July 21, 1970 J. M. TABOR 3,521,422

METHOD FOR CLOSING OPEN-TOPPED LIQUID CONTAINERS

Filed Oct. 24, 1967 5 Sheets-Sheet 1

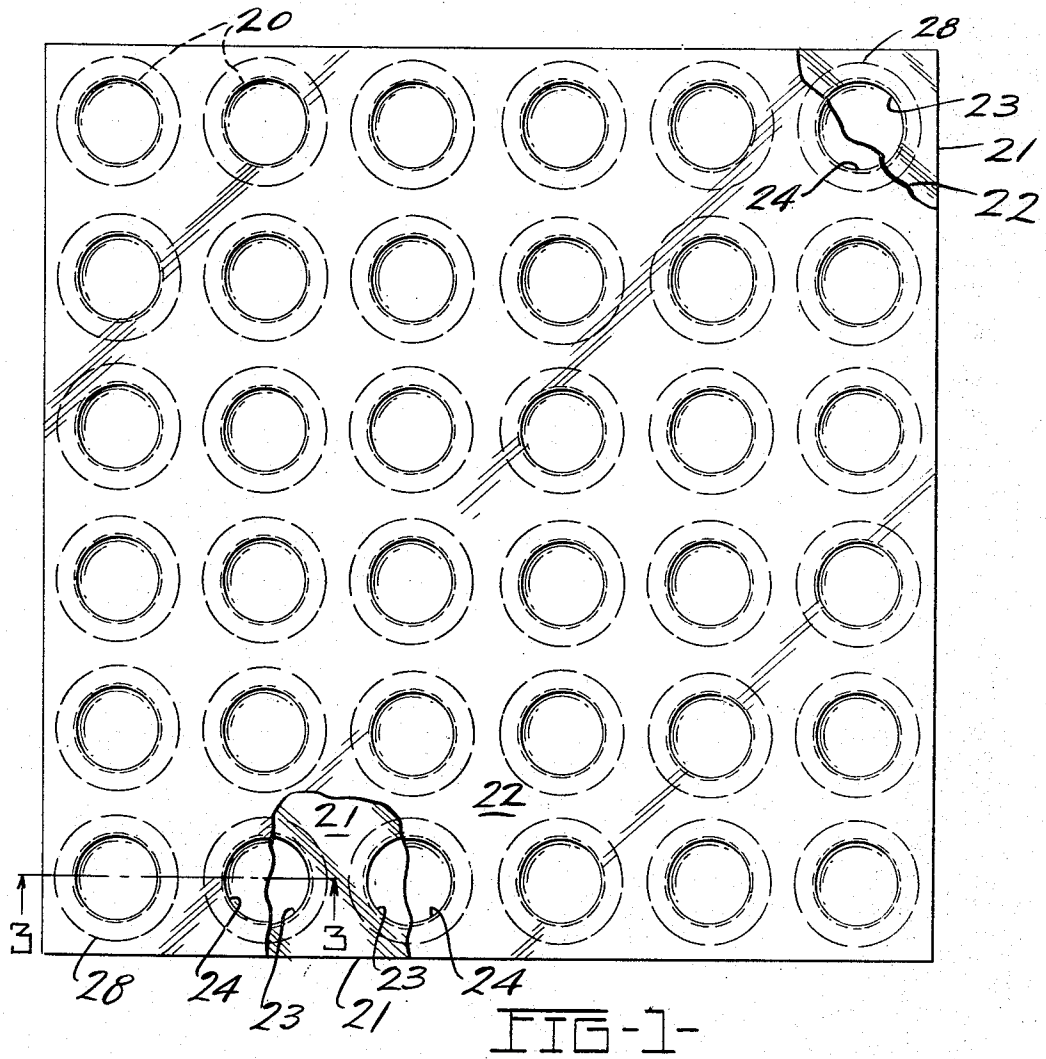


FIG-1-

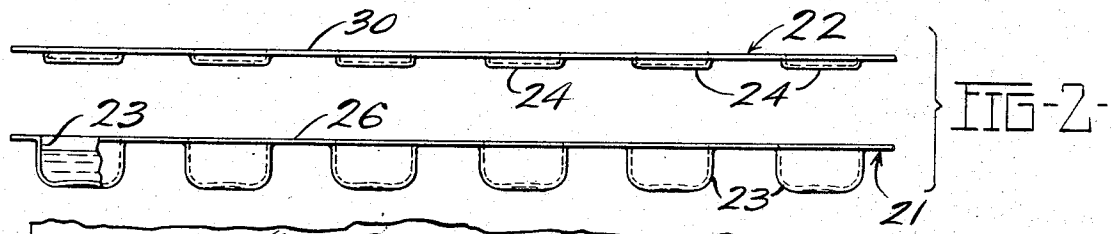


FIG-2-

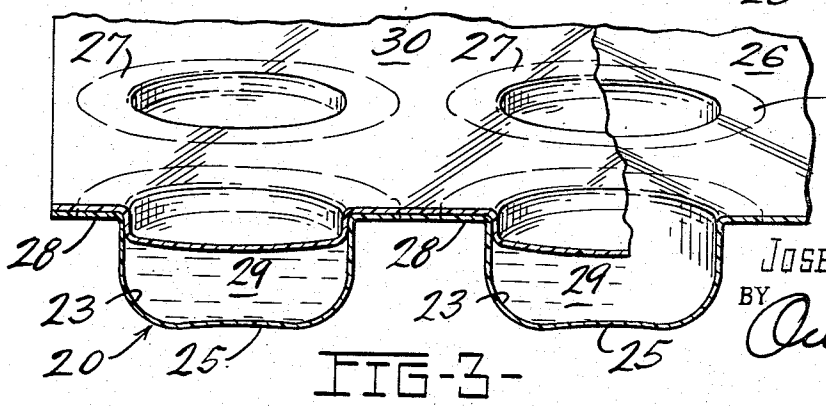


FIG-3-

INVENTOR:
JOSEPH M. TABOR.
BY Owen & Owen
ATT'YS.

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METHOD FOR CLOSING OPEN-TOPPED LIQUID CONTAINERS

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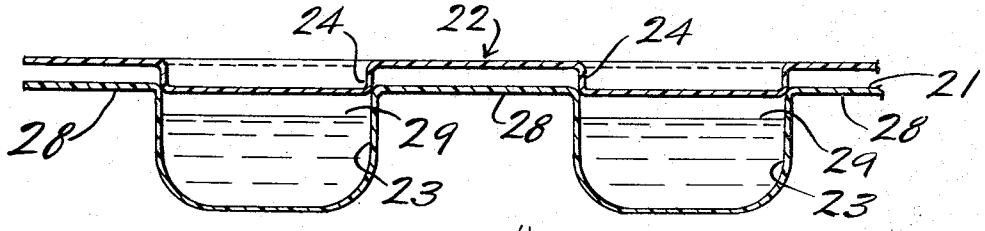


