May 22, 1962 M. C. PRESNICK 3,035,735

BOX

Filed March 12, 1958 2 Sheets-Sheet 1

FIG. 1

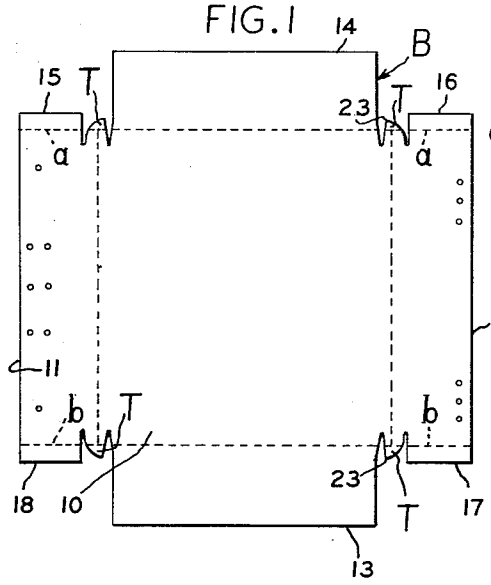


FIG. 2

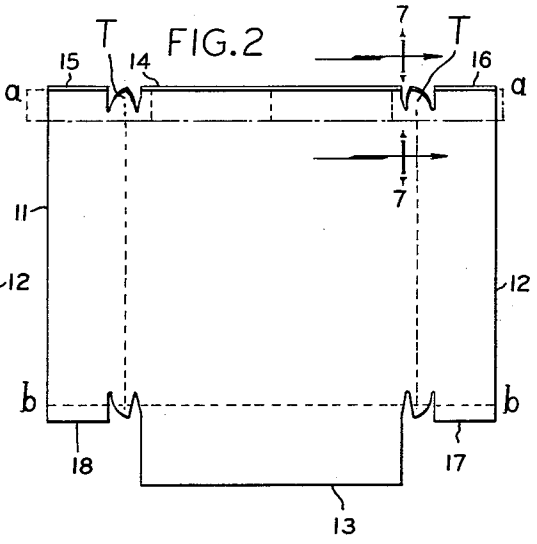


FIG. 3

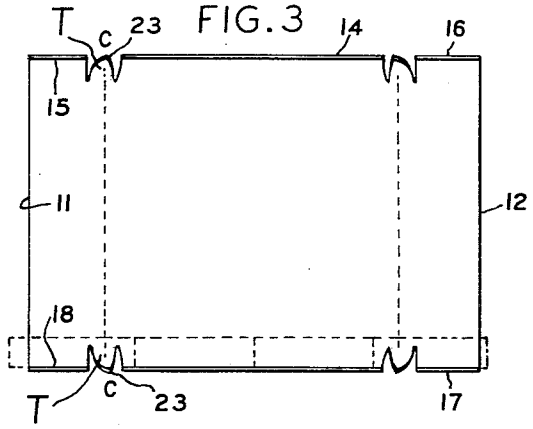


FIG. 4

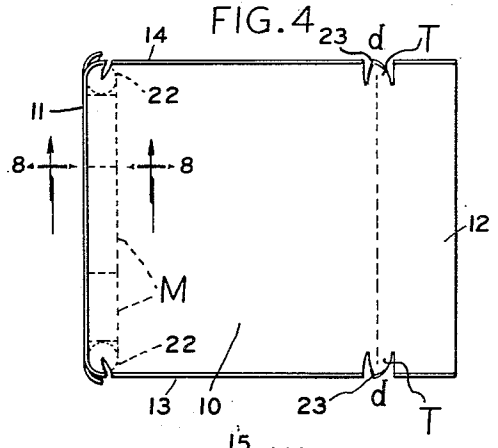


FIG. 5

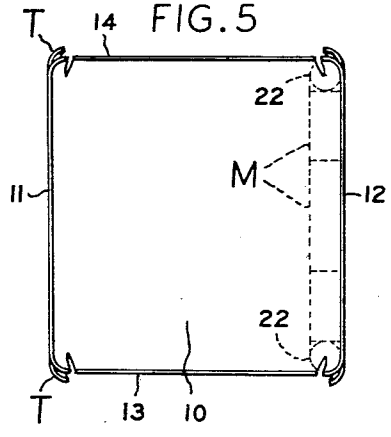
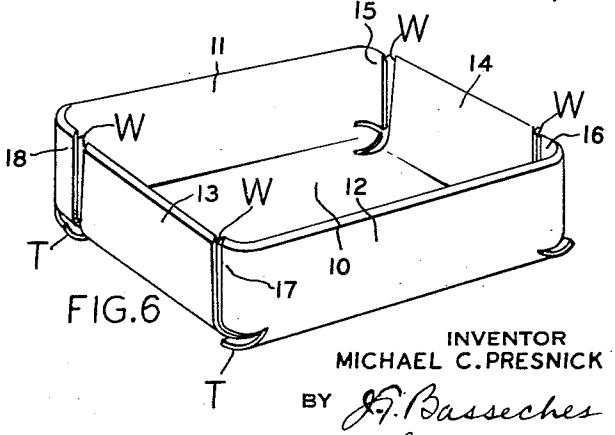


