United States Patent [19]

Malcolm

[11] **3,878,771**

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[54] **MANUFACTURE OF PAPERBOARD CARTONS WITH LIQUID-PROOF LINERS**

[76] Inventor: **James A. Malcolm**, 1 Ingleside Dr., Downsview, Ontario, Canada

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[21] Appl. No.: **265,964**

[52] **U.S. Cl.**..... **93/36.01**; 93/33H; 93/36 DA; 93/36.6; 156/251; 156/265; 156/521

[51] **Int. Cl.**..... **B31b 7/02**

[58] **Field of Search** .. 93/36.01, 36.6, 33 H, DIG. 1, 93/36 DA; 156/251, 265, 521; 93/DIG. 1

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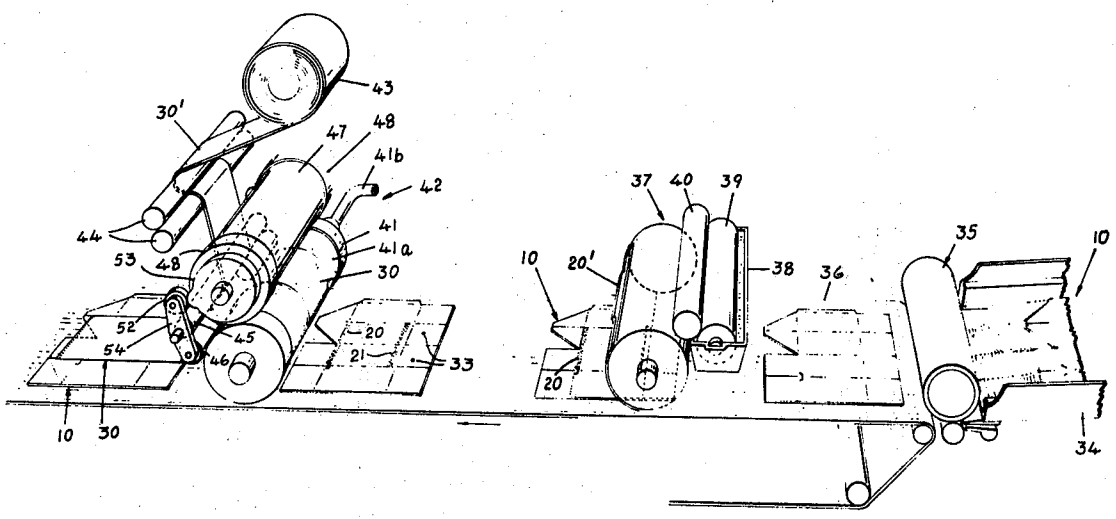
Primary Examiner—Roy Lake
Assistant Examiner—James F. Coan

[57] **ABSTRACT**

Containers are manufactured from flat paperboard blanks and liquid-proof liners which are laid flat on the blanks and cover adhesive thereon so that the assembled blanks and liners can if desired be stacked and stored. The liners are made from continuous tubular flexible material that is fed around a rotating cylinder where the liners are severed from the continuous material. The liners are sealed across one end, forming bags which when the containers are set up form ears at corners thereof. An ear can be used as a corner pouring spout; an ear can be adhered to an end flap of the container to be pierced by a pouring spout; and the container can be opened at a corner where the bag is adhered thereto, thereby opening the bag.

14 Claims, 20 Drawing Figures



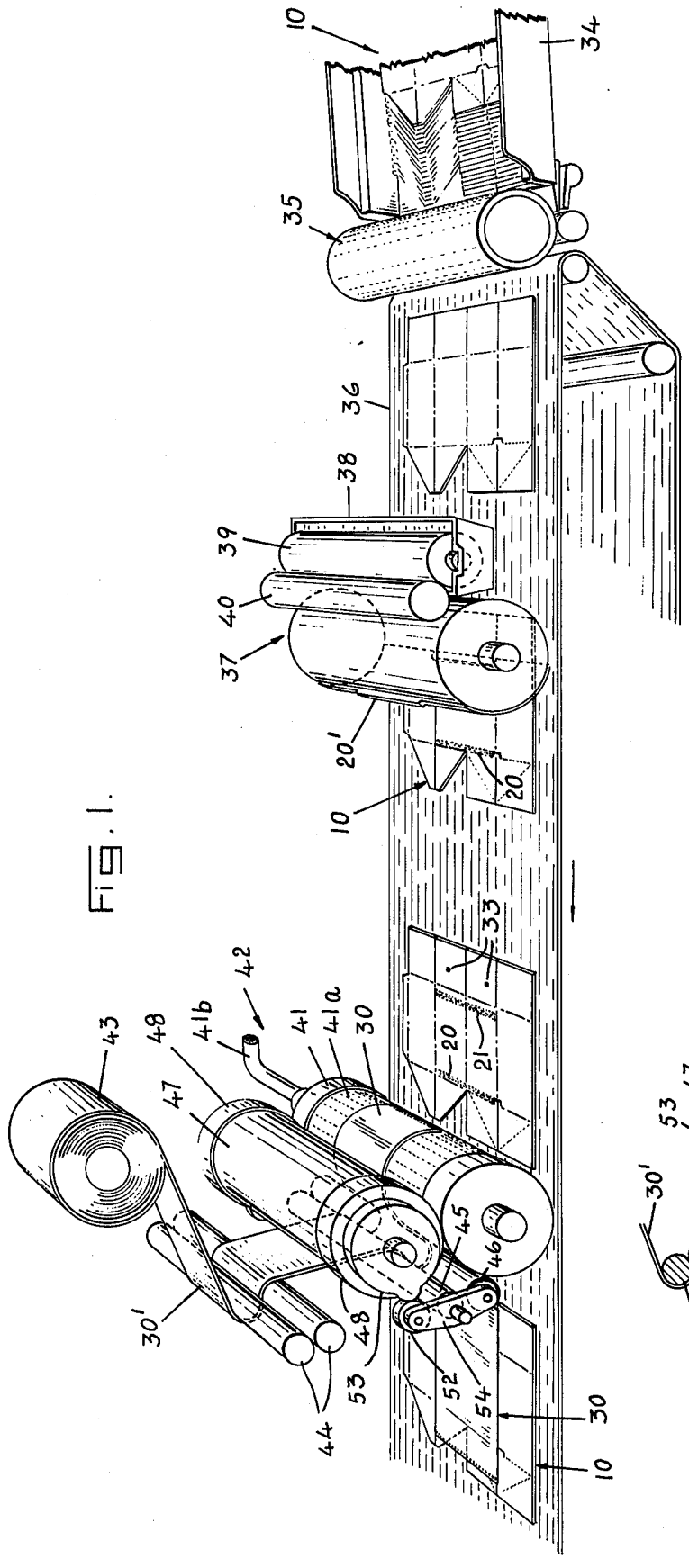

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Fig. 1.

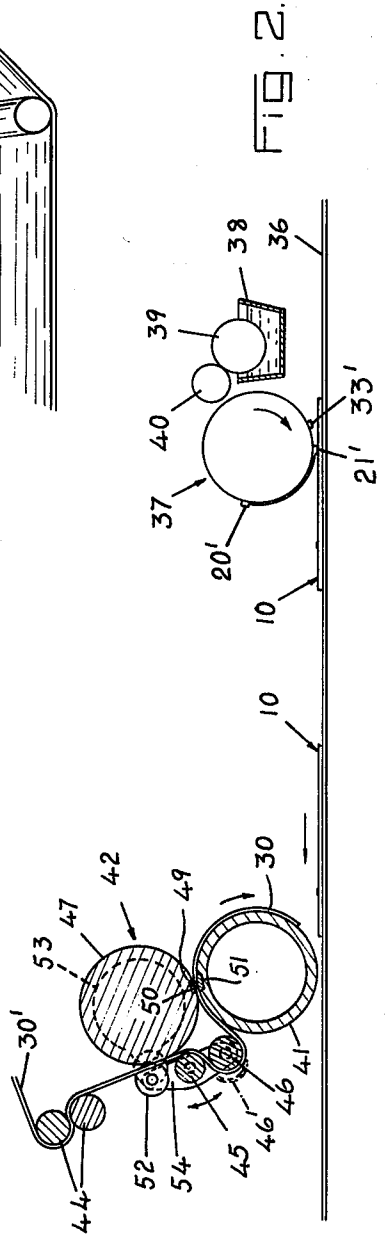
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Fig. 2.

