Sept. 8, 1936. R. K. REED 2,053,299

METHOD OF FORMING PAPER CONTAINERS

Original Filed Aug. 16, 1932 2 Sheets-Sheet 1

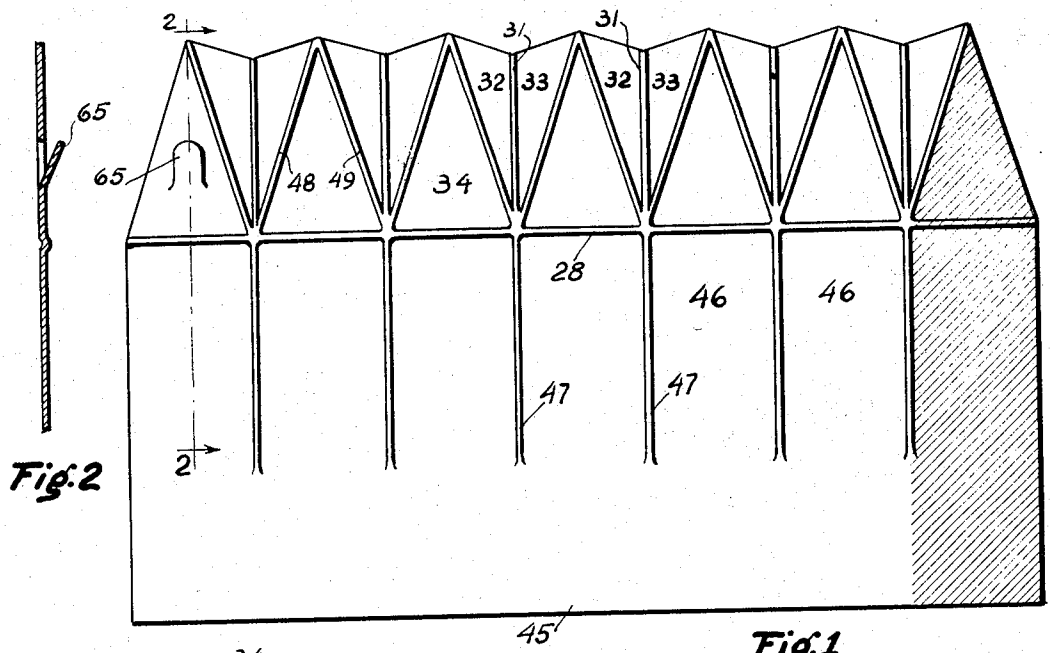


Fig. 2

Fig. 1

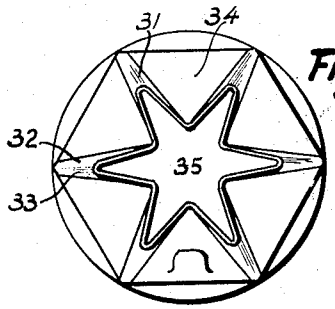


Fig. 3

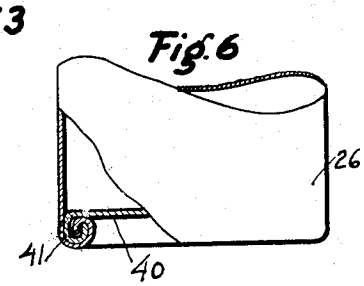


Fig. 6

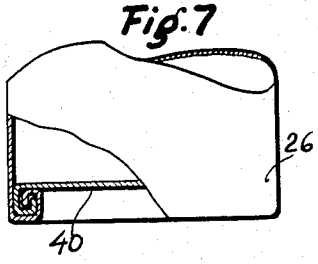


Fig. 7

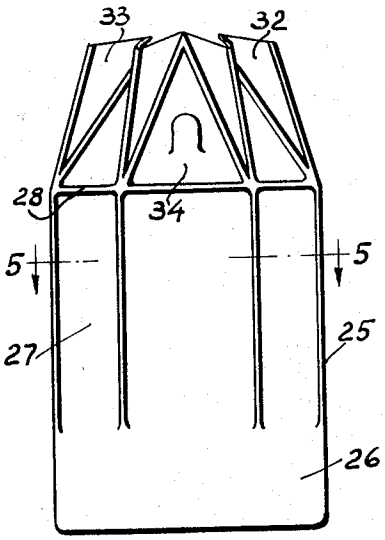


Fig. 4

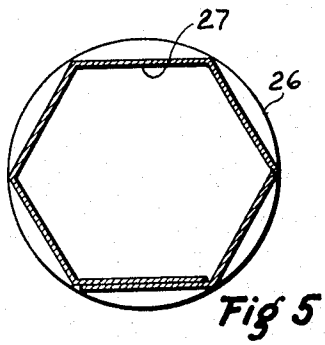


Fig 5

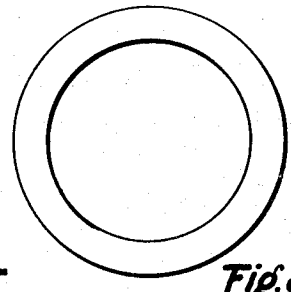


Fig. 8

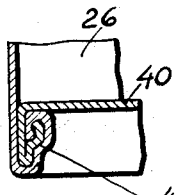


Fig. 9

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METHOD OF FORMING PAPER CONTAINERS

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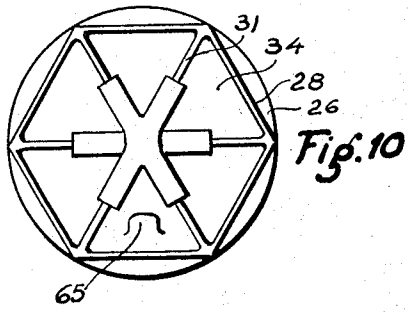


Fig. 10