FIG-4-

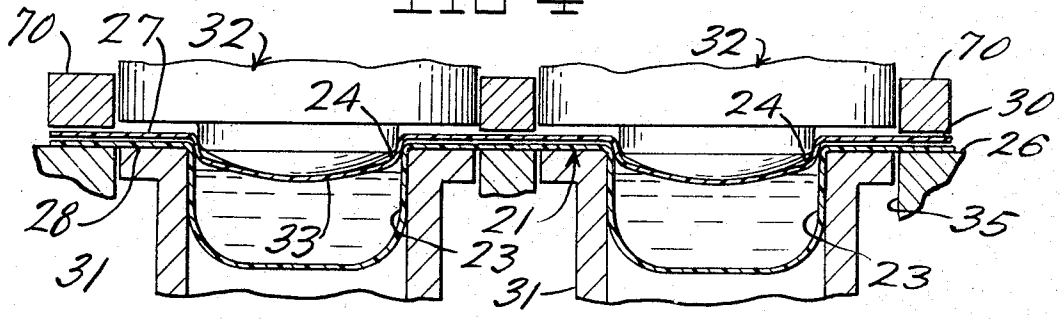


FIG-5-

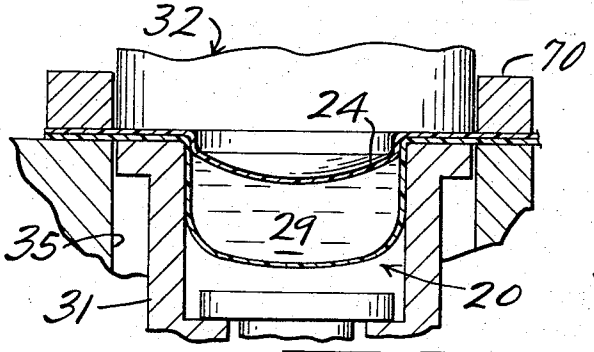


FIG-6-

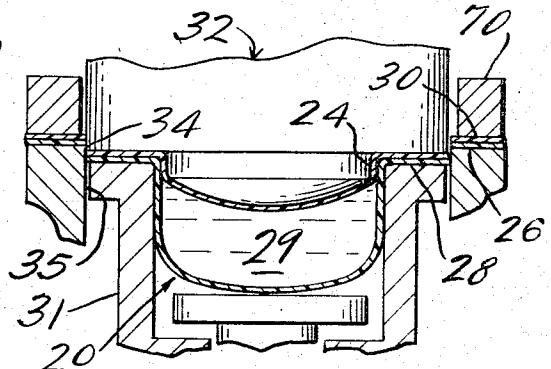


FIG-7-

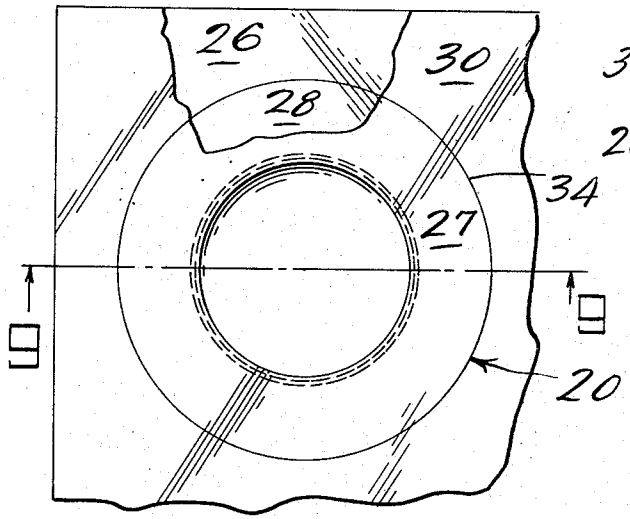