FIG. 6



INVENTOR
MICHAEL C. PRESNICK
BY J. F. Basseches
his ATTORNEY

May 22, 1962 M. C. PRESNICK 3,035,735

BOX

Filed March 12, 1958 2 Sheets-Sheet 2

FIG.7

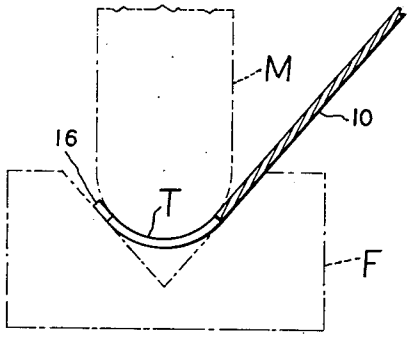


FIG.8

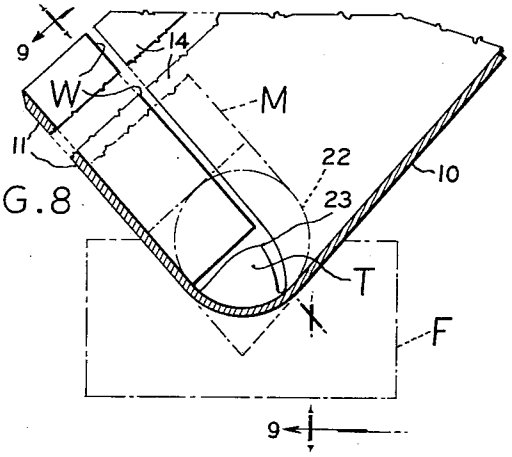
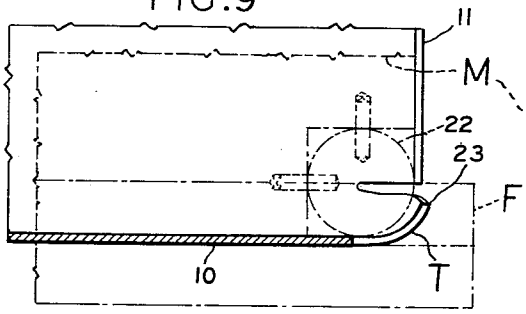
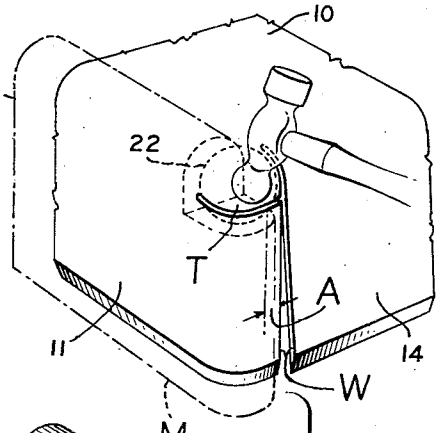


