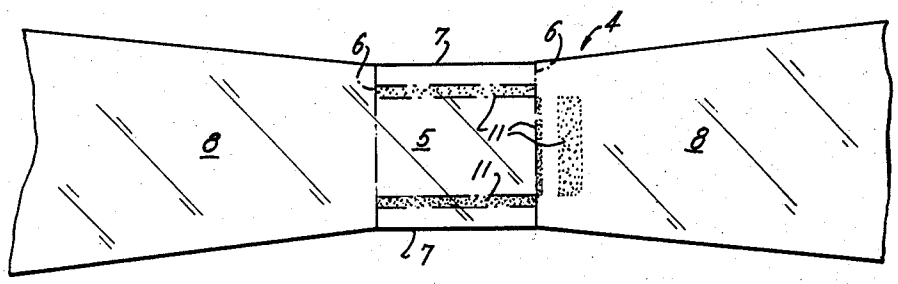
Sept. 15, 1964 G. A. MOORE 3,148,599

METHOD AND APPARATUS FOR FORMING CONTAINERS

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FIG. 1



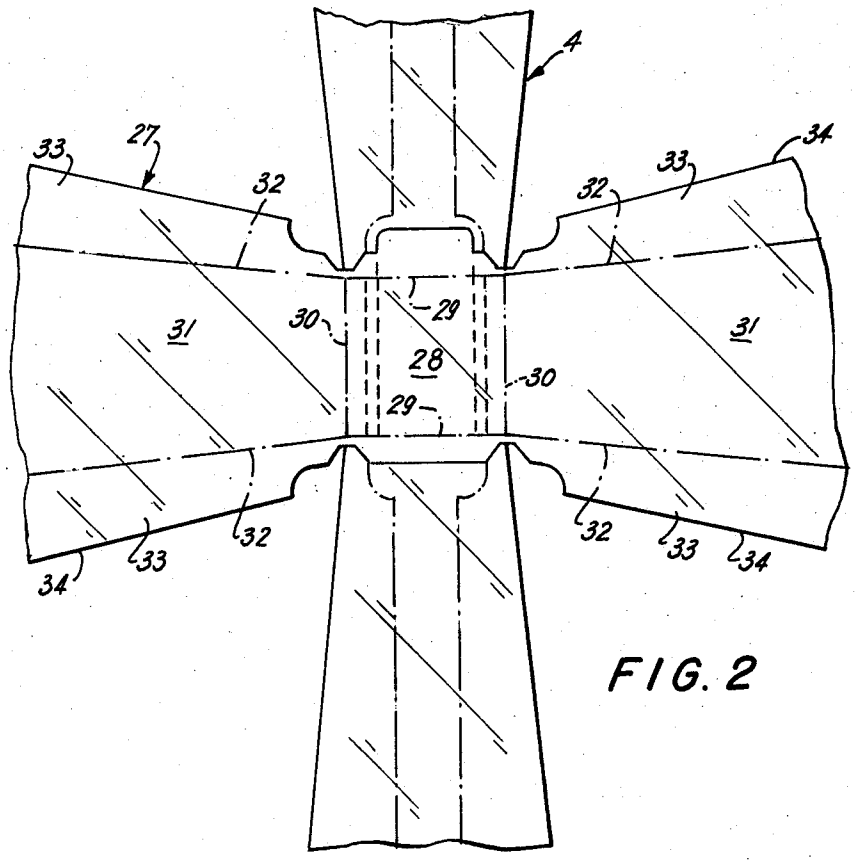


FIG. 2

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FIG. 3

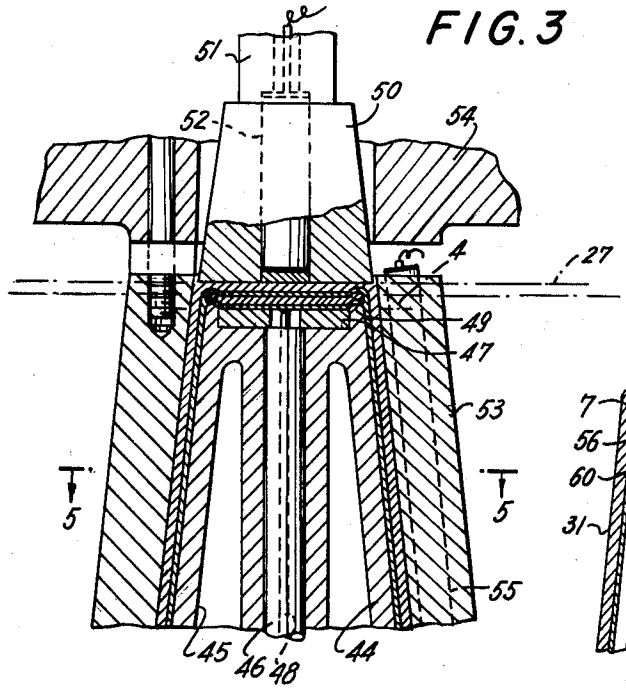


FIG. 6

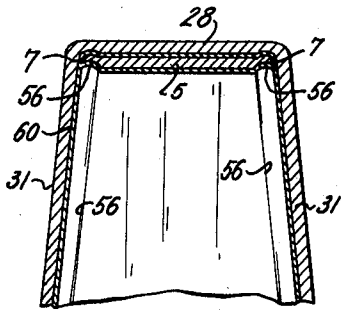


FIG. 4

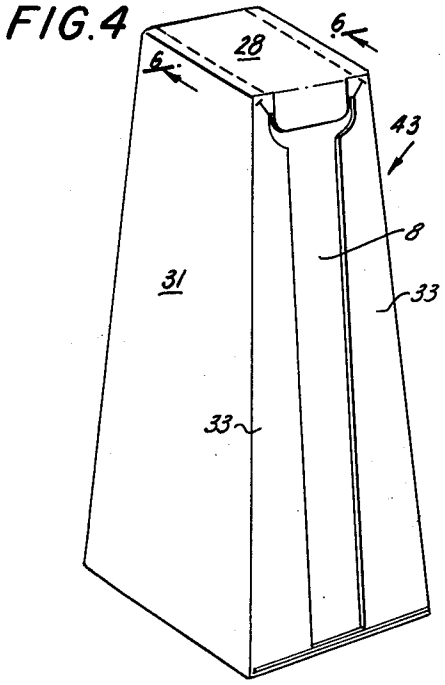


FIG. 5

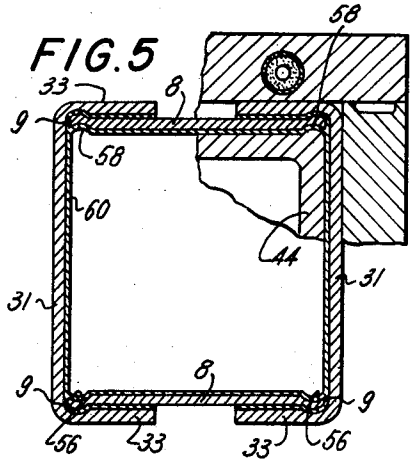
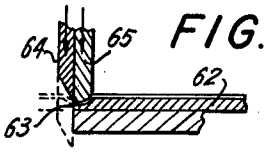


FIG. 7



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METHOD AND APPARATUS FOR FORMING CONTAINERS

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Original application Sept. 26, 1958, Ser. No. 763,747, now Patent No. 3,066,844, dated Dec. 4, 1962. Divided and this application Sept. 7, 1962, Ser. No. 222,028
9 Claims. (Cl. 93—36)

This invention relates to containers of paper board or other sheet material treated or combined on at least one face with a thermoplastic material, and more particularly to an improved method and apparatus for formation of such containers.

This application is a division of my copending application Serial No. 763,747, filed September 26, 1958, now Patent No. 3,066,844.

Many difficulties and mechanical complications have been encountered in the past in attempts to make containers of paperboard or other fibrous sheet material which are intended to hold liquids, viscous or greasy products. The difficulties are principally due to the deleterious effects on the product caused by the notorious wicking absorption therefrom through the raw cut edges of the fibrous material that invade the interior of the container structure. Attempts to coat these edges with a protective medium has met with little success due to the coarse porosity of the cut edges as well as the complications involved in the methods employed in doing so.

It is therefore a general object of the present invention to overcome these difficulties and complications by providing a novel method and apparatus for forming containers having a structure in which any wicking absorption by raw cut edges therein is avoided.

Another object of the invention is to render such raw cut edges non-wicking simultaneously while forming the complete structure of the container.

In accordance with the present method, each of the raw cut edges disposed within the container and a narrow margin adjacent thereto, are densely compressed in order to substantially reduce or eliminate the porosity of the container material in the highly compressed regions. Consequently, the tendency of the raw cut edges to absorb the product in the container is substantially eliminated. In one embodiment of the present apparatus, the dies which form the blanks into a container are specially contoured in the regions of the raw cut edges so that excess pressure is exerted on these regions. According to another embodiment, the mechanism which cuts the blanks out of the original sheet stock is adapted to compress the raw cut edges as they are produced.

