Aug. 30, 1949. J. A. ZINN, JR 2,480,176

METHOD OF ASSEMBLING CONTAINERS

Filed Aug. 23, 1945

3 Sheets-Sheet 1

Fig. 1

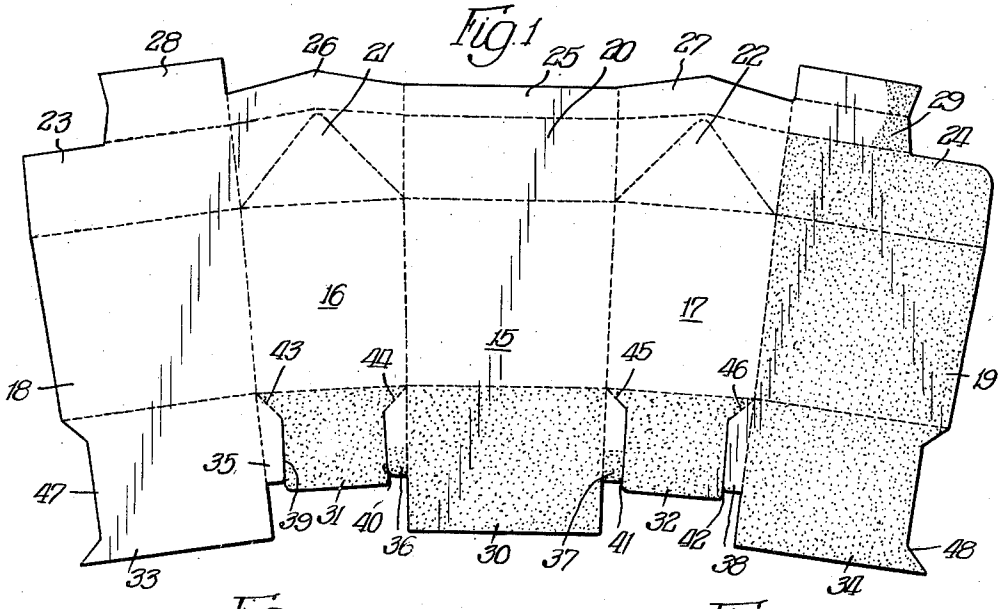


Fig. 2

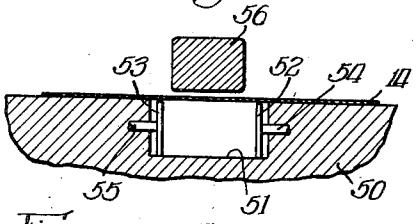


Fig. 3

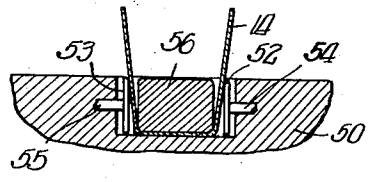


Fig. 4

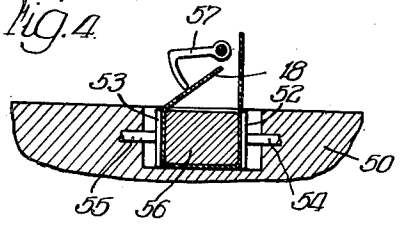


Fig. 5

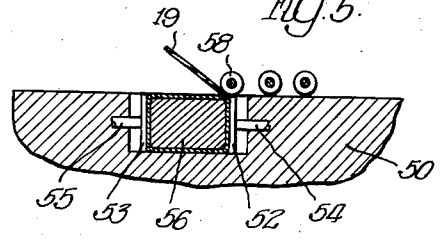
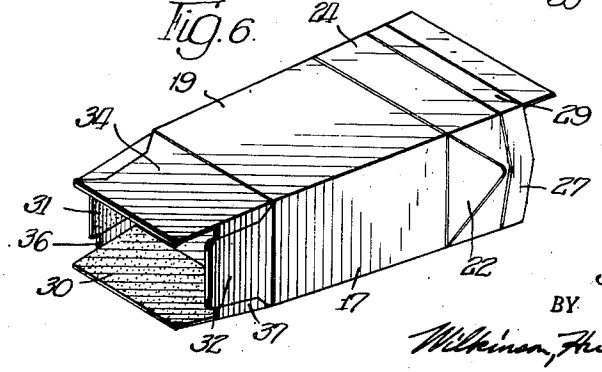


Fig. 6



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Fig. 7.