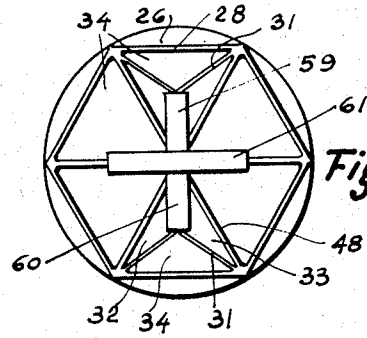


Fig. 16

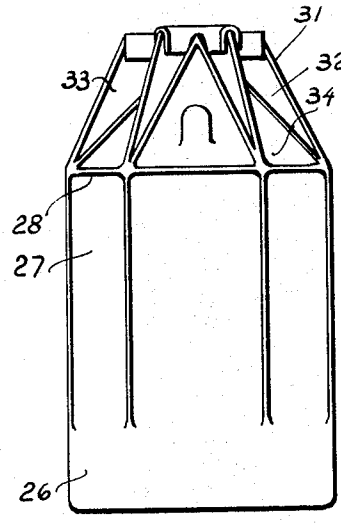
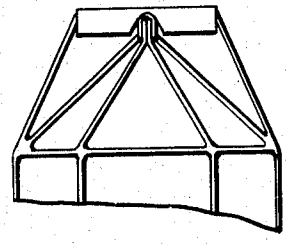


Fig. 11


Fig. 17

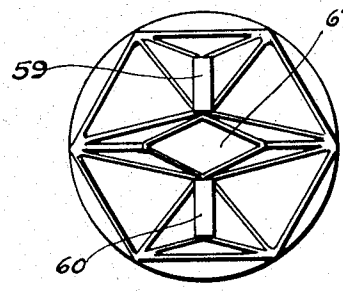


Fig. 18

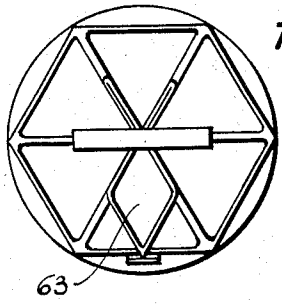


Fig. 12

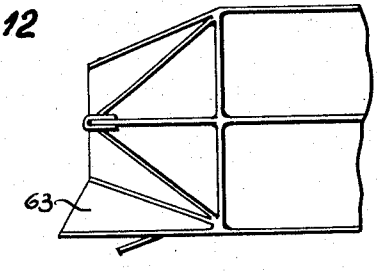


Fig. 13

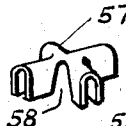


Fig. 14

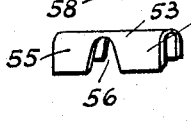


Fig. 15

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UNITED STATES PATENT OFFICE

2,053,299

METHOD OF FORMING PAPER CONTAINERS

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Original application August 16, 1932, Serial No. 628,968. Divided and this application July 27, 1933, Serial No. 682,365. Renewed December 5, 1935