Other objects and advantages of the invention will be apparent from the following description in which reference is made to the accompanying drawings. In the drawings:

FIG. 1 is a fragmentary plan view of one of the two blanks used to construct a container of the type to which the present invention relates;

FIG. 2 is fragmentary plan view of the blanks preparatory to their formation into a container;

FIG. 3 is a fragmentary view, partially in section, showing the container forming dies contoured in accordance with this invention;

FIG. 4 is a perspective view of the completed container;

FIG. 5 is a horizontal cross-sectional view on line 5—5 of FIG. 3;

FIG. 6 is a vertical cross-sectional view on line 6—6 of FIG. 4; and

FIG. 7 is a cross-sectional view showing a container blank being cut from the original sheet stock.

Referring to the drawings for further details of the

present invention, FIG. 1 shows a particular blank 4 that may be used in the construction of the container. The blank is provided with a central panel 5 separated by two parallel spaced score lines 6 and having two parallel spaced transversely disposed side cut edges 7 each of two lateral panel portions 8 having outwardly sloping side cut edges 9 extending outwardly from each of the opposed scored lines 16. The exterior surface side of the central panel 5 of the blank including one of the laterally extended panels 8 is provided with a pattern coated deposit of non-thermoplastic material such as a clear lacquer 11, for the purpose described in my above-mentioned copending application.

A primary blank is used in conjunction with the blank 4, and for purposes of illustration the blank 4 is shown in FIG. 2 crossed by the primary blank 27. This blank is provided with a central panel 28 with boundary score lines that are arranged in transversely opposite pairs 29 and 30 respectively. Panel portions 31 each extend laterally outward of each score line 30 and have outwardly sloping boundary score lines 32. Each panel 31 is provided with a pair of opposed longitudinal flanges 33 having outwardly sloped side edge portions 34.

As illustrated in FIG. 2 showing the registered assembly of blanks, it is to be noted that the prepared exterior surface of the central panel portion of the blank 4 is covered by the interior thermoplastic surface of the central panel portion of the blank 27. The container is constructed by first compressing and heating the superimposed central panel walls 5 and 28, and while kept under this compression the laterally extended panels 8 are folded downwardly and inwardly from two corner edges of the end forming panel portion 5, followed by folding the laterally extended panels 31 downwardly and inwardly while articulating their flange portions 33, so that they are brought into overlapping relationship upon the corresponding exterior surface portions of the advance folded panels 8. Heat and pressure that is imposed upon these flange portions effects the seam forming relationships more fully to be described hereinafter. The resultant container 43 is shown in FIG. 4.

FIG. 3 illustrates the dies which may be employed to form the container. One of the major parts consists of a male form member 44 having four side walls and an end wall with surfaces provided conforming in shape coincident with the container to be formed thereupon such as the container 43. The form is provided with an interior core or open space 45 through which to circulate water or other cooling fluid in order to control the temperature of the heat that is conducted into the form 44 during the operation of the apparatus. An ejector shaft 46 is provided through the center of the form and having a head plate 47, its top surface forming a major portion of the end wall of the form member, the shaft and head having a vent hole 48. The end wall surface adjacent two opposed corner edges of the male form are contoured in bead-like rib formations 49 and they project slightly outward from the flat base surface of the wall and dimensionally defined as being projected about one-third or more of the thickness of the single blank material. For example, if the thickness of blank material is .020 inch then the pair of contoured bead-like surface ribs may be projected outwardly of the flat surface approximately .006 to .003 or more, dependent upon the original calendered density of the material.

A first functional part in the apparatus is a platen head 50 that is mounted upon the end of a shaft 51 adapted to slide by actuated moving means. The head is provided with heating means such as an electrical cartridge element 52 that may be inserted or otherwise attached thereto and connected through a temperature control thermostat and to a source of electrical current supply.

The heated platen head upon being actuated by its shaft is moved into surface to surface contact with the superposed wall portion **28** of the previously registered blanks **4** and **27**, see FIG. 3, placed upon the end wall of the male form. High pressure actuated upon the top end of the shaft **51** causes the bottom surface of the head **50** to heat and compress the wall layers **5** and **28** together, the wall opposing ribs **49** on the end wall of the male form further causes the side cut edges **7** of the inner wall portion **5** to be materially reduced by concentrated pressure from its original thickness including a narrow marginal portion of its adjacent wall surface. This reduction in wall thickness offsets the densely compacted edge upwardly of its parent interior wall surface and the exterior surface of the outer wall portion **28** pressed by the head **50** remains in uniform surface plane.