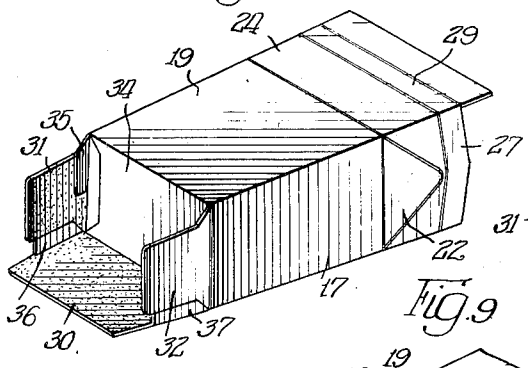


Fig. 8.

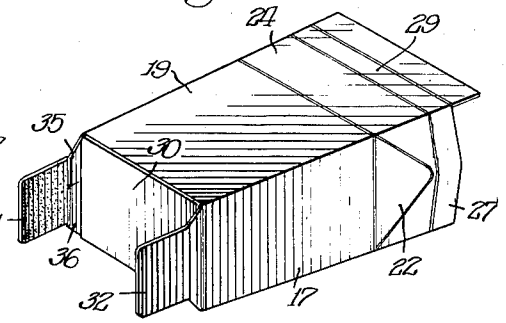


Fig. 9.

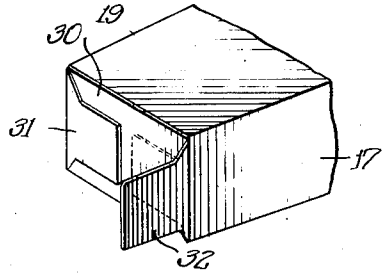


Fig. 10.

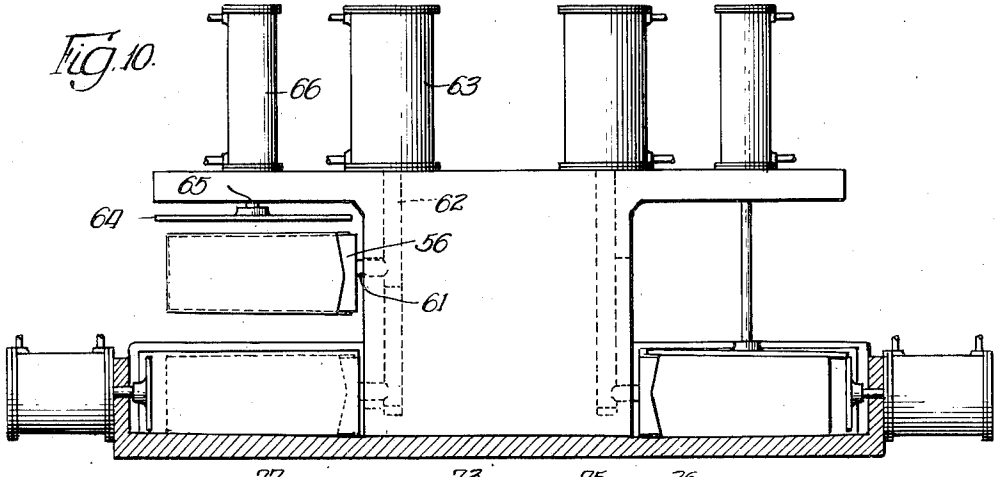


Fig. 11.

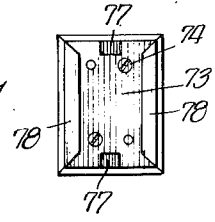
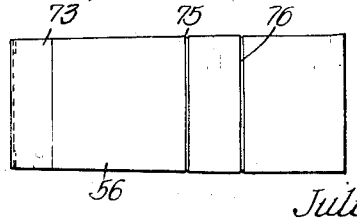


Fig. 12.