5 Claims. (Cl. 93—2)

This invention relates to a method of forming a paper container.

The present application is a division from an application filed August 16, 1932, Serial No. 628,968.

It is an object of the invention to provide an effective and economical method of forming a paper container.

With this general object in view, the invention consists in the method and steps which will first be described in connection with the accompanying drawings and then more particularly pointed out.

In the drawings:

Fig. 1 is a plan view of a blank for producing a bottle in accordance with the invention;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a top plan view of the bottle with the mouth partly open;

Fig. 4 is an elevational view of the same;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4;

Figs. 6 and 7 are explanatory views relating to the bottom closure;

Fig. 8 is a bottom plan view;

Fig. 9 is a sectional view (enlarged) through a modified bottom joint;

Fig. 10 is a top plan view of the closed bottle with clamping means in place;

Fig. 11 is an elevational view thereof;

Fig. 12 is an end elevation of the bottle in pouring position with part of the clamping means removed;

Fig. 13 is a side elevation of the same;

Figs. 14 and 15 are perspective views of the two-part clamping means;

Fig. 16 is a top plan view of a modified construction;

Fig. 17 is an elevation of the same; and

Fig. 18 is a top plan view of the same with the mouth partly opened for pouring.

Referring to the drawings, the invention is illustrated, as an example, in connection with a paper bottle having a one-piece body portion including a self-closing mouth, and a bottom closure secured to the body portion. It is to be understood that the term "bottle" is used to indicate containers generally and the term "self-closing mouth" is used to indicate a mouth closed by means of the material of the bottle body itself, rather than by a cover or other extraneous closure.

The bottle illustrated as an example in Figs. 1–2 has a lower portion 26 that is substantially circular in cross section and an upper portion 27 that is hexagonal in cross section. As shown, there is no sharp dividing line between these two portions, the flat sides of the hexagon merging gradually into the cylindrical part. Near the upper end of the bottle is a shoulder 28 and above this shoulder is a self-closing mouth.

In the exemplification illustrated in Figs. 1–12, the mouth is defined by the top edges of a plurality of pleats or folds formed in the bottle body and arranged to be closed and drawn together to close the mouth. To this end, that portion of the bottle body above shoulder 28, and which may be termed the bottle neck, comprises a plurality of triangular panels or flutes 34. These panels point inwardly and upwardly and hinge from shoulder 28. Connecting the several panels 34 are pleats or folds 32—33, their common edges 31, on which they hinge, pointing outwardly. As appears in Figs. 3 and 4, the top edges of pleats 32, 33 define a star-shaped mouth 35. By an inward crimping or gathering of the parts, the upper pointed ends of panels 34 approach a common central point, hinging from shoulder 28. At the same time, pleats 32, 33 close up, i. e. the two sides of each pleat approach one another. In completely closed position, the individual pleats are closed flat and the several pleats are drawn together with the inner ends of their top edges meeting at a common central point. In this position the mouth 35 is closed and the top of the bottle presents six radiating closed edges of two-ply stock, two of which appear in Fig. 12. Putting it another way, in this position the top of the bottle comprises a closed pyramid formed by panels 34, with a series of closed folds or pleats extending out from the edges of the pyramid in the nature of fins.

There is provided a bottom closure for the bottle which may conveniently be a separate closure permanently secured to the bottom of the bottle body. As here shown as an example, a disk-like closure 40 having a downturned flange 41 is assembled with the bottle body and the closure flange is secured to the bottom edge of the body by a spinning operation, this step being well known in the art.