FIG.9





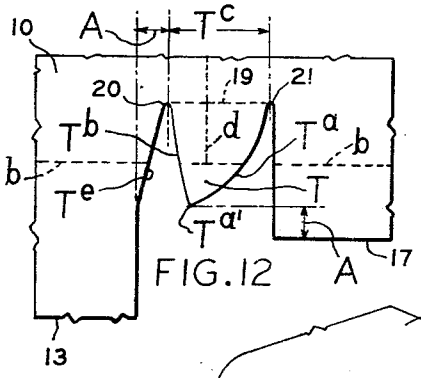


FIG.12

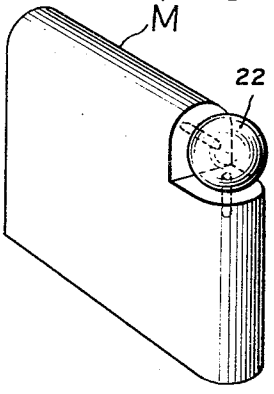


FIG.10

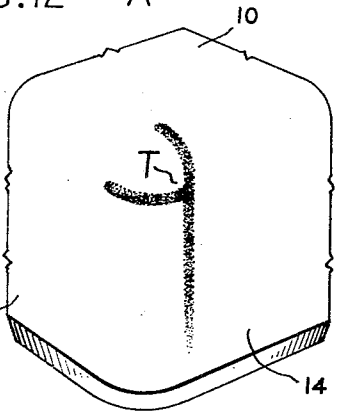


FIG.11

INVENTOR
MICHAEL C. PRESNICK

BY J. F. Bassuches
his ATTORNEY

United States Patent Office 3,035,735 Patented May 22, 1962

3,035,735

BOX

Michael C. Presnick, 150—20 71st Ave., Flushing, N.Y.

Filed Mar. 12, 1958, Ser. No. 720,868
2 Claims. (Cl. 220—62)

This invention relates to cases, and more particularly to polygonal cases made from sheet metal, and still more particularly to the provision of cases in which the corners thereof are substantially spheroidally formed or comprise a spherical angle.

My invention has as its objective the production of polygonal cases from sheeting, such as sheet metal, in which the corners have the segments of a substantially spherical angle and to perform the operation for making the corners without the expense incident to using drawing dies.

The incidence of making cases of rectangular outline with rounded or spheroidal corners heretofore practiced involved furnishing the trade with predetermined sizes of such cases. Due to the unusually high cost of drawing dies, this not only placed a limitation upon the sizes of cases which might be furnished but limited the selection of the sheeting material which might be employed as the sheeting selected must be responsive to shaping by the series of steps employed in using drawing dies. Limitations and shortcomings other than providing a restricted dimensional outline of case will be apparent to those skilled in the art, among such disadvantages being the high cost of finishing operations of blanks initially formed by drawing dies.

Known to me is the provision of a blank for making cases by bending dies in which the blank of which the box member is made consists of a polygonal sheet having side wall forming panels and end wall forming panels, joined to a bottom or top forming wall, in which the end walls and side walls are of rectangular outline, with the contiguous edges thereof arranged to meet in the box to be formed, and having intermediate the continuous edges a triangular tongue in which the base of the triangle is outlined by notches whereby, upon bending of the end and side walls in a plane normal to the bottom or top wall, an open top box or case member will be formed, and where the fold line is rounded, will supply a corner segment to complete the spheroidal corner of the box at the meeting edges of the end walls, side walls and bottom or top wall.

In such last described construction, the sequence of operation for uniting the edges of the side wall panels and end wall panels entailed a butt joint welding operation which extended to edges defined by the perimeter of the end wall, the side wall, the triangular tongue and the notches defining the triangular tongue.

Not only is the operation of welding as described unnecessarily expensive, but results in a weakened corner due to the crystalline nature of the weld which extends over substantially the entire triangular outline of the tongue.

Resort to the expensive operation of welding both the side edges of the triangular tongues and the notches, notwithstanding the weakened structure is attributable to the series of steps, including the use of bending dies applied to the triangular tongues to extend the bending stress against the base of the triangular tongue and to utilize the axis normal to the base running through the apex of the triangle as the direction of the first bending operation.

Without freeing the corner of the base of the triangle, little or no shaping of the apex of the triangle is believed to occur, particularly when employing sheet metal of a composition which is chosen for its physical characteristics of rigidity in the final product and retention of malleability for forming operations.

I have found that economies may be effected in the production of a box construction by bending dies, and to successfully form these cases or boxes from sheet metal into rectangular outline, with spheroidal or parti-spheroidal corner constructions, by a sequence of steps which initially effects the shaping of the substantially triangular segments which constitute the parti-spheroidal corner, which includes initially shaping the corner segment in substantially parallelism to the base of the triangular segment so that the unsupported apex is first shaped, and follow the same by the shaping operation in the transverse plane along a fold line which projects the apex of the segment into the second plane and forms an initially shaped segment.

Such sequence of operation in accordance with my invention reduces the extensiveness of the butt-joint welding operation which must be performed and provides a structure in which the segments is defined by a minimum of welding area.

Also, such operation does not place undue limitation upon the nature and thickness of the sheet metal to be formed, and involves the use of bending dies and pressures effecting substantial economies.