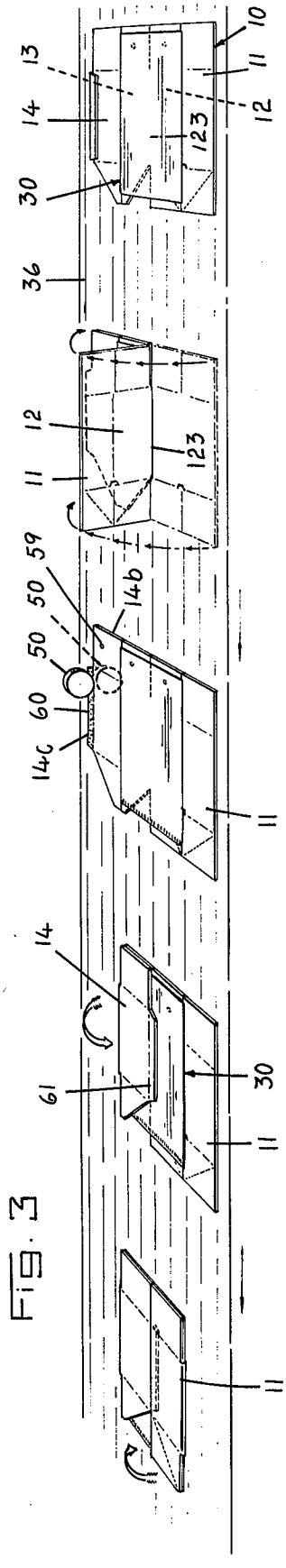


Fig. 7

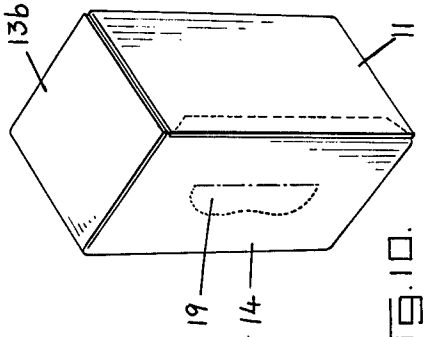


Fig. 10.

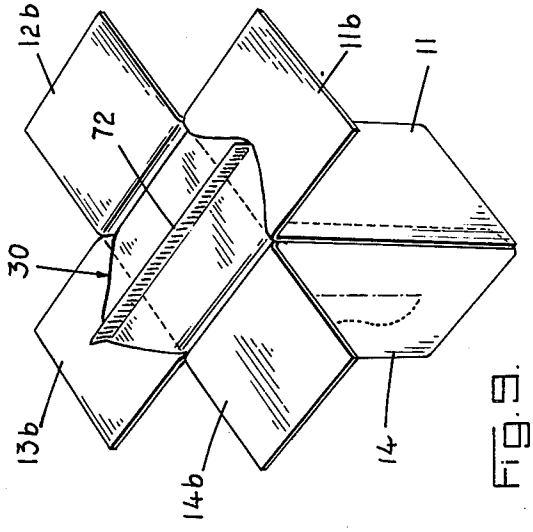


Fig. 9.

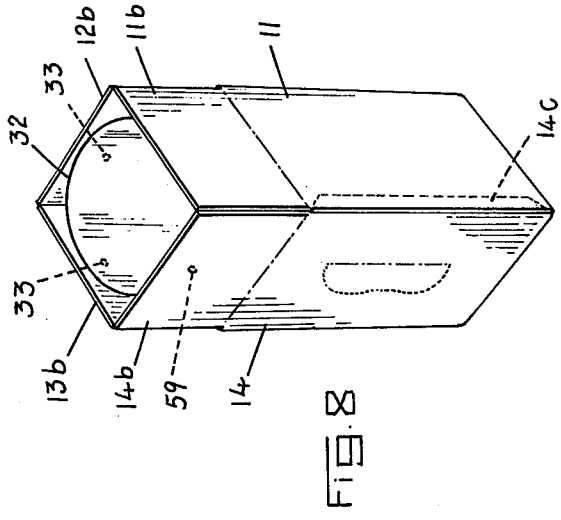


Fig. 8

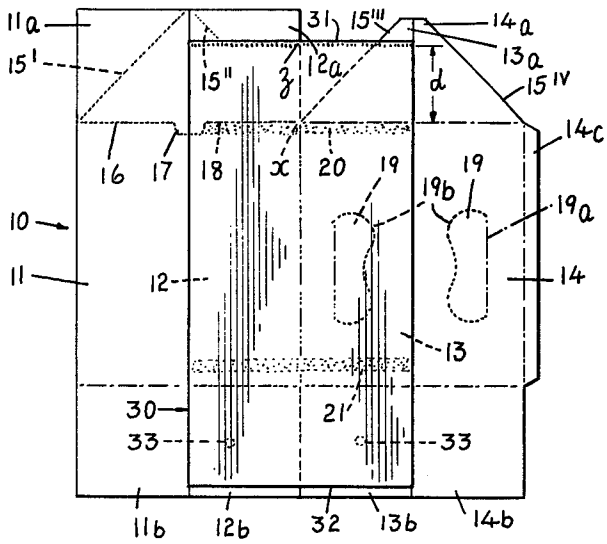


Fig. 4.

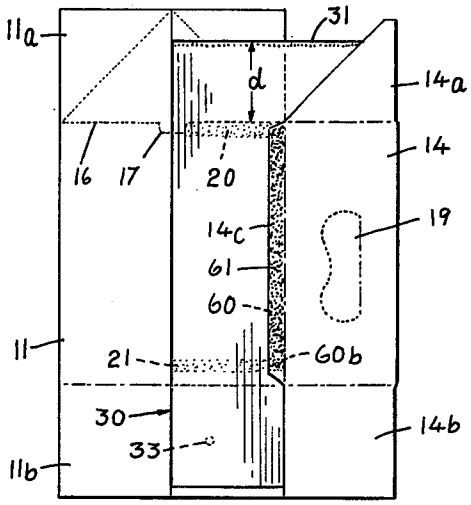


Fig. 5.

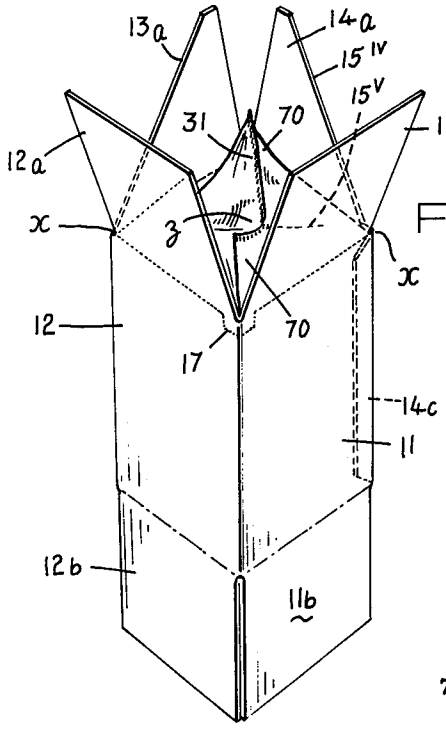


Fig. 6

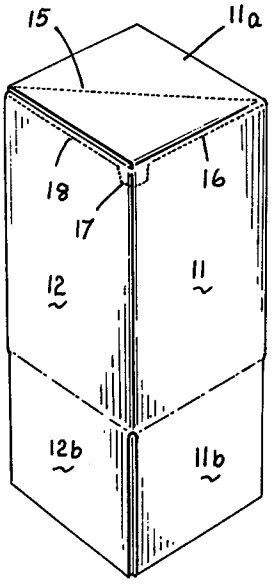


Fig 7.