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METHOD OF ASSEMBLING CONTAINERS

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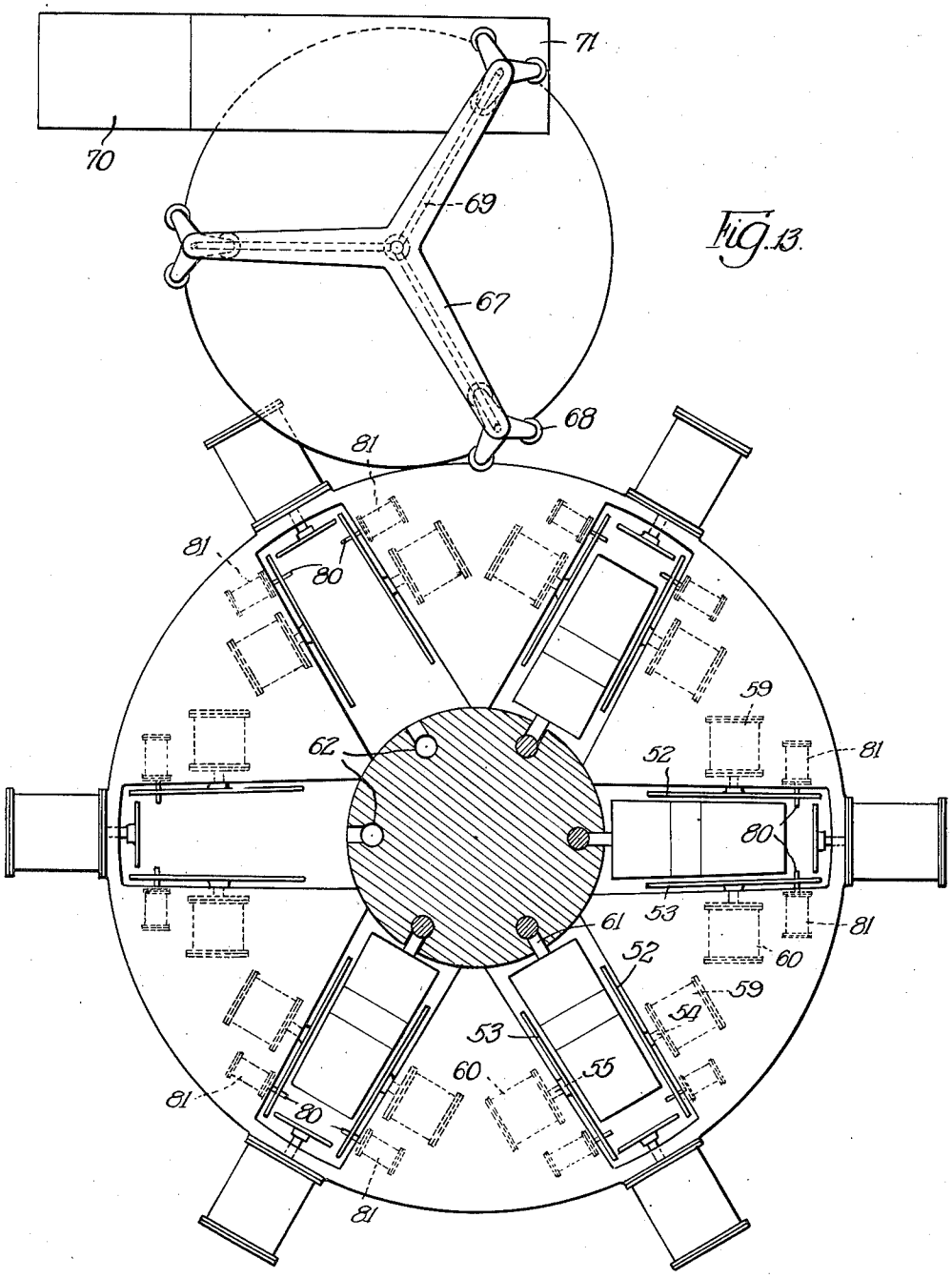


Fig. 13.