Accordingly, it is an object of this invention to provide cases or boxes as described which may be fabricated without the use of expensive drawing dies. A further object of this invention is to provide cases or boxes of the type described having spherical corners with increased resistance to wear and increased structural strength by reason of substantially reduced welded areas compared with boxes heretofore known.

Still another object of this invention is to provide a method for making cases or boxes of the type described wherein triangular tongues on the original blank may be shaped to define spheroidal corners in the finished blank in the course of the same operations by which the side and end walls of the box are formed.

A further object of this invention is to provide a method for shaping metallic blanks having integral, substantially triangular tongues, into a box or case of the type described, without the use of drawing dies, the steps incident to forming the end and side walls of the box or case at the same time serving to form spheroidal corner portions of the integral tongues.

Still a further object of this invention is to provide a method of forming a case or box of the type described from a blank, including integral tongue portions substantially triangular in shape, one entire side portion of said triangular tongue being integral with the sheet.

To attain these objects and such further objects as may appear herein or be hereinafter pointed out, I make reference to the accompanying drawing, forming a part hereof, in which—

FIGURE 1 is a plan view of a blank for making a box or case in accordance with my invention;

FIGURE 2 is a plan view of a blank after performance of an initial forming operation;

FIGURE 3 is a plan view of a blank after performance of a further forming operation;

FIGURE 4 is a plan view of a blank after performance of still a further forming operation;

FIGURE 5 is a plan view of a blank after performance of still a further forming operation;

FIGURE 6 is a perspective view of a box or case in an intermediate stage of assembly;

FIGURE 7 is a magnified section taken on the line 7—7 of FIGURE 2;

FIGURE 8 is a magnified section taken on the line 8—8 of FIGURE 4;

FIGURE 9 is a magnified section taken on the line 9—9 of FIGURE 8;

FIGURE 10 is a perspective view illustrating a finishing operation of a corner of a box or case in accordance with my invention, and also the die employed for forming the said corner;

FIGURE 11 is a magnified perspective view illustrating details of the weld configurations;

FIGURE 12 is a magnified view of a corner of a blank in accordance with my invention.

In accordance with my invention, I provide a blank B of sheeted metal. The blank includes a central, substantially rectangular portion **10** which eventually will form the bottom (or top) of the case or box, a pair of side panels or walls **11**, **12**, and end panels **13**, **14**, which panels will form, respectively, the side and end walls of the finished case or box. The side panels are provided at their ends with extensions **15**, **16**, **17**, **18**, for purposes which will appear hereafter. The side panels are additionally provided with generally triangular segments or tongues T, interposed in the corners of the blank between the side and end panels.

The tongues T (see FIGURE 12) while generally substantially spherical triangles, have their sides T*a* and T*b* outlined by radii having differing lengths, and these vary as the radius of the cylinder for the corners changes. The extent of the extensions A beyond the apex T*a'* is equivalent to the wraparound beyond the point of tangency of the cylinder to the contiguous wall. The integral base T*c* is offset from the edge of the end wall by approximately the distance A, and defines the angular edge T*e*. Arcs T*a* and T*b* are developed to provide lengths substantially equal to the contiguous sides after the complete bending operation.

The preferred form, as illustrated, contributes to the optimum results in the bending and subsequent welding operations, especially if the overhanging apex of the triangle is extended in the direction of the extensions **15**, **16**, **17** and **18**, and not transverse to these extensions.

The sequential order of carrying out the steps incident to forming a blank into a finished case or box has been determined to be critical to successful fabrication, particular importance being attached to the order in which the side and end walls or panels are bent to the upright position. All right angular bending operations have been carried out through the use of conventional bending dies (see FIGURE 7), the male die M, having a generally semi-cylindrical pressure area, and the female die F, having an angular cross section, preferably in the neighborhood of 84°. The dies are preferably of the laterally extensible type, to provide greater versatility in the size of boxes which may be fabricated.

The initial operation is carried out by bending the side panel **14**, extensions **15** and **16** and tongues or segments T along the bending line *a*—*a* (see FIGURE 2) until it is normal to the blank B. It is important to note that the first bending line *a*—*a* lies substantially across the segments or tongues T in a line substantially parallel with the base **19** of the triangular segments as defined by the points **20**, **21**. By reason of the nature of the dies (see FIGURE 7), a parti-cylindrical bend is produced along the line *a*—*a*.