In carrying out the invention in its entirety, the overlapping portions of the bottle body and the bottom closure are subjected to a crushing or squeezing operation. Fig. 6 illustrates schematically the parts after the spinning operation. Spun joints of this type have a considerable percentage of leakers due to various causes. For example, a proper lock is destroyed by the in-

herent spring-back in the material and liquid can work its way around the spiral path formed by the overlapped scroll. Creases frequently are formed in the joint and provide channels through which liquid can escape.

Fig. 7 illustrates schematically one manner of avoiding these faults. As there shown, the overlapped scroll of the joint has been subjected to a squaring pressure that squeezes the joint together and crushes it sufficiently to break down the fibres. As a result, any channels formed by creases are squeezed out or closed up; any spring-back tendency is destroyed by the breaking down of the fibres; and the path presented to any liquid that may tend to escape is composed of sharp angles, thus preventing leakage.

Fig. 9 illustrates another crushed and squeezed joint. In this case, pressure is applied to the bottom of the scroll, slightly off-center. The resultant chasing action forces the edge of the bottle body well around back of the edge of the closure flange to form a proper lock and there is a further interlock of the parts at the point **42**. As in the former case, the fibres are broken down to destroy any spring-back tendency; creases are squeezed out or closed up; and the path for any liquid tending to escape has sharp angles. Moreover, as appears in Fig. 9, all internal air spaces in the scroll are closed up.

With joints such as those described, there is substantially no danger of any leakage at the bottom of the bottle.

The body above described, i. e. the entire container except for the bottom closure, may conveniently be formed from a unitary flat blank. Fig. 1 illustrates, by way of example, a flat blank suitably cut and scored or embossed for forming the bottle above described.

This blank comprises a rectangular portion **45** defined by three cut edges and a horizontal score **28**. This rectangular portion is set off into a plurality of panels **46** by vertical scores **47**. These vertical scores start at horizontal score **28** and terminate short of the bottom of the blank, substantially as shown. The number of panels depends on the shape of the desired bottle, there being one extra panel to provide a seam. Thus, for the hexagonal bottle described, seven panels are provided.

Above each panel **46** of the blank is a triangular panel **34**. These panels, except those at the ends, are defined by score **28** and oblique scores **48**, **49**. The triangular panel **34** at one end is defined by scores **28** and **49** and a cut edge of the blank and the panel at the other end is defined by scores **28**, **48** and a cut edge of the blank. The apex of each triangle lies in the top edge of the blank which is of zig-zag formation substantially as shown.

In line with vertical scores **47**, and conveniently formed as continuations thereof, are scores **31**, extending to the top edge of the blank. These scores **31** set off the area between the several panels **34** into two triangles **32**, **33**, having their apices lying in horizontal score **28**.

In forming the bottle body from the blank described, according to an approved procedure, glue or other suitable adhesive is applied to one end panel **46** and one end panel **34**, as indicated by the shading in Fig. 1. The blank is then wound on a cylindrical mandrel with the end panels overlapping and is there held until the adhesive sets. This provides a cylindrical tube to which the bottom closure is attached as above described.

With this cylinder in more or less softened condition, for example, just after a paraffining bath, crimping fingers or dies are applied to the top of the cylinder. By this action, the cylinder "breaks" along scores **47** to take a hexagonal shape, except for the unscored lower portion which remains cylindrical. There is a further "break" along score **28** and along scores **48**, **49**, and **31**. As the crimping action is continued, the top portion is gathered inwardly, panels **34** hinging from the shoulder formed by score **28** and triangles **32**, **33** forming pleats which hinge at their edges formed by scores **31**.

The crimping or closing operation may be interrupted with the mouth only partly closed, as in Fig. 3, for filling. Thereafter, further crimping action closes up the mouth as above described.