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UNITED STATES PATENT OFFICE

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METHOD OF ASSEMBLING CONTAINERS

Julius A. Zinn, Jr., Belmont, Mass.

Application August 23, 1945, Serial No. 612,177

8 Claims. (Cl. 93—44.1)

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This invention relates to a new and improved method of assembling or forming cartons, pails or boxes formed of sheet material such as cardboard or the like and more particularly to a method of this character in which the cartons are firmly and positively formed to exact size and shape.

While my improved method may be used with other types of cartons or containers, it is especially adapted for use with the carton disclosed in my prior Patent Number 2,358,124, issued September 12, 1944, for a Carton.

Cartons of this type are especially designed for carrying liquids or finely divided material and to be satisfactory must be absolutely leakproof. This means that all seams must be positively and completely closed without air bells and the bottom must be firmly closed to force the portions into intimate contact to make, in effect, a unitary, multiple layer bottom.

Further the carton must be accurately sized with all corners and seams formed to exact dimensions both to insure a water-tight closure and to provide a container of predetermined capacity.

It is also important that surfaces be flat and free from bulges or projections to prevent damage to containers due to hooking adjacent containers or other objects when packed or stacked closely together.

It has been found in repeated tests that these results can be achieved only if all four sides of the carton are firmly held against a mandrel or other solid support at the time the multi-layer bottom is closed and compressed against the mandrel in the final forming operation.

These cartons are particularly adapted to use to replace glass milk bottles although they may be used for other purposes. Containers for milk are used daily in large quantities and for practical reasons of shipment and storage areas they should often be assembled or shaped immediately before filling. Assembled containers require large shipping and storage areas, while containers shipped in the flat form very materially reduce these requirements. Containers shipped and stored in the flat may also be more conveniently and efficiently maintained in the completely sanitary condition required of food containers.

It is an object of the present invention to provide a new and improved method of forming containers from flat blanks.

It is an additional object to provide a method of this character in which the blanks are positively held on a mandrel at the time that the bottom is closed and formed or is applied to the carton.

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It is a further object to provide a method in which the blank is held positively against the mandrel on all four sides at the time the bottom is formed.

It is also an object to provide a method especially adapted for use with blanks from which the bottom is formed by means of a plurality of overlapping flaps compressed to form a multilayer bottom of uniform thickness substantially throughout its area.

It is another object to provide a method adapted to form the containers rapidly and efficiently upon continuously operating machines whereby the method is adapted for commercial use.

Other and further objects will appear as the description proceeds.

While my improved method may be carried out upon various types of machines, I have shown certain forms of machines adapted for this purpose by way of example. The machines are shown somewhat diagrammatically in the accompanying drawings in which—

Figure 1 is a plan view of a blank used in making one form of container adapted to be folded and sealed by the method of the present invention.

Figures 2, 3, 4 and 5 are diagrammatic figures showing apparatus for folding and sealing the side seams in a blank and steps in the method.

Figure 6 is a perspective view showing the blank after the side seam has been closed.

Figure 7 is a view similar to Figure 6 showing the partly formed blank with one side flap folded down.

Figure 8 is a view similar to Figure 7 showing the second side flap folded down.

Figure 9 is a fragmentary perspective showing one end flap folded down upon the side flap.

Figure 10 is an elevation, partly in section, showing diagrammatically one form of apparatus for holding the blank.

Figure 11 is an end view of the mandrel of Figure 10.

Figure 12 is a plan view of the mandrel of Figure 10, and

Figure 13 is a diagrammatic plan view of the apparatus of Figure 10 with feeding apparatus added thereto.