FIG-8-

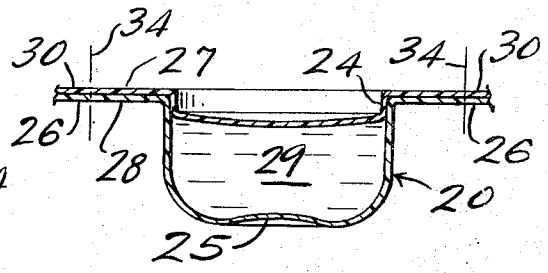


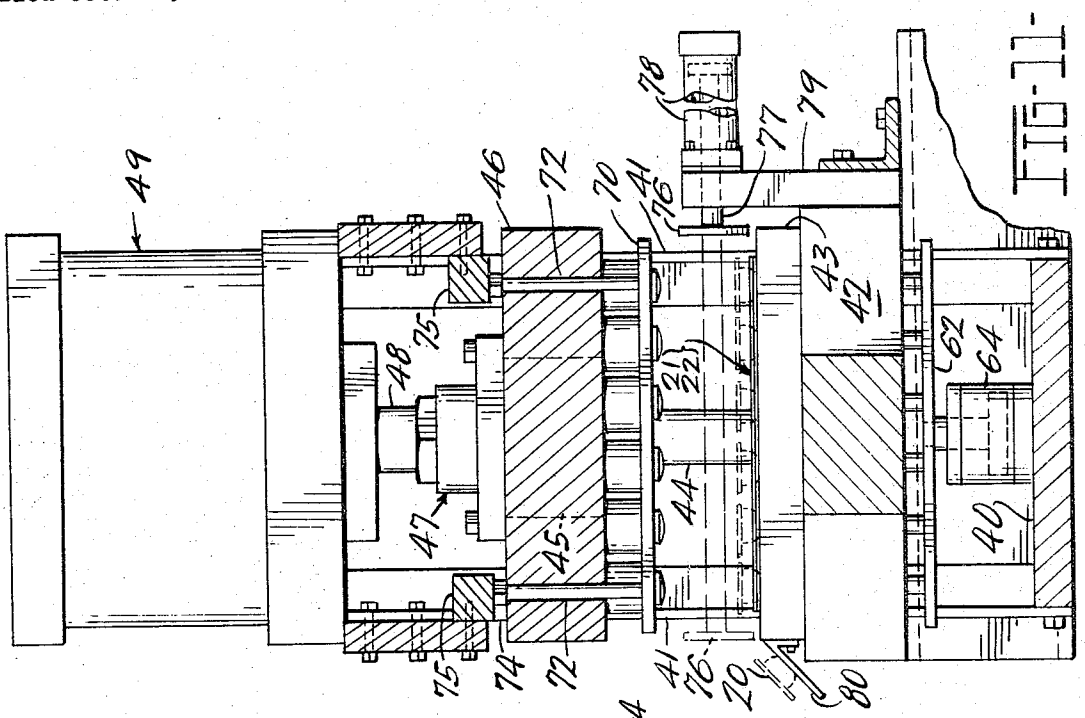
FIG-9-

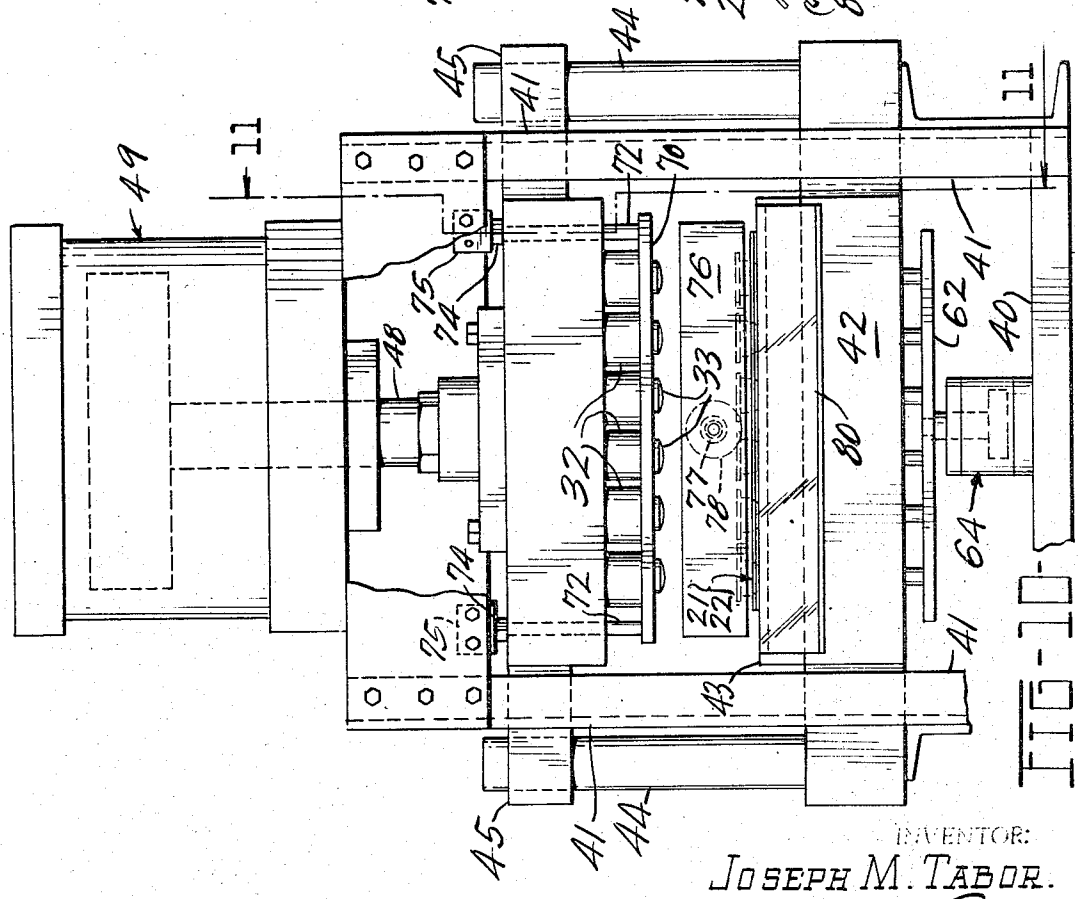
INVENTOR:
JOSEPH M. TABOR.
BY Owen & Owen
AT T'YS.