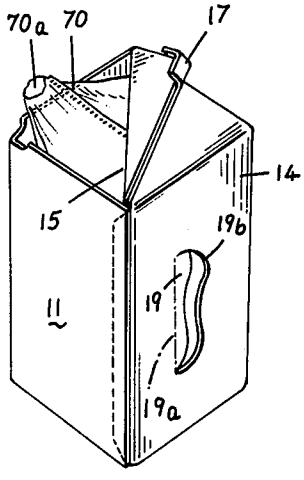


Fig. 11.

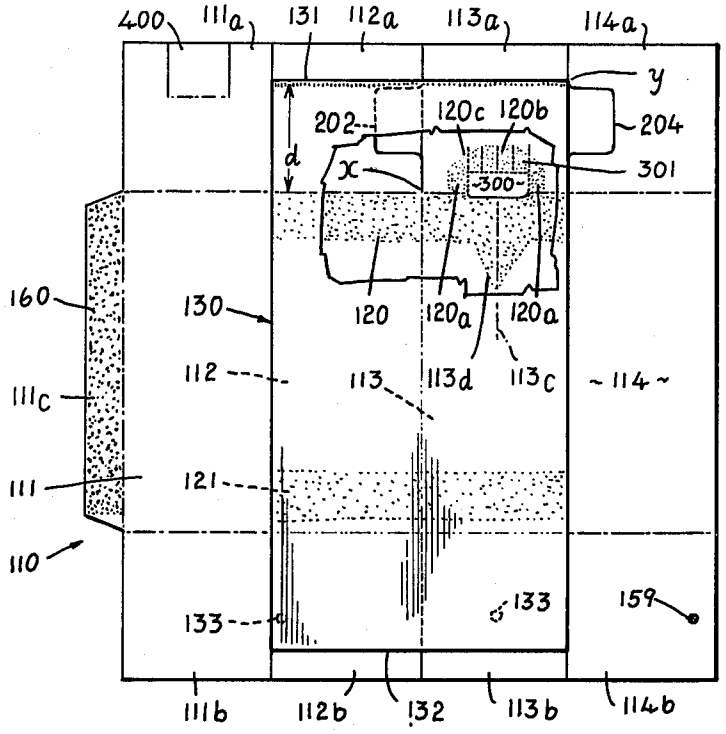


Fig. 12.

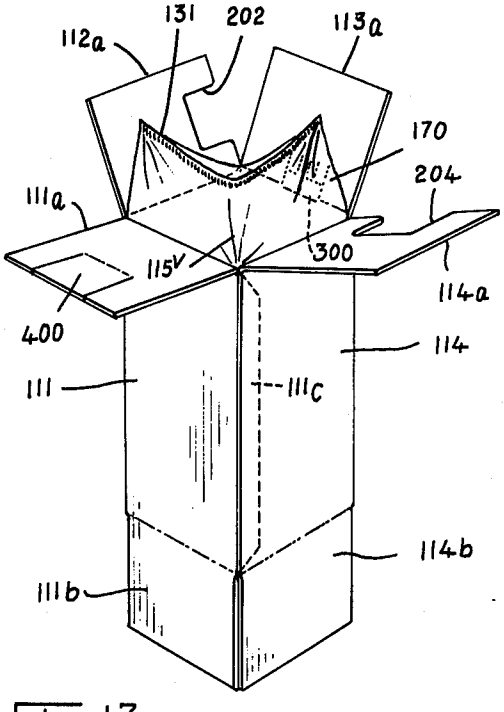


Fig. 13.

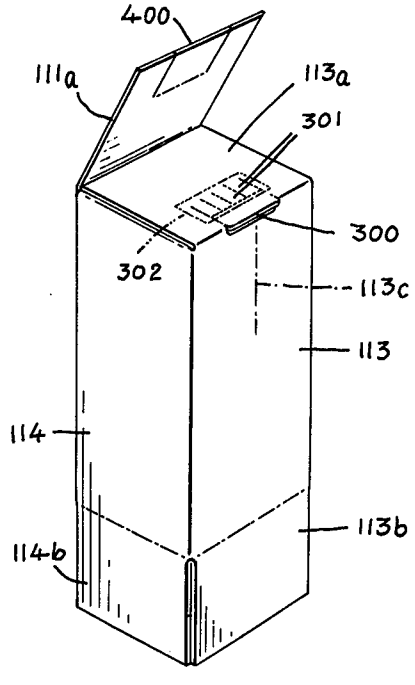


Fig. 14.

Fig. 17.

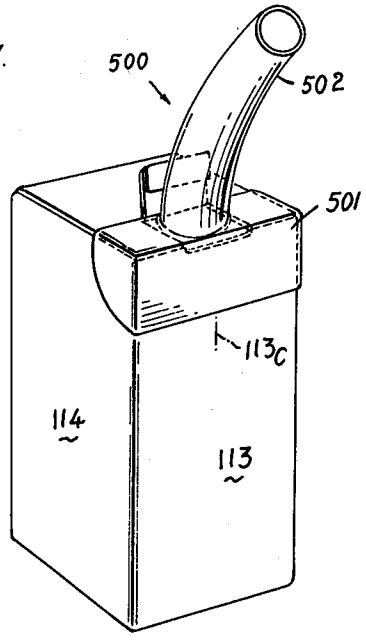


Fig. 18.

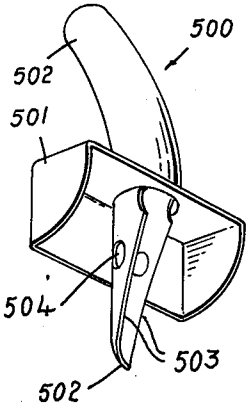
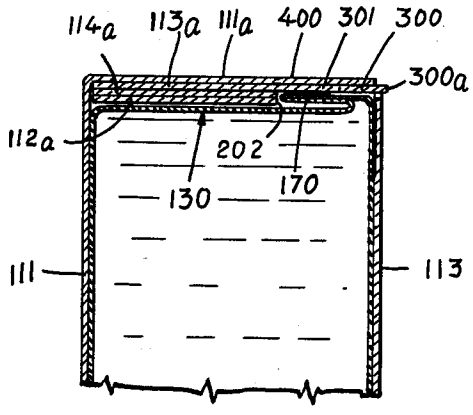


Fig. 15.



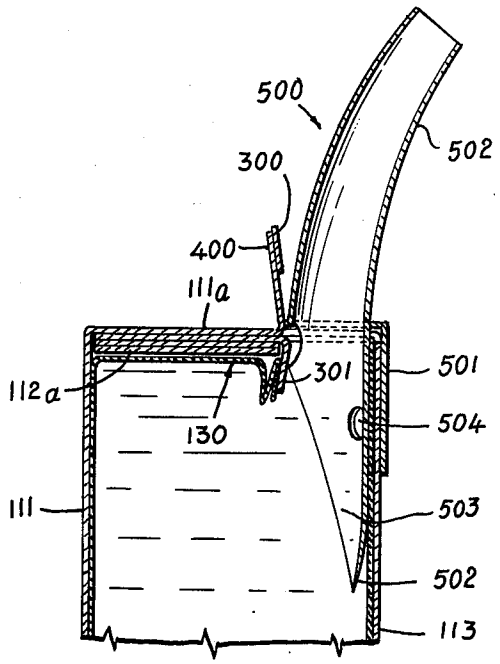


Fig. 16.