In carrying out the invention in its entirety, the folds and creases above described are "set" to remove any tendency to spring back. This may be accomplished by making the folds and creases while the container is soft and hot and filling the same with a cold liquid while still soft and hot. For example, with the bottle described, after the blank has been wound into tubular shape and the bottom closure attached, it is subjected to a hot paraffin bath. This is a customary step in proofing paper containers for milk and similar contents. While the container is still soft and hot, the crimping pressure above referred to is applied and the mouth partially closed (Fig. 3). While the container is still soft and hot, milk or other liquid at subnormal temperature, e. g. 40°, is introduced and the mouth immediately closed. The action of the cold contents on the hot and soft container "sets" the various folds and creases and removes any spring-back tendency.

In carrying out the invention in its entirety, the mouth is sealed by means of a temperature differential. This may be accomplished by means of a crimping or gripping die maintained at a temperature substantially different from the temperature of the bottle. For example, if the bottle is to be sealed while still hot, as from the paraffin bath, the die may be water-cooled to obtain the temperature differential. Or, if the bottle is cool, i. e. at room temperature, a heated die may be used. By such gripping or squeezing of the pleats or folds to close the same tightly at a temperature differential, the pleats are sealed shut, thus sealing the mouth and rendering it substantially air- and water-tight.

The bottle illustrated in Figs. 1–12 has clamping means for retaining the mouth closed. As appears more clearly in Figs. 10–15, this retaining means is in the form of a two-part removable clamp. One part is a clamp element **53** comprising two alined clip portions **54**, **55**. The clips of this clamp element are arranged to slip over the top edges of two diametrically alined pleats to grip the same and hold them closed. The clamp element **53** is centrally cut away, as at **56**, to straddle the other pleats. The second part is a clamp element **57** having four similar clip portions arranged in X formation for slipping over the remaining pleats to grip the same and hold them closed. This clamp element **57** is centrally cut away, as at **58**, to straddle clamp element **53** and the other pleats.

Figs. 16–18 illustrate a further embodiment of clamping means. In this case, two adjacent pleats are drawn together and clamped by a single clip **59**. The two diametrically opposite adjacent pleats are similarly drawn together and

clamped by a similar single clip **60**. The remaining two alined pleats are clamped by a clamping element that is a duplicate of clamp **53**.

While the mouth of the bottle sealed as above described is not liable to come open under ordinary handling, the clamping means described positively holds the mouth closed, since the mouth cannot open unless the pleats unfold. As a result, the bottle may be shipped and otherwise handled without danger of leakage at the mouth. Moreover, the clamping means serves as a protection against the accumulation of dust or dirt on the edges of the mouth.

To remove the contents, the bottle mouth may be opened or partially opened in various ways. The invention in its entirety, however, includes provision for forming a pouring spout. This may be accomplished, for example, by removing part of the clamping means to free one or more pleats and utilizing such pleat or pleats to form a pouring spout.

One method of so obtaining a spout is to cause one of the triangular panels **34** to swing outwardly, the adjacent pleats unfolding and forming, with the panel, a pouring spout. Such a method is illustrated in Figs. 10–12. Clamp element **57** is removed, thus releasing two adjacent pleats, e. g. the lowermost pleats as viewed in Figs. 10 and 12. With this particular clamping means the opposite two pleats are also released but that is incidental. Upon an outward movement of the intervening panel **34**, the two adjacent pleats open or unfold. Continued movement of the panel results in a reverse bend along scores or creases **48**, **49**, the pleats approaching a full open or flat position. In this position, the panel and the adjacent pleats form a pouring spout **63** similar to the spout of a pitcher (Figs. 12, 13).

The formation of this spout may be effected in various ways, for example, by finger pressure or by supplying the panels with a pulling tab.

In using finger pressure, the bottle may be held in one hand and the two released pleats grasped between the thumb and forefinger of the other hand. A diverging pressure on the edges of the two pleats tends to and eventually does flatten out the bends along scores **48**, **49**, i. e. the bends between the panel and the connected sides of the adjacent pleats. As the center line is reached and crossed, the panel starts to pull away. The direction of pressure is now changed, but without the necessity of any shift of the hand. By now squeezing the edges of the pleats toward each other, the pleats open out with a reverse bend along scores **48**, **49** and the parts take the spout position of Figs, 12, 13.