Referring first to the blank shown in Figures 1 and 6 to 9 inclusive, this blank is similar to that disclosed in my prior application for Carton,

Serial Number 426,795, filed January 15, 1942. The blank comprises a side wall panel 15 and end wall panels 16 and 17. It further shows side wall panels 18 and 19 arranged to be adhesively joined to form a side wall panel of double thickness, having a relatively wide seam and with the finished wall being of the same external dimensions as the side wall 15. The top closing portion of the blank similarly comprises a side top portion 20, end top portions 21 and 22 and overlapping side top portions 23 and 24. In addition the top portions 20 to 24 inclusive, are provided with the top closure portions 25, 26, 27, 28 and 29, respectively.

The bottom closing portion of the blank comprises a side flap member 30, end flap members 31 and 32 and overlapping side flap portions 33 and 34, adapted to be adhesively joined to form a single side flap member. As shown herein the side flap members 31 and 32 are each provided with integral wing portions 35 and 36 for end flap 31, and 37 and 38 for end flap 32. These side flap members are formed from portions of the end flap members 31 and 32, respectively, by slits 39, 40, 41 and 42, respectively, cut in the latter, such slits extending down to diagonal score lines 43, 44, 45 and 46, respectively, as clearly shown in Figure 1. The overlapping end flap members 33 and 34 are provided with cut-away portions 47 and 48, respectively, so that when these two portions are adhesively secured together they present portions at their end of the double bottom flap which are of single thickness. These cut-away portions each are substantially equal in area to a pair of wing portions such as 35 and 36 when these wing portions are folded against the end portion such as 31 in the folding of the carton. Thus when the bottom is completely closed it presents a multi-layered, stiff bottom area of substantially uniform thickness.

It will be noted in Figure 1 that the side wall panel 19 and its associated top and bottom closing members are indicated as being coated with a suitable adhesive. Similarly the side flap 30 and the end flaps 31 and 32 are coated with this adhesive.

The initial stages of forming the carton by closing the side seam may be carried out as indicated diagrammatically in Figures 2 to 5 inclusive. Suitable apparatus would comprise a base plate 50 having a well 51 formed therein and a pair of lateral pressure plates 52 and 53 moved by rods 54 and 55 respectively. These rods may be operated by any desirable mechanism which forms no part of the present invention and need not be further described.

The mandrel 56 is located in alignment with the well 51 and may be reciprocated from a position above the well into a position pressing the blank against the bottom of the well by any suitable mechanism.

In addition, as shown in Figure 4, kicker 57 is provided to close down the inner of the over-lapping side wall, as wall 18 of Figure 1.

In Figure 5 a series of rollers 58 are shown for rolling down side wall portion 19 of the blank of Figure 1.

In carrying out this portion of the process according to the apparatus shown diagrammatically, the blank 14 is deposited by suitable means upon the plate 50 properly located in registration with the well 51 as shown in Figure 2. The mandrel 56 is moved downwardly forcing the blank 14 to the form shown in Figure 3, the mandrel being in proper registration so as to force the body member 15 and associated top and bottom closures against the bottom of the well with the remaining portions of the blank extending upwardly. The plates 52 and 53 are next forced inwardly to force the end portions of the blank 16 and 17 firmly and positively against the sides of the mandrel 56. The kicker 57 then folds down the portion 18 of the blank with its connected top and bottom closure portions against the upper surface of the mandrel 56. Finally, the portion 19 of the blank has its adhesive coated surface pressed firmly against the outer surface of the portion 18 by the rollers 58 which are rolled across the blank as it is folded about the mandrel. These steps in the method of forming and assembling the blank result in a seamed and set-up blank as shown in perspective in Figure 6.