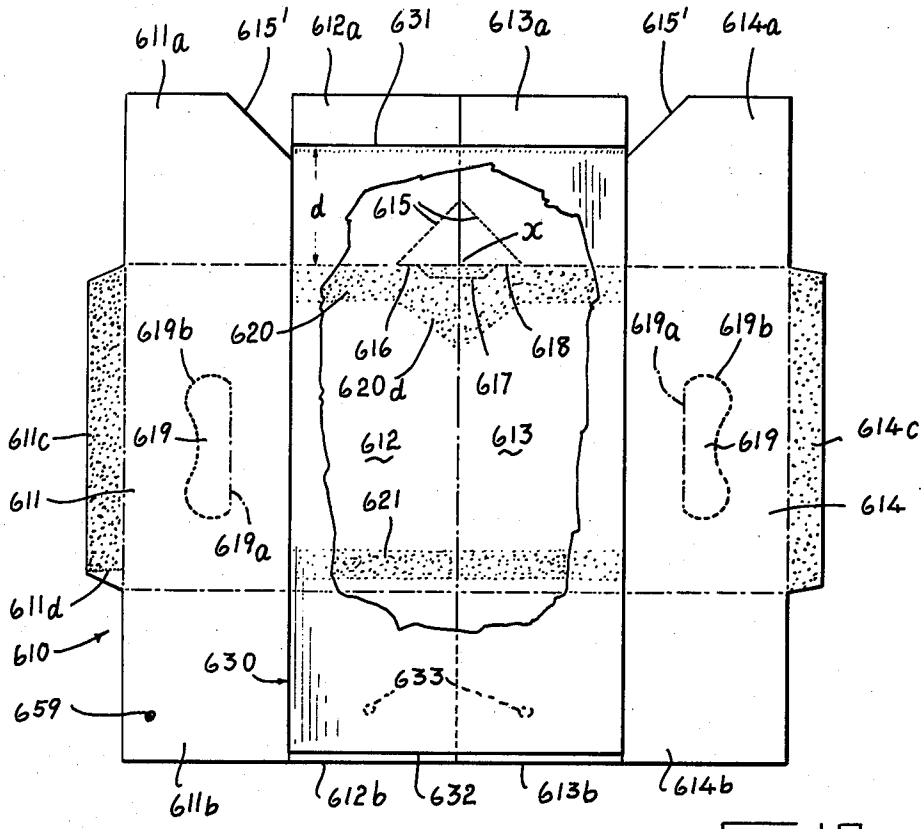

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Fig. 19.

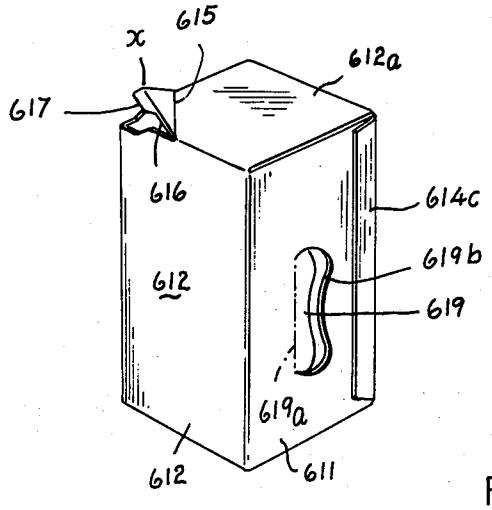
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Fig. 20.

MANUFACTURE OF PAPERBOARD CARTONS WITH LIQUID-PROOF LINERS

CROSS-REFERENCES TO RELATED APPLICATIONS

Nil

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the manufacture of containers from paperboard carton blanks to which flexible bags are attached to serve as fluid-containing liners from which the contents can conveniently be poured.

2. Description of the Prior Art

For holding liquids or other fluid materials it has heretofore been proposed to provide containers made of paperboard and lined with a fluid-impermeable material in order to provide an inexpensive, preferably rectangular container that can be easily disposed of, but various difficulties have been encountered in producing, storing and readily setting up such containers into a structure that is strong, full, capable of stacking, easily opened and easily emptied, with materials compatible with the contents of the container.

SUMMARY OF THE INVENTION

In accordance with the present invention a flexible bag, of material impermeable to the intended contents, is accurately positioned on a flat carton blank and affixed thereto by adhesive covered by the bag. To form the bag, continuous tubular material is fed to a rotary cylinder where the bag is cut from the material and laid against the carton blank. Patterns of adhesive ensure that as the carton is set up the bag is opened to substantially fill the carton and be supported thereby, the bag having one end closed by a seal transverse to the bag and defining a bag corner or ear of surplus bag material located adjacent a corner of one flat end of the carton, the carton being openable at that corner so that the ear can be used to form a pouring spout. An ear of the bag can be affixed to said end of the carton, to be pierced by a pouring spout. Part of the sealed end of the bag can be adhered to a corner of the carton to be opened therewith. The bag is filled from the opposite end, which can be closed by any convenient means.

BRIEF DESCRIPTION OF THE DRAWINGS

The making of preferred embodiments of the invention is illustrated in the accompanying drawings in which:

FIG. **1** shows diagrammatically apparatus for applying adhesive to paperboard carton blanks, for forming bags from tubular liner material, and for assembling the blanks and bags;

FIG. **2** is a longitudinal section through parts of the apparatus of FIG. **1**;

FIG. **3** shows diagrammatically the folding and gluing of an assembled blank and bag in forming a container therefrom;

FIG. **4** shows the carton blank with the tubular bag correctly positioned thereon;

FIG. **5** shows one of the stages in folding the blank;

FIG. **6** shows the container erected or set up, but with the ends of the carton open;

FIG. **7** shows the container with one end of the carton closed;

FIG. **8** shows the other open end of the carton with the bag ready for filling;

FIG. **9** shows the same end as in FIG. **8** but with the bag filled and sealed;

FIG. **10** shows the container filled and closed;

FIG. **11** shows how the container can be opened from the end shown closed in FIG. **7**;

FIG. **12** shows another carton blank with a tubular bag correctly positioned thereon (parts of the bag being cut away for clarity of illustration);

FIG. **13** shows a container formed from the blank and bag of FIG. **12**, with the ends of the carton open;

FIG. **14** shows the container of FIG. **13** during a stage of closing and sealing one end of the carton;

FIG. **15** is a longitudinal section through the fully closed end of the container of FIG. **14**;

FIG. **16** is a longitudinal section similar to FIG. **14** but showing a pouring spout inserted into the container;

FIG. **17** shows the container of FIG. **16** with the pouring spout inserted;

FIG. **18** shows the pouring spout;

FIG. **19** shows another carton blank with a tubular bag positioned thereon (parts of the bag being cut away); and

FIG. **20** shows a container formed from the blank and bag of FIG. **19**.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The carton blank **10** shown in FIG. **4** consists of a sheet of paperboard (which term as used herein includes corrugated or uncorrugated board) that has been cut and creased in a die (not shown) to define four rectangular side-forming panels **11, 12, 13** and **14,** with flaps **11***a*, **12***a*, **13***a* and **14***a* protruding beyond the ends of the panels for closing what will ultimately be the flat top end of a carton, and flaps **11***b*, **12***b*, **13***b* and **14***b* protruding beyond the opposite ends of the panels for closing what will ultimately be the flat bottom end of the carton. The flaps **11***a* and **12***a* are rectangular and are scored along lines **15′**, **15″** which will ultimately coincide with a diagonal **15** of the upper end of the carton (FIG. **7**). The flaps **13***a* and **14***a* are approximately triangular, terminating with their hypotenuses along lines **15‴** and **15⁽ⁱᵛ⁾** which will also ultimately coincide with the diagonal **15.** Along the crease that separates the flap **11***a* from panel **11** the blank is weakened by a perforated line **16** that deviates downwardly at **17,** adjacent what will be a corner of the carton, to form a tab, and then continues at **18** along the crease that separates the flap **12***a* from panel **12.** The panel **14** has a narrow flap **14***c* along its free edge, and within the body of each panel **13** and **14** is a flap **19** defined by a straight crease line **19***a* and a curved perforated line **19***b* to form a handle, as seen in FIG. **11.** (For simplicity the flaps **19** have not been shown in FIGS. **1** and **3.**) Applied to the central panels **12** and **13** of the blank **10** is a first widthwise line or pattern of adhesive **20** which extends along what will be the top end of the carton, and another such adhesive line or pattern **21** is applied near the opposite end. The line **20** crosses the juncture of panels **12** and **23** at "*x*" which will form one corner of the carton.