In like manner, the end panel **10**, extensions **17** and **18** and tongues are next bent about the bending line *b*—*b* (see FIGURE 2) to the position shown in FIGURE 3.

The partially formed blank of FIGURE 3 is next bent to form the side walls, the bend being effected along the line *c*—*c* to position the side panel **11** and parts carried thereby in a plane normal to the blank B.

Bending along the line *c*—*c* is effected through the use of a bending die as shown in FIGURE 10, which has spherical end pieces **22**. It should be noted that the die for forming the bend along the line *c*—*c*, the end pieces **22**, and the die performing the bend along the lines *a*—*a* and *b*—*b* all have the same radius of curvature, thereby

assuring that each of the bends forming the box will be parti-cylindrical in configuration and will have uniform radii of curvature.

It will be readily recognized that upon forming the bend along the lines *c*—*c* with a die as illustrated in phantom in FIGURE 4, the segments or tongues T will be formed about the pieces **22** to assume a parti-spherical configuration.

The partially formed blank as shown in FIGURE 4 is, in like manner, bent along the line *d*—*d* to assume the configuration shown in FIGURE 5, and in perspective in FIGURE 6.

It should be noted that the bending lines *c*—*c* and *d*—*d* intersect the bases of the tongues T substantially normal to the said bases and merge in close proximity to the apices **23** of the said tongues.

As will be seen from FIGURE 6, the extensions **15**, **16**, **17** and **18** will each lie closely adjacent a side marginal edge of end panels **13** and **14**. I have determined that by welding the extensions to the end panels prior to forming the tongues T, into close adjacency with the corner defining portions of the walls, the latter operation may be performed with considerably greater expediency. Accordingly, the partially completed box, as shown in FIGURE 6, is next welded along corner lines W in a manner assuring intimate contact of the welded marginal edges with the corners welded as aforesaid. The tongues T may be peened or otherwise bent into close adjacency with the junctions of the bottom, side and end walls and may then be welded in such closely adjacent position (see FIGURE 11).

The welded portions may be ground flush with the surface of the box, to enhance the appearance thereof.

The thus completed box will have a great deal of structural rigidity as compared with boxes of this type heretofore known also employing spherical corners, by reason of the fact that no drawing and consequent reduction of the thickness of the sheet is employed in the formation thereof. Furthermore, the use of integral tongue members has been made available by reason of the novel series of steps which permits formation of the said members into parti-spherical corners without requiring the use of notches or cutouts surrounding the base of the essentially triangular segments. The use of triangular segments for the formation of the corners, which segments include a base portion entirely connected to the original blank, greatly augments the structural rigidity and resistance to wear of my completed assembly since the weld area necessary to seal a corner of my box is greatly reduced in size as compared with structures heretofore known.

The terms "bending" and "bent" as employed in the claims are intended to refer to a linear operation effected by bending dies in which the male die has a generally semicylindrical pressure area and the female die has a generally angular cross-section, as distinguished from drawing dies which form the metal being shaped into three dimensional directions to effect a contouring from a plane surface.

Furthermore, the welding operation is simplified since each corner may be sealed by two essentially linear welds rather than requiring the use of intricate weld patterns as heretofore employed.

By the procedure of first welding together the edge of the extension of the side panel and the edge of the end panel, enough heat is transferred to the triangular tongue to anneal it and make this material more workable. This expedient is particularly effective in connection with some aluminum alloys which are chosen for their rigidity.

Having thus described by invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is:

1. A heavy gauge sheet metal blank for forming a case comprising a substantially rectangular sheet, intersecting lines of fold defining a rectangular bottom panel and the base of opposed end panels and opposed side

panels, the end panels lying within the extension of the lines defining the base of the side panels and the side panels having portions at the ends thereof traversed by the extensions of the lines forming the base of the end panels, spaced notches formed in the blank at each corner thereof between the ends of the side and end panels defining triangular tongues, each of said tongues being traversed by both said lines of fold defining the base of the adjacent side and end panels and extending outwardly in a direction traverse to the line of fold defining the base of the adjacent end panel, whereby each end of the blank has a pair of tongues extending outwardly in the same direction as the end panels.

2. A blank in accordance with claim 1 wherein the side edges of the triangular tongues are arcuate on one side edge and rectilinear on the other side edge thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

305,710	Patton	Sept. 23, 1884
537,119	Levy	Apr. 9, 1895
1,929,742	Hedlund	Oct. 10, 1933
2,695,728	Wahl	Nov. 30, 1954