July 21, 1970 J. M. TABOR 3,521,422

METHOD FOR CLOSING OPEN-TOPPED LIQUID CONTAINERS

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INVENTOR:
JOSEPH M. TABOR.
BY Owen & Owen
ATT'YS.

July 21, 1970 J. M. TABOR 3,521,422

METHOD FOR CLOSING OPEN-TOPPED LIQUID CONTAINERS

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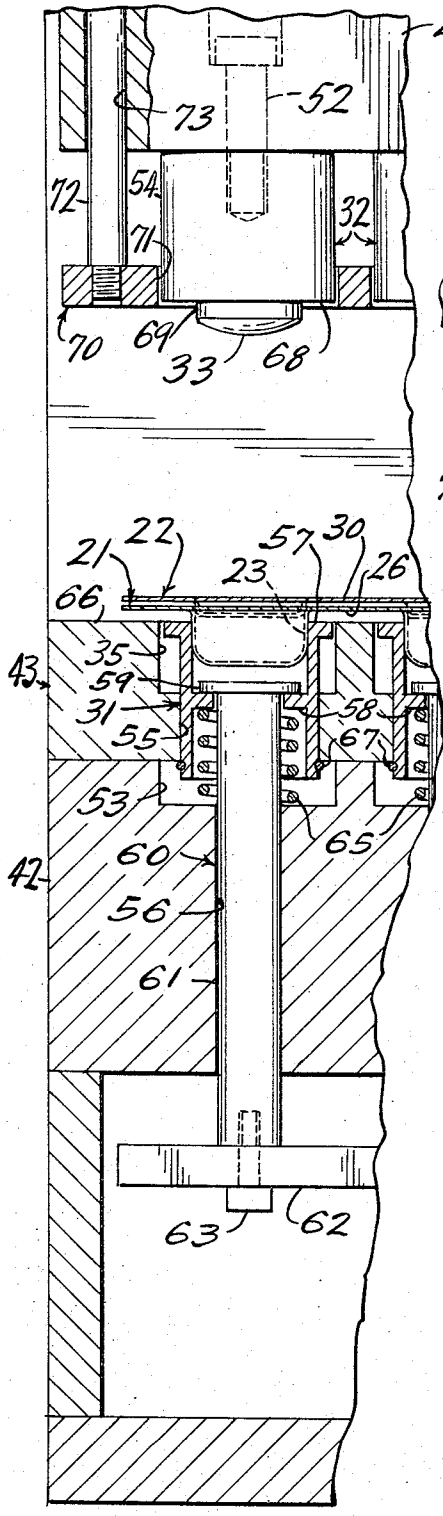