A flexible liner **30** is laid flat on the blank **10** as shown in FIG. **4,** over the adhesive lines **20, 21** to which it adheres. The liner is of material suitable for holding

liquids, the material of the liner being chosen so as to be impermeable to the liquid that is to to hold. The liner illustrated may be a transparent polyethylene bag having a transverse seal **31** at one end and open at its other end **32.** The bag material is of course chosen to suit the liquid or granular or other fluid material that the bag is to contain. The bag is laid over the central panels **12** and **13** and, when flat, is coterminous with the total width of these adjoining panels, protruding beyond the ends of the panels over the flaps **12***a*, **13***a* and **12***b*, **13***b* but not beyond the longitudinal extremities of the flaps. As will be seen, the longitudinal distance *d* between the seal **31** and the adhesive line **20** (coincident with the crease line **18**) must be at least half the length of the diagonal **15,** *d* being equal to the distance between point *x*, where adhesive line **20** crosses the juncture of panels **12** and **13,** and point *z* spaced longitudinally from *x* on seal **31.** The other end **32** of the bag must protrude beyond the adhesive line **21** sufficiently far to have adequate material to close the end **32** once the bag has been filled. On the flaps **12***b*, **13***b* are spots of adhesive **33** which detachably secure the bag to these flaps.

Apparatus for producing the knocked down container of FIG. **4** is illustrated in FIG. **1.** Carton blanks **10** that have been cut, creased and perforated, ready for gluing, are stacked in a feed tray **34** from which a rotary combing device **35** of conventional type delivers the blanks in succession to a conveyor **36.** The blanks pass below a rotary gluer **37** which applies the adhesive lines **20, 21** and spots **33,** to each blank, as for example by means of raised elements **20′, 21′, 33′** (FIG. **2**) which are supplied with glue from a pot **38** by rollers **39, 40.**

The blanks travel, adhesive line **20** and adjacent end flaps leading, under a rotating combiner cylinder **41** of a machine **42** which makes the bags **30** and positions them accurately on the blanks. To hold the blank **10** on the conveyor **36** the latter may be perforated and have a vacuum box (not shown) under it. The machine **42** is basically a known machine for laying windows over openings in carton blanks (for example, a Model Triple A window machine made by International Paper Box Machine Company of Nashua, N.H., U.S.A.), but with important modifications described below. From a spool **43** extruded, seamless tubular bag stock **30′** passes continuously between driven feed rolls **44,** over an idler roll **45** and around a bob roll **46** onto the combiner cylinder **41,** the latter being perforate as at **41***a*, with vacuum applied to the interior of the cylinder through a line **41***b* so that the material **30′** clings to the combiner cylinder without blousing as the cylinder rotates. (For simplicity on illustration, the perforations **41***a* are not shown in FIG. **2.**) Electrostatic properties of the tubular material **30′** may also help in holding it against the cylinder. Above the combiner cylinder is a cutting and sealing cylinder **47** having rings **48** which retain an elongated knife **49** and electrical heating bar **50** that register on each revolution of the cylinders with a longitudinal anvil **51** on the combiner cylinder. The tubular material **30′** is fed lengthwise between the cylinders **41, 47** and the knife **49** severs the tubular stock **30′** (thus forming the open end **32** of a bag **30**), and, substantially at the same time, the heating bar **50** forms the transverse seal **31** in a straight line adjacent to and just behind the line of severance. As an alternative to providing the heating bar **50,** the tubular material can be provided with spaced apart transverse seals **31** before it is wound on the spool **43,** and the knife **49** can sever the bags adjacent these seals. To ensure that successive bags are spaced apart by the same amoount as the successive blanks **10** on conveyor **36,** after a bag has been separated from the material **30′** by the knife **49** the bob roll **46** is swung to the broken line position **46′**, drawing the sealed, free end of the material **30′** away from the severed end of the just completed bag **30,** this being accomplished by a roller **52** which runs on a cam **53** of cylinder **47,** the roller **52** and bob roll **46** being at opposite ends of a rocker **54** that pivots about the axis of idler **45.** Successive bag lengths are severed on successive rotations of cylinder **47.** The bags travel with their sealed ends leading. The feeding of blanks **10** is coordinated with the spacing between bags formed at the combiner cylinder to bring the bags precisely into the position shown in FIG. **4** as the bags pass under the combiner cylinder and are pressed thereby against the adhesive lines **20, 21** and spots **33** on the blanks **10.** It is to be noted that the bags cover the adhesive lines **20,** 21 and spots **33,** these being the only adhesive areas on the blank, so that no adhesive is transferred to the mechanisms that contact the blank.

The machine **42** can assemble a bag **30** and carton blank **10** on each revolution of the cylinder **41.** The machine can be wide enough to run two parallel spools of material **30′** and to handle two parallel lines of carton blanks, thus doubling its per hour output so that a production of at least 6,000 knocked down units per hour can be achieved. These flat units are devoid of exposed adhesive areas and if desired can be stacked for further processing as needed. Alternatively, the units may continue, as shown diagrammatically in FIG. **3,** to be folded for setting up into containers.

FIG. **3** illustrates the operations of a straight-line folder-gluer of conventional type. Knocked down containers consisting of carton blanks **10** with bags **30** affixed thereto enter at the right hand end of FIG. **3,** and are folded about the crease **123** between panels **12** and **13,** to break this crease, the panels **11** and **12** being laid over the panels **13** and **14** and then returned to their original position. Then gluing means, for example rollers **50,** apply adhesive to both the upper and lower sides of the edge flap **14***c*. Thus, a line of adhesive **60** is applied to the upper side of flap **14***c*. Another spot of glue **59** is applied to end flap **14***b* by a glue spotter (not shown). As a first step in setting up the container, the panel **14** having the flap **14***c* is folded over the flat liner **30,** as also shown in FIG. **5,** so that the adhesive line **60** (on the underside of flap **14***c* as seen in FIG. **5**) adheres to the liner, as does the adhesive spot **59.** It is important that the adhesive line **60** terminates at one end at the distance *d* from the seal **31** (FIG. **5**). At the other end the line **60** terminates at **60***b*, level with the adhesive line **21.** With flap **14***c* in the position shown in FIG. **5,** there is exposed adhesive **61** covering the other side of flap **14***c*. The panel **11** is then folded over, as shown at the left hand end of FIG. **3,** to lie upon and adhere to the adhesive **61** on edge flap **14***c*. At this stage, the knocked down containers might be stored for subsequent use, but if they are to be filled immediately they can proceed to a conventional erecting mechanism (not shown) which erects the carton to the rectangular box condition shown in FIG. **6**

In the set up condition of FIG. **6,** the bag seal **31** runs generally diagonally of the box from adjacent the cor-

ner tab **17**, and the bag has been stretched taut along a line **15**^{r} adjacent the other diagonal of the box. Tautness along line **15**^{r} is ensured by the fact that each half of the line **15**^{r} (i.e., the distance between each corner *x* and the midpoint *z* of seal line **31**) represents the distance *d* of FIGS. **4** and **5**, one half being from the seal **31** to the adhesive line **20** adjacent one end of the diagonal, and the other half being from the seal **31** to the adhesive line **60**, adjacent the other end of the diagonal **15** of the carton, the adhesive line **60** being on the flap **14***c* which joins the two sides **11** and **14** of the carton.

Although the bag is taut along the line **15**^{r} of FIG. **6**, the remainder of the closed end of the bag forms a pair of corners or ears **70** of material that is surplus in the sense that it must be pressed or folded into the carton when the flaps **11***a*, **12***a*, **13***a* and **14***a* are later closed to the positions shown in FIG. **7** where they form a substantially flat container end. As will later appear, the provision of the generally conical ear **70** at the openable corner **17** of the carton is useful in dispensing the contents of the container.

The flaps **14***a*, **12***a*, **13***a* and **11***a* are closed in that sequence, adhesive being applied as they are laid one upon another. Flap **14***a*, as it is closed, presses downwardly the ear **70** adjacent to it, but because flap **14***a* terminates along hypotenuse **15**^{ir} the other ear **70** is not pushed away by flap **14***a* but is left in a position to be pressed down by the next flap to be closed, namely, **12***a*. Referring to FIG. **8**, which shows the container of FIG. **7** inverted, it is to be noted that the unsealed end **32** of the bag was pulled open in erecting the container, because the longitudinal adhesive line **60** pulls one side of the bag away from the opposite side which adheres to the lines **20, 21**, the complete opening of end **32** being ensured by the spots of glue **33, 59** which hold the bag to the flaps **12***b*, **13***b* and **14***b* adjacent the unsealed end **32** of the bag.