A general assembly of a suitable form of apparatus is shown in Figures 10 and 13, this apparatus including six such wells as have been described, each with its associated mandrels and side and bottom plates. In this diagrammatic showing the side pressure plates 52 and 53 are shown as operated by fluid pressure cylinders 59 and 60 which move the rods 54 and 55. The mandrels 56 are shown as carried by rods 61 connected to plungers 62 operated by fluid pressure cylinders 63. Each well and mandrel assembly is provided with a top pressure plate 64 operated by rod 65 which is actuated by the fluid pressure cylinder 66. In the drawings of Figures 10 and 13, which are somewhat diagrammatic, tucking bars 80 having been shown, extending through openings in the pressure plates 52 and 53. These bars are actuated by cylinders 81. The blanks are fed to the apparatus by means of a feeding device such as shown in Figure 13, which comprises three arms 67 each provided with suction members 68 through which suction may be created and released as desired through tube 69 carried by the arms. The arms rotate about their common axis, and may be timed so as to have a peripheral speed identical with the speed of rotation of the forming table carrying the mandrel and pressure plates. The blanks may be fed to the feeding arms by any known adhesive coating apparatus indicated by the block 70 along a feed table 71. The feed along the table 71 may proximate the speed of the speed of movement of the arms 67 so that the blanks may be continuously picked up by the suction device carried by the arms. Suitable kickers or tucking mechanism are provided for folding the bottom closure flaps in the sequence indicated in Figures 7, 8 and 9. These include the tucking bars 80 or equivalent mechanism of known type. It will be understood that similar means will be provided acting upwardly and downwardly, but since the present invention relates to the method rather than the apparatus they have been omitted from the drawing for the sake of simplicity.

The double bottom flap formed by over-lapping members 33 and 34 is first folded down as shown in Figure 7. This carries with it the integral wing portions 35 and 38 which engage their related end bottom flaps 31 and 32 and are secured thereto by the adhesive thereon. The end flap 30 is next folded upwardly as shown in Figure 8 carrying with it its related wing portions 36 and 37, which are similarly secured to the end flaps 31 and 32. The final step in forming the bottom consists in folding over the flaps 31 and 32 as indicated in Figure 9, the integral wing portions being folded with them. It will be noted that

these wing portions thus seal the thickness area which has been left by the cut-away portions 47 and 48 in bottom flaps 33 and 34, which otherwise is of double thickness.

The mandrel as shown in detail in Figures 11 and 12, may be provided with a removable end portion 73 held in place by the bolts 74. The mandrel proper is provided with grooves 75 and 76 which coincide with the creases formed between the body portion and top closure portions of the blanks so that these creases are not destroyed or flattened out when the blank is pressed firmly against the mandrel from all sides. The mandrel end, as shown in Figure 11, may be formed with recesses 77 to allow for the double thickness where wing portions 35 and 36 and 37 and 38 over-lap for portions of their length. It may also have raised portions 78 to take care of the reduced thickness either side of flaps 31 and 32 and thus to insure a flat outer bottom surface.

It will be apparent that my improved method may be carried out mechanically and rapidly by the form of apparatus somewhat diagrammatically shown and described. It is to be understood, however, that the method is independent of the particular apparatus used and the apparatus has been disclosed merely to make clear the manner in which the method may be carried out.

The method involves the step of continuously feeding blanks to continuously moving mechanism for forming the cartons. Such a step is preferable where quantity production is desired but is not essential to the process in its broader aspects. The method more particularly involves forming the blank about a mandrel against which all four sides of the blank are positively pressed and firmly held. This assures adequate sealing without air pockets or bells at the side seam and also affords accurately and positively formed corners with flat sides and ends. This prevention of the formation of air pockets or blisters is highly important, especially in cartons used to contain liquids. Where the material to be enclosed is solid in character, the material may be preformed to the proper size and shape and the carton formed about the material, the solid material serving as the mandrel. Thus where reference is made herein to a mandrel, the term applies equally well to any solid shaped and sized to fill the container and used as a mandrel for the formation of the carton.

It is highly important in my improved method that these four sides be firmly held against the mandrel at the time that the bottom closing flaps are folded and sealed. This assures perfectly formed edges between the bottom and sides bent exactly on the score lines and without bulges of any kind upon either sides or ends. The method further provides for positively and firmly forcing the folded end flaps against the end of the mandrel at the time when all four sides are firmly held against the mandrel. This insures that the adhesive will be fully set while the corners and sides are rigidly held in proper formation. It further insures that the bottom in a blank of the form shown will be pressed to form an integrally united bottom of substantially uniform thickness throughout, such a bottom forming a substantially rigid base for the carton and with the properly formed side and end walls of the carton provides an assembled container adapted to contain liquids or finely divided materials without bulging and without leaking.