FIG-12-

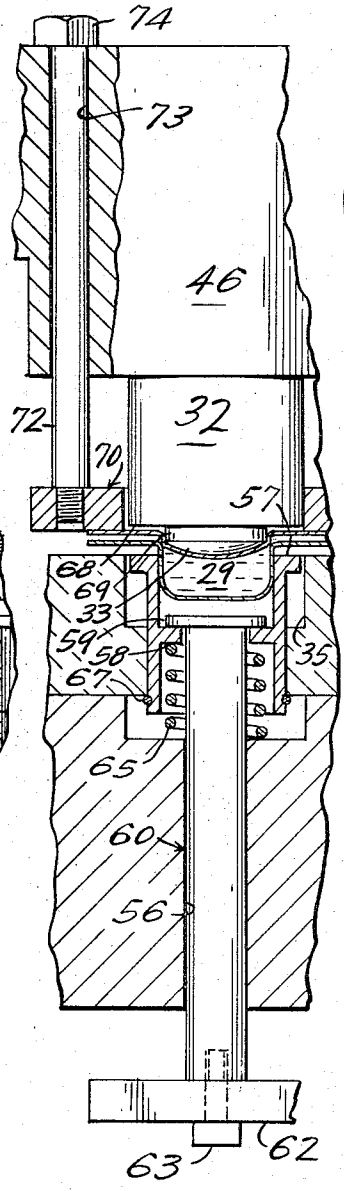


FIG-13-

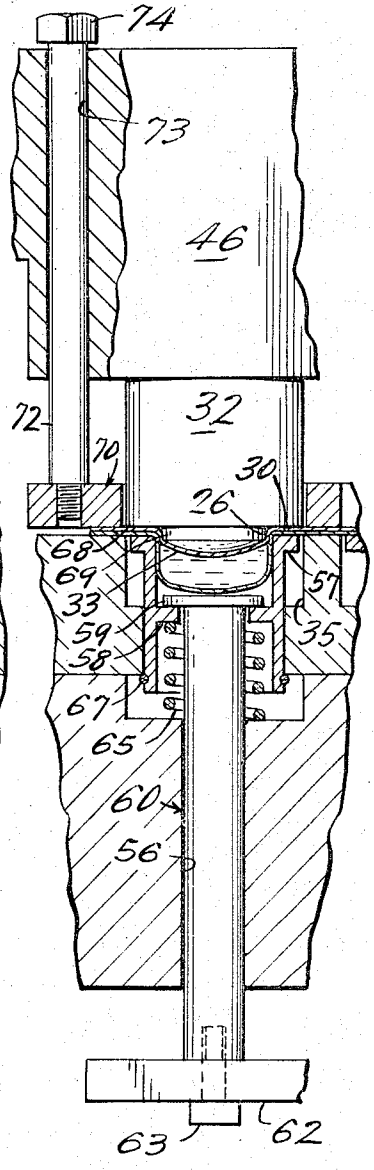


FIG-14-

INVENTOR:
JOSEPH M. TABOR.
BY Quinn & Quinn
ATT'YS.

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METHOD FOR CLOSING OPEN-TOPPED LIQUID CONTAINERS

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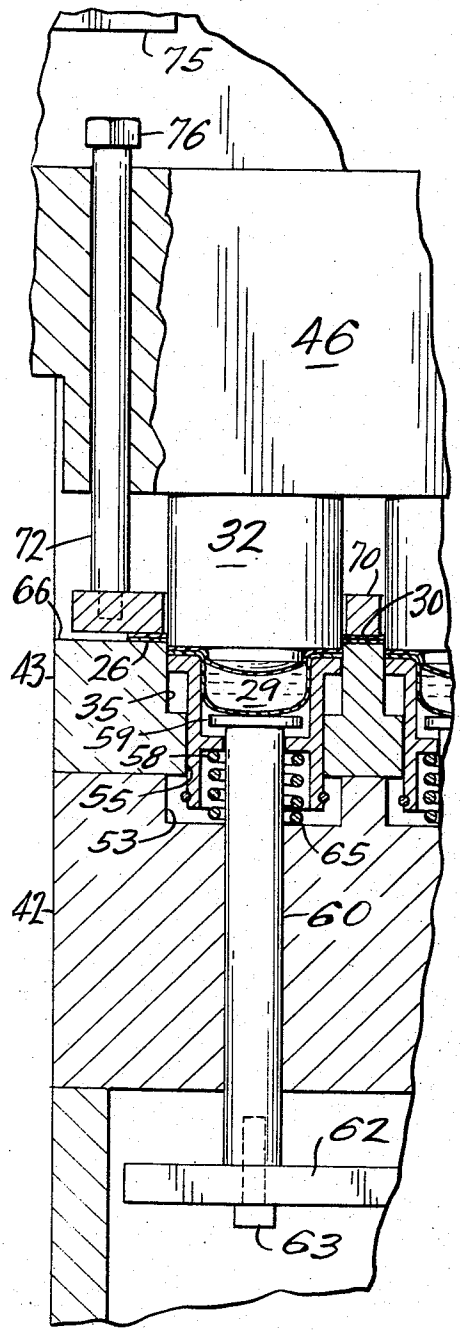