The squaring up of the carton requires the sealed end of the bag to draw inwardly towards the open end **32**, the bag portions in FIG. **6** between each corner *x* and the bag seal at *z* having moved through ninety degrees from their positions in FIG. **4**, and the seal **31** having twisted downwardly at *z* to form the ears **70** which extend upwardly at angles of about 45° from *z*. The fact that end **32** opens fully ensures that air pressures within and outside the bag are equal so that there is no air pressure differential tending to pull the bag out of place as the carton is set up. The containers may be stored in the condition shown in FIG. **8**, with the bag ends **32** open, or they may be immediately filled with liquid or other flowable material. The open end **32** is then closed and, if necessary, sealed as by a transverse seal **72** as shown in FIG. **9**. When the end **32** is closed it is pulled away from the glue spots **33, 59** which were provided to ensure opening of the end **32**. The flaps **11***b*, **12***b*, **13***b* and **14***b* are then folded and glued down (the order is immaterial) to form a second flat closed end for the container, as seen in FIG. **10**. Such a container is light in weight, and having flat sides and ends it can be stacked and packed tightly with other such containers. The hypotenuses of the triangular flaps **13***a*, **14***a* lie along the diagonal **15** which is coincident with the taut diagonal **15**^{r} of the inner bag **30**. Because the carton is weakened along the tab **17** at one corner, the container can easily be opened by pressing the tab **17** inwardly and tearing the flaps **11***a*, **12***a* along the perforated lines **16** and **18**, folding these two flaps back along the score lines **15**′ and **15**″ (FIG. **11**), the hypotenuse of flap **13***a* serving as a fulcrum. One of the ears **70** is thereby exposed, and it can be pulled out and cut open as at **70***a* to serve as a pouring spout for dispensing the contents of the container. As indicated in FIG. **11**, the flaps **19** can be pressed inwardly with the fingers by freeing them along the perforated lines **19***b*, thereby providing recesses whereby the container can be grasped when pouring its contents from the spout opening **70***a*. The inwardly swinging flaps **19** protect the inner bag from being perforated by the finger nails. The adhesive lines **20, 21** and **60** are spaced from the flaps **19** and consequently the bag can flex when the flaps are pressed inwardly. The bag deforms particularly easily adjacent the flap **19** of panel **14** because the adhesive lines **20** and **21** do not extend onto panel **14**.

The bag **30** fits snugly into the carton **10** because its transverse dimensions are the same as the transverse dimensions of the interior of the carton, and the bag walls are pulled closely against the walls of the carton because the adhesive lines **20** and **21** affix the bag to two sides of the carton and the adhesive line **60** pulls the bag against the other two sides of the carton as the container is erected, the vertical adhesive line **60** on the inturned flap **14***c* being diagonally opposite the center points of the horizontal adhesive lines **20** and **21**. The line **20** could be spaced slightly from the ends of panels **12, 13** if it is desired to reduce the amount by which the spout can protrude from the carton when it is opened, but the distance *d* must be maintained between the seal **31** and the line **20**. The adhesive line **21** is spaced upwardly from the bottom of the carton sufficiently to make room for the end **32** of the bag when it has been closed; a spacing of about half an inch is satisfactory. The end **60***b* of the adhesive line **60** is similarly spaced upwardly to ensure that no undue tension is applied to the bag material. The bag and the carton can be completely filled, the carton providing physical support for the flexible bag and its contents. The adhesive lines **20, 21** and **60** prevent the bag from collapsing when its contents are poured out, but it would be possible to employ an adhesive which allows the bag to release from its attachments to the carton and thus deflate as it is emptied. (To achieve this one might wish to use a bag material which is slightly pervious to the contents of the bag, and by using an adhesive which loses its effectiveness when exposed to such contents.) The adhesive line **20** extends close to the tabbed corner **17** to affix the bag to the carton adjacent that corner and thus prevent collapse of the pouring spout, though the ear **70** is not itself affixed to the carton. If any difficulty should be encountered in pouring out the contents of the bag, the other ear **70** can be exposed and opened to provide ingress for air or to serve as a second spout.

The bag **30** may consist of a laminate of nylon (forming the outside of the bag, and used for its strength and barrier qualities) and polyethylene (used at the inside for its heat sealability). The adhesive used must be compatible with the bag material which it engages. It is not necessary to use an adhesive that remains tacky, the described method making it unnecessary to apply adhesive a substantial time before it is used.

Another container made according to the method of the present invention is illustrated in FIGS. **12** to **17**. In this embodiment, a flat paperboard blank **110** consists of four rectangular side-forming panels **111, 112, 113,**

114 having rectangular flaps **111***a*, **112***a*, **113***a*, **114***a* respectively protruding beyond one end and rectangular flaps **111***a*, **112***b*, **113***b*, **114***b* at the other. On the adjoining central panels **112, 113** are a pair of widthwise lines of adhesive, a first **120** extending along the ends from which the flaps **112***a*, **113***a* protrude, and a second **121** extending near the opposite ends of the central panels. Spots of adhesive **133** are provided on the flaps **112***b*, **113***b* to serve the same purpose as the spots **33** of the first embodiment. All the adhesive so far described is, as in the first embodiment, covered by a liner bag **130** which covers the whole of the inner surfaces of panels **112, 113** and the major part of the end flaps of these panels, the bag **130** having a sealed end **131** and an open end **132.** Bags **130** are laid on blanks **110** by the method illustrated in FIG. **1** so that the bags cover all the adhesive that has been applied at the gluer **37,** so that the knocked down containers emerging from the machine **42** have no exposed adhesive and can if desired be stacked and stored. The ends of each bag **130** do not protrude beyond the free ends of the end flaps of the carton blank, and thus are protected by the carton blank against fouling.

At the juncture of the panels **112, 113** the adhesive line **120** is the distance *d* from the transverse seal **131** of the bag, the distance *d* as before being half the length of the diagonal of the set-up container. To set the container up, adhesive is applied to both sides of an edge flap **111***c* of panel **111,** a spot of adhesive **159** is applied to flap **114***b*, panel **111** is folded over panel **112** so that the line of adhesive **160** on edge flap **111***c* sticks to the bag, the end of line **160** being the distance *d* from the bag seal **131.** Panel **114** is folded over panel **113** and sticks to the other adhesive side of edge flap **111***c* to connect the sides of the carton together, and when the carton is squared up it appears as in FIG. **13,** the bag being taut along the diagonal, as at **115**^{r}, between the juncture of sides **112, 113** and the juncture of sides **111, 114.** At either end of the transverse bag seal **131** the bag has surplus material forming corners or ears **170.**

The end flap **113***a* of the carton blank has, at the end of panel **113,** a rectangular portion **300** which is devoid of adhesive and is surrounded by a line of perforations so that portion **300** can without difficulty be removed as described hereinafter. The portion **300** is surrounded by adhesive, namely by the line **120** on panel **113,** by lines **120***a* along the sides of portion **300,** and by a line **120***b* along the edge of portion **300** remote from panel **113.** When the bag **130** is laid on the blank **110** the bag adheres to all these lines of adhesive, and when the carton is set up (FIG. **13**) part of one of the ears **170** of the bag is affixed, at the side adjacent flap **113***a*, around the removable portion **300,** without being attached to the removable portion. Where the adhesive lines **120***a* and **120***b* meet they have a corner bevel **120***c* corresponding to a line that the ear **170** can adhere to without rupture when the carton is set up. This bevel **120***c* in FIG. **12** coincides with an imaginary straight line drawn from *x*, which will constitute a corner of the set-up carton, to the bag apex *y*. As will be seen, the removable portion **300** has a width (measured along the line **120**) corresponding to that of an insertable pouring spout. If this width is so great that it is difficult to achieve a firm bond of the bag to the flap **113***a* around the entire portion **300,** because of the limitation imposed by the bevel **120***c*, it may be necessary to space the bag seal **131** a greater distance than *d* from the corner *x*, thus raising *y* and increasing the slope of the bevel **120***c* to ensure that the bag is firmly held taut across the area of the portion **300.**

The area **120***b* is divided by parallel perforations into fingers **301,** best seen in FIG. **14,** which abut the portion **300** at their free ends, at the side of portion **300** opposite from line **120** and thus spaced from what will be the edge of the carton at the top of carton side **113.** These fingers can be deflected downwardly to facilitate smooth and easy penetration of the container by a pouring spout, as described later.

