge of the blank in FIG. 1 lying outside line 15 is represented in FIG. 7 as comprising the material to the left of the point 40 in wall 13. Any suitable arrangement of forming dies may be employed to shape the flange which terminates in a rolled hoop or bead section 41. Since adequate material is available at the corners of the container to permit such a flange shape, this container modification is preferred, in view of the stability provided by the rolled flange. A finished container of this type is shown in FIG. 8 and is well adapted for the fitting of a tear strip type of cover thereon, a method and apparatus for closing the same being well known in the art. It will be understood that when the bead 41 is formed at the corners of the container more than one layer of the blank will be formed into a bead, as explained above with reference to the four tri-ply reinforced points in each corner of the container.

In FIG. 9 is shown an alternate flange arrangement having bead section 42 and shoulder 43. Resting on the bead is a loosely fitting cover 44, having a recessed portion 46 and an outward and downwardly turned flange 45. As is seen in FIG. 9, bead 42 extends above as well as below the adjoining portion of the container, which initially keeps the cover from mating fully with the container. When the cover is closed by conventional equipment into a shape where its uppermost portion is on a level with the adjoining portion of the container such action, in effect, extends the container outwardly and forms a tight seal when the cover is closed thereabout. Flange 45 of the cover is initially extending outwardly so that it will be easily seated into proper position on the container. When it is in a closed position recess 46 rests on the shoulder 43. This recess in the cover permits great lateral stability and reinforces the closed container from being crushed inwardly. Additionally, it may be noted that the edge of the cover is in a higher plane than the center portion of the cover. The container and cover are designed in such a manner that the bottom periphery of the container will stack on top of the cover and be prevented from sliding off because of the outer portion of the cover being elevated to form a ridge.

Although I prefer to employ three major panels at each corner, any uneven number of major panels of a greater number than two, each having a minor wing panel attached thereto, can be used without departing from the invention, provided that the panels provide a reinforced and continuous flange.

Having thus described the invention and having illustrated certain preferred forms of the same, it is not intended to limit the scope of my invention necessarily thereto. On the contrary, such variations as may be employed by those skilled in the art are intended to be included in the scope of the following claim.

What I claim as new and desire to secure by Letters Patent of the United States is:

A reinforced container made of aluminum foil and having a bottom and at least three upstanding sides integral with said bottom, the upper ends of said sides having laterally projecting integral rim portions, and for each adjacent pair of sides a corner made of a series of triangular panels comprising alternating major and minor panels, all of said panels and the corresponding ends of said pair of sides being delineated by radial fold lines converging at a common apex slightly above said bottom and said bottom having a rounded edge below said apex, said fold lines extending upward from said apex to the edge of the container, the major and minor panels defining an arcuate corner and defining at their upper edges a laterally projecting integral rim continuation of the rim portions on said side walls, giving a continuous rim reinforcing the container, said foil in said rim being continuous throughout the periphery of the

rim, the first and last panels of said series of panels being minor panels integral with said pair of sides and an uneven number of at least three of the panels in said series of panels being major panels alternating with intermediate minor panels, two of said major panels and the minor first and last panels of said series overlying said pair of sides to the extent of said first and last panels of said series, thus affording three-ply reinforcing struts at the ends of said corner and at the ends of said pair of sides, and at least one of said major panels in the series overlapping two adjacent major panels of the series to the extent of intermediate alternate minor panels, thus forming with said intermediate minor panels two corner reinforcing struts of three-ply thickness intermediate the three-ply struts at the ends of the corner and corresponding pair of sides.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

|           |            |               |
|-----------|------------|---------------|
| 501,248   | Hillson    | July 11, 1893 |
| 672,275   | Leighton   | Apr. 16, 1901 |
| 927,538   | Hothersall | July 13, 1909 |
| 1,304,740 | Carpenter  | Mar. 27, 1919 |
| 2,669,914 | Swaine     | Feb. 23, 1954 |
| 2,673,003 | Stewart    | Mar. 23, 1954 |
| 2,777,601 | Cheeley    | Jan. 15, 1957 |

##### FOREIGN PATENTS

|         |               |               |
|---------|---------------|---------------|
| 103,316 | Australia     | June 20, 1936 |
| 703,351 | Great Britain | Feb. 3, 1954  |