Working in conjunction with the male form and platen head is a female form member **53** hereinafter referred to as a female die and having four side walls with inner surfaces of the wall cavity shaped to be coincident with the exterior of the container to be formed. The die **53** may be supported on a cross head carriage **54** that is adapted to be reciprocated in stroke movements and dwell periods by actuating mechanical means. The inner wall surfaces of the die are flatly parallel with the side wall surfaces of the male form when engaged thereupon. The die **53** is provided with electrical heating elements **55** that may be inserted into holes drilled into the walls of the die, each element being located adjacent each of the four corner ends of the side walls thereof. These heater elements are to be wire connected through a suitable temperature control thermostat to the electrical current supply line. Following the operational function of the platen head **50**, the female die **53** is caused by actuated means to move downwardly upon the outwardly extended panels of the firmly clamped central portions of the blanks **4** and **27**. The mouth of the die is arranged with a pair of opposed projected flexible prongs (not shown) that first engage the surface portions of the panels **8** of the blank **4** and bending these two panels downwardly each from a corner edge **6** of its clamped wall section and directed inwardly upon the coincident side wall surfaces of the male form **44** and followed by the bending of the panels **31** of the blank **27** from the corner edges **30** and upon the adjacent side wall surfaces of the male form by the directing action of the inner wall surfaces of the moving female die. During this action, the flanges **33** are articulated along their respective corner edges **32** and **29** in this order by the co-action of the interior wall surfaces of the die thereby placing the plastic face of the bent flanges upon the corresponding exterior surface portions of the first bent panels **8**.

The surfaces of the two opposed side walls of the male form upon which are placed the bent wall panels **8**, are provided with continued bead-like contoured projections **58** adjacent the longitudinal corner edges in the same manner as hereinbefore described for the bead-like or rib surface contours **49** disposed on the top surface of the end wall portion of the same form. These side wall corner projected ribs **58** are contacted by the inner face of the bent panels **8** and the flanges **33** of the transversely disposed panels **31** which overlap the corresponding surfaces of these panels **8** thus forming two-ply thicknesses of material over these contoured surface portions of the male form. As the heated female die nears the end of its downward movement the wedge-like taper of the inner surfaces of the side walls opposed by the like taper walls of the male form begins to heat iron the exterior surfaces of the die articulated flanges **33**, and at the end of the movement the considerable pressure exerted upon these flanges highly compresses the two-ply material, upon these opposing contoured side walls of the male form. The material sections of the structure opposed by the contoured surface portions **58** of the male form are compressed excessively compared with the other sections of the pressed material such as shown in FIGURE 5.

The seam construction along the four longitudinal corners of the container is shown in FIG. 5, and the seam construction along the two opposed corner edges of the end wall of the container is shown in FIG. 6. It is to be noted that the exterior surface **33** (FIG. 5) or **28** (FIG. 6) is disposed in flat plane in contrast with the interior surface **8** (FIG. 5) or **5** (FIG. 6) wherein a grooved recess **56** has been formed. It will be further noted that the thickness of the two-ply wall material at the recess has been reduced as compared with the thickness of the adjacent wall material. Hence, the density of the highly-compressed edge **9** (FIG. 5) or **7** (FIG. 6) section of material is greatly increased in order to substantially close the porosity of the paper board part of the material and thereby arrest the normal tendency of these edges to wick-absorb moisture, liquids or greases. Further protection against this tendency has been provided whereby the pressure imposed at these particular contour surfaces of the recessed sections **56** squeezes the thermoplastic film **60** outwardly at the same time that the edge **9** or **7** is densely compressed into abutment against the film lining of the opposing wall **31**. The heat and pressure imposed that forms the recessed wall sections causes the meeting portions of film material **60** at the corners to heat-fuse together and thus encase the compressed edges **9** and **7** within the film material. Due to the fact that these corner regions of the structure have been highly compressed and thereby strongly reinforced, the normal tendency of the joined plastic film to break loose due to wall stress and distortion effects in handling the container is arrested and insures the continued stability of the impervious interior surface structure of the container.