With the carton set up as in FIG. **13,** the flaps **112***a*, **114***a*, **113***a* and **111***a* are folded in, in that order, to close one end of the container. The flap **112***a* has a rectangular portion **202** removed, of a size snugly to receive an insertable pouring spout, and also large enough to enable the flap **112***a* to be closed down at the end of the container without pulling the bag ear **170** away from its adhesion to the lines **120***a*, **120***b* of flap **113***a*. The flap **114***a* has a similar cutout portion **204,** and the flap **114***a* is folded down and laid on the upper surface of flap **112***a* to which adhesive has been applied by conventional means. Flap **113***a* is then laid down on the upper, adhesive coated surface of flap **114***a*, and thus overlies the flaps **114***a* and **112***a* save where the bag ear **170** is affixed to the flap **113***a*. On the upper side of flap **113***a*, as seen in FIG. **14,** is a rectangular varnished area **302** which includes and is slightly larger than the fingers **301,** and adhesive applied to attach the flap **111***a* to flap **113***a* is effective at all areas except **302.** Thus, a lifting tab **400** on the flap **111***a* is adhered to the portion **300** of flap **113***a* but not to the fingers **301,** the tab **400** overlying both the portion **300** and the fingers **301.** With the flaps folded down the upper end of the container is as illustrated in FIG. **15,** the bag ear **170** being located in the cut-away areas **202, 204** of flaps **112***a*, **114***a*, and this ear being held taut under the removable portion **300** by the adhesive which surrounds the latter in the areas **120***a*, **120***b* of flap **113***a* and along the line **120** of side wall **113.** The bag **130** can be filled from the other, open end **132** (the opening of this end having been facilitated by glue spots **133,** 159), the bag material having been chosen to hold without leakage the desired contents, for example, motor oil. The end **132** is sealed after filling, and the flaps **111***b*, **112***b*, **113***b* and **114***b* are closed and adhered together to complete the container.

The container can be opened in a manner similar to the one illustrated in FIG. **11,** by opening the corner of the container at the juncture of walls **111, 112,** thus exposing the bag ear that is not attached to flap **113***a*, and for this purpose a lifting tab can be provided similar to the tab **17** of FIG. **11.** The exposed bag ear can then be cut open. However the preferred mode of opening the container of FIG. **15** is shown in FIGS. **16** and **17,** using a metal pouring spout shown in FIG. **18.** This spout **500** is the same as a conventional oil can spout except that instead of having a curved guide to fit a cylindrical can it has a rectangular guide **501** that matches the configuration of the container and fits snugly thereover as seen in FIG. **17.** The spout has a curved pouring neck **502** that extends through the guide **501** and merges with a bayonet having a curved, piercing tip **502** from which a pair of flanges **503** diverge upwardly, the flanges having openings **504** therethrough. (The distance between the flanges **503** at the guide **501** equals the diameter of

the neck **502** at the guide and is herein referred to as the width of the pouring spout.) The first step in opening the container is to lift the tab portion **400**, thus lifting the removable portion **300** attached thereto. It will be noted from FIG. **12** that the portion **300** extends slightly into panel **113** so that when the carton is set up its extension forms a small protruding lip **300***a* (FIG. **15**) beneath which one can insert one's fingernail to lift portions **300** and **400**. With these lifted, the ear **170** is exposed, stretched taut over the opening left by the portion **300**, where ear **170** is easily pierced by the tip **502** of the bayonet. The fingers **301** are also exposed, since the varnish on them prevented them from being attached to, and thus lifted with, the tab **400**, and as the spout is pushed downwardly the fingers **301** are depressed by the flanges **503** into the container, the flanges engaging first the middle fingers and then the outer ones. These easily flexed fingers cause little resistance to the downward progress of the spout, so that only slight pressure is required to press the spout to the fully inserted position shown in FIGS. **16** and **17**. Because the spout is so easily inserted, it is not necessary to grasp and squeeze the container as the spout is pressed down. To squeeze the container would of course tend to force its contents upwardly as the spout is inserted, causing spillage. The guide **501** assists in positioning the spout on the container and ensures that when the container is inverted its contents all flow out the neck **502**. The wall **113** may be provided with a line of weakness **113***c* to enable the wall to bulge easily behind the bayonet, and the glue line **120** may be extended downwardly in this region, as at **113***d* (FIG. **12**) to ensure that the bag **130** is not dislodged from the carton wall and to reinforce the bag against leakage.

The cross-sectional size of the pouring spout (ignoring the guide **501**) approximates the cutout portions **202** and **204** of the flaps **112***a*, **114***a*, and the combined area of the removable portion **300** and the fingers **301**, so that the spout fits snugly into the container.

In the containers described above, the bag is attached to the carton at and adjacent to the points *x* of FIGS. **4** and **12**, and thus at a corner in which no ear **70** or **170** of the bag is nested when the container is set up. The attachment of the bag to this corner of the carton can be used for an alternative mode of opening the container, as can be most easily described by reference to the embodiment illustrated in FIGS. **19** and **20**. In this embodiment a carton blank **610** consists of rectangular panaels **611, 612, 613, 614** having flaps **611***a*, **612***a*, **613***a*, **614***a* at one end and flaps **611***b*, **612***b*, **613***b*, **614***b* at the other. A line of adhesive **620** is applied on the panels **612, 613** along the crease line separating these panels from their flaps **612***a*, **613***a*, the line **620** being extended downwardly as at **620***d* at the juncture of the panels **612** and **613**. Another adhesive line **621** crosses panels **612** and **613** near their other end. Spots of adhesive **633** are applied to flaps **612***b*, **613***b*, and a bag **630** is formed and laid over the central panels **612**, 613 and parts of their end flaps by the apparatus of FIG. **1**, the bag having a sealed end **631** and an open end **632**. As before, the sealed end **631** is located the distance *d* from point *x* at the juncture of panels **612**, 613. Both panels **611** and **614** are provided with edge flaps **611***c* and **614***c* respectively. When the carton is to be set up, the side of flap **614***c* seen in FIG. **19** is covered with adhesive, a spot of adhesive **659** is applied to end flap **611***b*, and both sides of edge flap **611***c* are coated with adhesive, but the adhesive on the side of flap **611***c* seen in FIG. **19** terminates at **611***d* level with the lower edge of adhesive line **621**. Panel **611** is folded over panel **612** so that flap **611***c* and spot **659** adhere to the bag **630**, and then panel **614** is folded over panel **613** to adhere to flap **111***c*, and flap **614***c* also adheres to panel **611** and overlies it as seen in FIG. **20** which shows the erected container. The end flaps **611***a*, **613***a*, **614***a*, and **612***a* are folded down and glued together in that order, the bag **630** is filled from its open end **632**, and then the bag is pulled away from the spots **633, 659** and closed, and the end flaps **611***b*, **612***b*, **613***b*, **614***b* are closed and glued together.