The method may be carried out mechanically at high speeds by apparatus of the types shown somewhat diagrammatically herein where the operations are continuous. It will be understood, however, that the invention can be carried out by other forms of apparatus and that the method is independent of the particular machinery used.

While I have described certain preferred ways of carrying out my improved method, it is capable of modification to meet differing conditions and requirements and I contemplate such variations as come within the spirit and scope of the appended claims.

I claim:

1. The method of assembling cartons or the like from flat blanks which comprises folding the blank around a mandrel, holding the entire side area firmly against the mandrel, thereafter forming and forcing the bottom elements of the blank against the mandrel while retaining pressure against the entire side area.

2. The method of assembling cartons or the like from flat blanks which comprises folding the blank around a mandrel, overlapping blank portions on the side of the mandrel and forming an adhesive secured seam, holding the entire side area firmly against the mandrel, thereafter forming and forcing the bottom elements of the blank against the mandrel while retaining pressure on the entire side area.

3. The method of assembling cartons or the like from flat blanks which comprises folding the blank around a mandrel, holding all four sides firmly against the mandrel, thereafter forming the bottom by folding and overlapping flaps of the blank against the bottom of the mandrel, and forcing the formed bottom against the mandrel while retaining pressure on all four sides.

4. The method of assembling cartons or the like from flat blanks which comprises folding the blank around a mandrel, overlapping blank portions on one side of the mandrel and forming an adhesive secured seam, holding all four sides firmly against the mandrel, thereafter forming the bottom by folding and overlapping flaps of the blank against the bottom of the mandrel, and forcing the formed bottom against the mandrel while retaining pressure on all four sides.

5. The method of assembling and forming cartons or the like from flat blanks which comprises folding the blank to provide an open ended structure, sealing overlapping portions of the blank to form a seam, firmly supporting the interior of the blank which means conforming to the finished interior contour and size of the carton, forcing substantially the entire area of each of the four walls of the blank against the supporting means, folding bottom forming flaps of the blank against the supporting means and applying pressure against substantially the entire area of said bottom while maintaining pressure against all said four walls.

6. The method of assembling and forming cartons or the like from flat blanks which comprises feeding blanks consecutively to a plurality of forming mandrels as said mandrels move past a feed point, progressively forming the blanks upon said mandrels by folding the lateral walls of the blank about the mandrel, forcing and holding said walls against the mandrel, forming and forcing the bottom elements of the blank against the mandrel while the walls are held against the mandrel, removing the formed carton from the mandrel and returning the mandrel to the feeding point.

7. The method of assembling and forming cartons or the like from flat blanks which comprises

feeding blanks consecutively to a plurality of forming mandrels as said mandrels move past a feed point, progressively forming the blanks upon said mandrels by folding the lateral walls of the blank about the mandrel, forcing and holding said walls against the mandrel, forming and forcing the bottom elements of the blank against the mandrel while the walls are held against the mandrel, removing the formed carton from the mandrel and returning the mandrel to the feeding point, the mandrels moving continuously throughout the process.

8. The method of assembling and forming cartons or the like from flat blanks which comprises feeding blanks consecutively to a plurality of forming mandrels as said mandrels move past a feed point, progressively forming the blanks upon said mandrels by folding the lateral walls of the blank about the mandrel, forcing and holding said walls against the mandrel, forming and forcing the bottom elements of the blank against the mandrel while the walls are held against the mandrel, removing the formed carton from the mandrel and returning the mandrel to the feeding point, the mandrels moving continuously throughout the process and the blanks being fed to the mandrels while said blanks are moving at substantially the speed of the mandrels.

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The following references are of record in the file of this patent:

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Certificate of Correction

Patent No. 2,480,176 August 30, 1949

JULIUS A. ZINN, JR.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 6, line 52, for the word "which" read *with*;

and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of January, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.