Within the scope of the teaching of the present invention there is shown in FIG. 7 a fragmentary portion **62** of a modified container blank cut of paper board sheet material that may be provided with a coating of plastic film. As the blank is cut by the knife **64**, an element **65** presses down on the edge **63** of the blank and densely compacts the cut edge on a narrow margin adjacent thereto. The particular cut edge **63** is intended to be representative of any edge or edges of a container forming blank that may be ultimately disposed within the interior of a particular container to be formed thereof. For example, an edge of a foldable marginal flange portion of a blank adapted to form a longitudinal body side seam in a container of the folding carton type that will avoid undue wicking absorption. When making the blank of sheet material having short fibres and/or ground wood composition, the edge may be waxed and then be compacted in the same manner in order to augment the efficiency of the cut edge's resistance to absorbent penetration of imposed substances.

The invention has been shown and described in preferred form only and by way of example and many variations may be made which will fall within the spirit and scope of the invention. It is understood, therefore, that the invention is not limited to any specific form or embodiment except insofar as such limitations are set forth in the appended claims.

What is claimed is:

1. A method of forming a container for liquids and greases from a blank having raw cut edges disposed within the interior of the container when the latter is formed including the step of densely compressing all of said raw cut edges and narrow margins adjacent thereto to a thickness less than their original thickness to reduce their porosity and thus harden said edges against the tendency to wick absorb the product in the container.

2. A method according to claim 1 wherein said compressing is done during the formation of the container from the blank.

3. A method according to claim 1 wherein said com-

pressing is done simultaneously with the cutting of said blank from the original sheet material.

4. A method of forming a container from two blanks, each blank having a central area corresponding in size and contour to the central area of the other and panels extending in opposite directions from said central area, the central areas and panels of one of said blanks terminating in raw cut edges which are disposed within the container when the latter is formed, the method comprising the steps of superposing said blanks in crosswise relation with their central areas in registry to form the base end wall of the container, folding said panels of each blank into opposed relation to form the side walls of the container, the raw cut edges of said one blank being brought into abutting relationship with the inner surfaces of said other panels, and densely compressing each raw cut edge of said one blank and a narrow margin adjacent thereto in order to reduce their thickness and squeeze said raw cut edge tightly against the panel which it abuts.

5. A method of forming a container comprising the steps of cutting a primary blank of thermoplastic coated fibrous sheet material, said blank having a substantially rectangular central area and oppositely extending panels each provided with longitudinally extending flanges on either side, cutting a secondary blank of similar sheet material having a central area corresponding to the central area of said primary blank and oppositely extending panels having longitudinally extending raw cut side edges, superposing said blanks in crosswise relation with the central areas into registry, applying heat and pressure to said central areas to activate said thermoplastic and thereby join said areas, bending said blanks along the edges of said central areas to bring said panels into opposed relation, bending said flanges over the outer surfaces of the panels adjacent to them, and applying heat and pressure to the side cut edges of said secondary blank in order to densely compress them in thickness and to blend in union the meeting surfaces of the thermoplastic material on each panel with the thermoplastic material on the panels adjacent to it.

6. Apparatus for forming a container including a blank of sheet material having raw cut edges disposed within the container when the latter is formed, said apparatus comprising male and female dies movable into engagement with the container blank between them, the inner surfaces of said female die being planes conforming to the external contour of the container, the outer surfaces of said male die being substantially planar, and ridges formed on said male die corresponding to the locations of said raw cut edges whereby when said dies engage said ridges densely compress and harden said raw cut edges.

7. Apparatus according to claim 6 including means for heating said dies.

8. In apparatus for forming a container having an integral base end wall and body side walls including a blank of sheet material having raw cut edges disposed within the interior structure of the container when formed, said apparatus comprising male and female dies movable into engagement with said blank between them, the inner surfaces of said female die being in plane conforming to the external surface contour of the container, the exterior surfaces of said male die being substantially in plane with said surfaces of the female die except for relatively narrow ridges formed on said male die corresponding to the locations of said raw cut edges whereby upon engaging the dies in forming the container the ridges densely compress and harden said raw cut edges over concentrated surface areas adjacent thereto.

9. The method of forming a container of foldable sheet material having thermoplastic properties and of folding the blank components of said material into shaped side walls of the container which includes the steps of bringing the boundary edges of said side walls into connected and bonded union each to the other while heat ironing their respective adjacent surface areas in impervious seam forming relationship, and densely compressing selective aligned areas of said adjacent surface areas to a thickness less than their original thickness whereby inner disposed boundary edges in the seam formed structure are rendered non-absorbant.

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