In the set-up container the bag is taut along a diagonal of the upper end of the container extending from the corner *x* to the upper end of the flap **611***c*, the adhesive at the ends of this diagonal being spaced from the bag seal **631** by the distance *d*. The line of adhesive **620** secures the bag to the carton along the upper edges of the panels **612** and **613**, and adjacent corner *x* these panels are weakened by a perforated line that extends at **616** for a short distance along the crease between panel **612** and flap **612***a*, then deviates downwardly as at **617** to form a tab portion at the juncture of panels **612, 613**, and then extends at **618** for a short distance along the crease between panel **613** and flap **613***a*. From the outer ends of perforated lines **616** and **618** two crease lines **615** define triangular corner portions of the end flaps **612***a*, **613***a*, corresponding in size to triangular corner positions that are removed from end flaps **611***a* and **614***a* along lines **615'**. When the container is set up, the lines **615, 615'** coincide and form a fulcrum about which the corner of the container can be opened by pushing in the tab portion above line **617** and lifting the tab portion and the triangular corner portions of flaps **612***a*, **613***a*. It is to be noted that the bag is adhered to the carton both above and below the line **617**, and when the tab portion is pushed in and lifted the part of the bag attached to it tears along the lines **616, 617, 618**, so that the contents of the container can be poured over the lip formed at the juncture of panels **612** and **613**. The additional adhesive area **620***d* is provided to ensure that the bag remains affixed to the carton below the pouring lip, to prevent bleeding or leakage of the contents of the bag and consequent weakening of the paperboard. To facilitate grasping the container for pouring, flaps **619** can be pressed inwardly in the panels **611** and **614** about crease lines **619***a*, the flaps **619** being defined by these crease lines and by perforated lines **619***b*. The carton can be gripped in one hand by pressing one flap **619** inwardly with the fingers and the other flap **619** with the thumb, the flaps guarding the bag against puncture by the fingernails. The edge flaps **611***c* and **614***c* reinforce the carton along the edge where it is gripped, opposite the corner *x*.

Modifications of the preferred embodiments herein described will readily occur to those skilled in the art, and are intended to be covered by the subjoined claims.

What I claim as my invention is:

1. A method of making knocked down containers from flat paperboard blanks each having four rectangular panels for forming sides of a carton, an edge flap on one of the panels for connecting sides of the carton, and end flaps protruding beyond the ends of the panels for closing the ends of such carton, comprising applying adhesive to successive blanks across a pair of ad-

joining panels, feeding the blanks successively past a rotating cylinder with end flaps of the blanks leading, feeding continuous tubular flexible bag material lengthwise to the rotating cylinder, providing sealed lines transversely of the tubular material at spaced apart intervals therealong, transversely severing the tubular material on the cylinder adjacent to but not coincident with said sealed lines to form successive separate bags each having an open end and one of said transverse sealed lines at the other end, delivering the successive bags around the cylinder and applying them by the cylinder flat against the adhesive on the successive blanks as the blanks pass the cylinder to secure the bags to the blanks, and coordinating the delivery of the bags to the blanks to ensure that each bag covers said pair of adjoining panels of a blank and covers and adheres to said adhesive and protrudes beyond the ends of said adjoining panels with the transverse sealed line of the bag spaced from the ends of said adjoining panels by a distance that is at least one half the length of a diagonal of one end of such carton.

2. A method as claimed in claim **1,** wherein the sealed lines are provided transversely of the tubular material by pressing an elongated heating element against the tubular material on the rotating cylinder to heat seal the material transversely, and wherein the tubular material is transversely severed on the cylinder, at substantially the same time as each transverse sealed line is formed, by pressing against the tubular material an elongated knife adjacent said heating element.

3. A method as claimed in claim **1,** wherein said pair of panels are central panels of the paperboard blank, adhesive is applied to two sides of said edge flap, and the carton is formed by folding the panel having the edge flap to lay one of said adhesive sides of the edge flap against the flat bag to adhere thereto, and then folding the remaining panel to lie over the other adhesive side of the edge flap to adhere thereto, the adhesive on said one side of the edge flap being spaced from said transverse sealed line of the flat bag by a distance at least one half the length of a diagonal of one end of such carton.

4. A method as claimed in claim **3,** wherein the adhesive applied across said pair of central panels comprises a pair of transverse adhesive patterns adjacent the ends of said central panels.

5. A method as claimed in claim **3,** wherein adhesive is applied to end flaps of the blanks to adhere to the bags and facilitate opening the bags when the carton is set up.

6. A method as claimed in claim **1,** wherein an end flap that adjoins one of said pair of panels is provided with a removable portion at an end of said one panel, adhesive is applied to surround said removable portion, and the bags are laid on the blanks to cover and adhere to the last mentioned adhesive.

7. A method as claimed in claim **1,** wherein the cylinder is perforated and holds the bag material against it by vacuum applied to its interior.

8. A method of making containers from flat paperboard blanks each having four rectangular panels for forming sides of a carton, an edge flap on one of the panels for connecting sides of such carton, and end flaps protruding beyond the ends of the panels for closing the ends of such carton, comprising applying to successive blanks a pair of transverse adhesive patterns extending across the widths of a pair of adjoining central panels adjacent the ends of said adjoining panels, and feeding the blanks successively past a rotating cylinder which applies flat against each blank a flexible tubular bag that adheres to and covers said adhesive patterns and is coterminous with the total width of said adjoining panels, the bag being laid to protrude beyond the ends of said adjoining panels with an end seal of the bag longitudinally spaced from one of the transverse adhesive patterns, at the juncture of said adjoining panels, by a distance at least one half the length of a diagonal of one end of such carton, adhesive being applied to two sides of said edge flap, and such carton being formed by folding the panel having the edge flap to lay one of said adhesive sides of the edge flap against the flat bag to adhere thereto, and folding the remaining panel to lie over the other adhesive side of the edge flap to adhere thereto, the adhesive on said one side of the edge flap being spaced from said seal of the bag by a distance at least one half the length of a diagonal of one end of such carton.

9. A method as claimed in claim **8,** wherein successive bags are formed by feeding extruded tubular bag material to said cylinder where bags are cut from the tubular material and the end seal of each bag is formed in a straight line across the width of the leading end of the bag.

10. A method as claimed in claim **9,** wherein said cylinder is a vacuum cylinder for holding the bags thereagainst to apply them to the blanks.

11. A method as claimed in claim **8,** wherein the adhesive is applied to the edge flap and the panels are folded in a straight-line folder-gluer.

12. A method as claimed in claim **11,** wherein spots of adhesive are provided on end flaps of the blank to adhere to the bag adjacent its unsealed end and thereby open said unsealed end when the carton is set up.

13. A method of making knocked down containers from flat paperboard blanks each having four rectangular panels for forming sides of a carton, an edge flap on one of the panels for connecting sides of such carton, and end flaps protruding beyond the ends of the panels for closing the ends of such carton, comprising applying to successive blanks a pair of transverse patterns of adhesive extending across the widths of a pair of adjoining panels adjacent the ends of the panels, and feeding the blanks successively past a rotating cylinder which applies flat against each blank a flexible tubular bag that adheres to and covers said transverse adhesive patterns and is coterminous with the total width of said pair of panels, the bag being laid to protrude beyond the ends of said pair of panels with an end seal of the bag longitudinally spaced from one of the adhesive patterns, where it crosses the juncture of said pair of panels, by a distance at least one half the length of a diagonal of one end of such carton, the flat blank and bag being devoid of exposed adhesive whereby they can be stacked with other such flat assembled blanks and bags without adhering thereto, an end flap being provided with a removable portion adjoining one of said pair of panels and defined by a line of weakness and surrounded by adhesive which is covered by and adheres to the bag, the removable portion being unattached to the bag.

14. A method of making knocked down containers from flat paperboard blanks each having four rectangular panels for forming sides of a carton, an edge flap on one of the panels for connecting sides of such carton,

and end flaps protruding beyond the ends of the panels for closing the ends of such carton, comprising applying to successive blanks adhesive extending transversely across a pair of adjoining panels adjacent an end of the panels, and also applying adhesive around a removable portion of an end flap that adjoins one of said pair of panels at said end of the panels, and feeding the blanks successively past a rotating cylinder which applies flat against each blank a flexible tubular bag that is coterminous with the total width of said pair of panels and protrudes beyond the ends of said pairs of panels and adheres to and covers the adhesive, with a transverse end seal of the bag longitudinally spaced from said transversely extending adhesive by a distance at least one half the length of a diagonal of one end of such carton.

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