During this opening of the spout there is no general opening of the mouth, the latter being prevented by clamp element **53** which maintains the next adjacent pleats at each side of the spout closed. It so happens that the other two pleats are released, as above referred to, but clamp element **53** prevents any pull or other force that would tend to open them.

There is provided means for pulling out a panel to form the spout above described. Although capable of various constructions, in that shown as an example in Figs. 1–13, one of the panels **34** has a cut-out finger piece or pulling tab **65**. This tab is formed in the outer ply of the overlapping panel so that there is no leakage around the cut-out. The spout above described may be formed by pulling out the panel by means of the tab.

A spout such as that described forms a convenient means of removing the contents of the bottle as there is substantially no drip. Moreover, if only part of the contents is removed, the parts forming the spout may be refolded into initial position and the clamp element replaced. While the mouth, after being once thus partly opened and reclosed, is not air- or liquid-tight, it is sufficiently closed to protect the contents from dirt, dust, etc. while the bottle stands in a refrigerator or the like.

In the embodiment of the clamping means illustrated in Figs. 10–13, all the clips are removable. It will be seen, therefore, that both clamp elements may be removed and the mouth generally opened. But for forming the spout described, it is necessary to have only two adjacent clips removable so as to free two adjacent pleats.

It is possible to form other types of pouring spouts. For example, two alined pleats may be released while the others are held closed. This is illustrated in Figs. 16–18 in which removal of clamp **61** releases the horizontally alined pleats, clips **59** and **60** holding the other pleats closed. By finger pressure applied to the edges of these released pleats, the two pleats may be squeezed open to form a double-ended pouring spout **67**. Release of the pressure or a reverse pressure closes these pleats and clamp element **61** may be replaced. In this case, also, all the clips may be removed, if desired, and the mouth generally opened.

With the bottle above described, there is substantially no danger of leakage at the bottom because of the joint described. The only body seam is a vertical one so there is no horizontal ledge where liquid might tend to work into the overlap. The single seam is relatively wide (Fig. 5) so that there is no danger of the contents breaking down the adhesive to an undue extent. At the top, the mouth is tightly closed so that the bottle may be shipped and otherwise handled without leakage. Not only is the use of extraneous closures avoided, but the mouth is readily opened for removal of the contents and readily closed again if part of the contents is to be retained. In original closed position, moreover, the neck of the bottle presents an interior surface that is substantially a jointless pyramid. As a result, there are no cracks, crevices, ledges or the like where the contents might accumulate. This, in the case of milk, for example, avoids any unsanitary accumulation of dried milk.

The bottle is capable of economical production, particularly in view of the fact that the entire body, i. e. all the container except the bottom closure, is formed from a unitary flat blank which may be cut from a paper roll.

What is claimed is:

1. The method of producing a filled and closed package which comprises forming a paper container having a neck, forming scored lines in said neck where ultimate folds are desired, subjecting the container to a hot coating bath, applying crimping pressure to the container neck while the coating is still hot to make folds along said score lines, and filling the container while still hot with a relatively cold liquid, thereby to set the folds.

2. The method of producing a filled and closed package which comprises forming a paper container having a neck, subjecting the container to a hot coating bath, applying crimping pressure to the container neck while the coating is still hot to make folds therein, and filling the container

while still hot with a relatively cold liquid, thereby to set the folds.

3. The method of producing a filled and closed package which comprises subjecting a paper container to a hot coating bath, applying crimping pressure to the neck of the container while the coating is still hot to make folds for effecting a self-closing mouth, filling the container while still hot with a relatively cold liquid, thereby to set the folds, and gathering in the folded portion to closing position.

4. The method of forming a paper container which comprises providing the container neck with a plurality of scored lines where folds are desired, subjecting the container to a hot coating bath, and applying crimping pressure while the coating is still hot to make folds along said scored lines.

5. The method of producing a filled and closed package which comprises forming a paper container having a neck provided with scored lines where ultimate folds are desired, subjecting the container to a hot coating bath, applying crimping pressure to the container neck while the container is still in a softened condition from the hot bath, thereby to make folds along said scored lines and partially close the container mouth, filling the container, and then further gathering in the folds of the neck portion to close the mouth.

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