FIG-15-

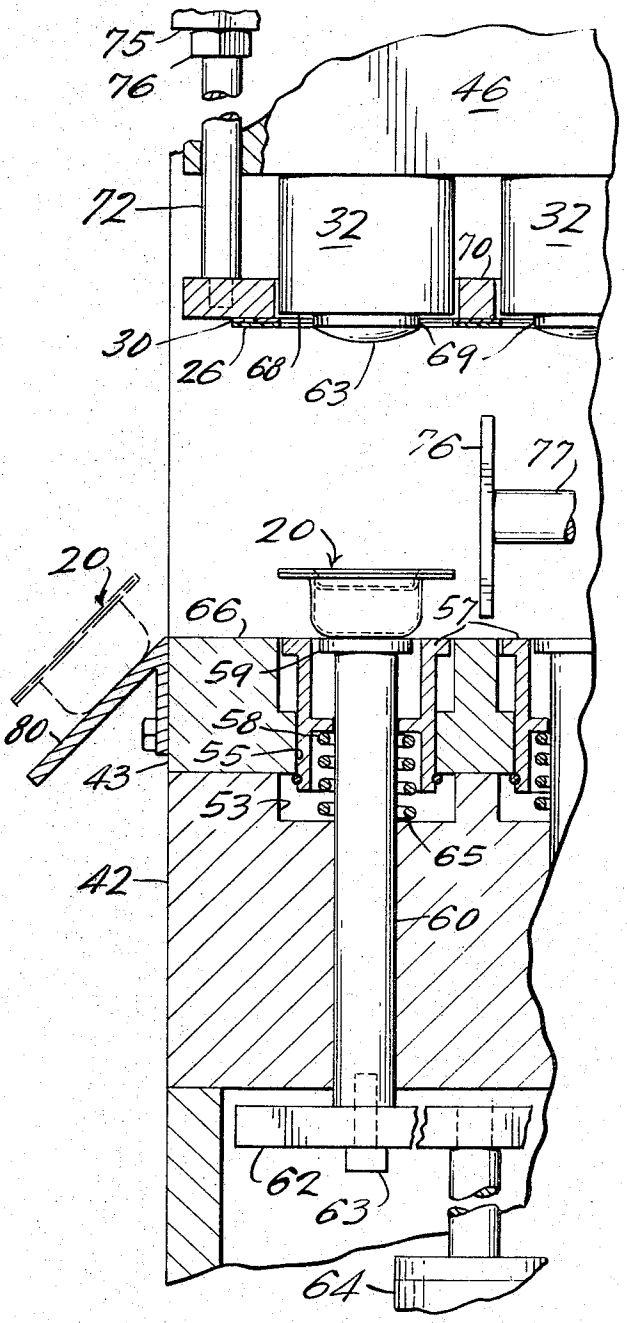


FIG-16-

INVENTOR:
JOSEPH M. TABOR.
BY Owen & Owen
ATT'YS

United States Patent Office 3,521,422
Patented July 21, 1970

3,521,422

METHOD FOR CLOSING OPEN-TOPPED LIQUID CONTAINERS

Joseph M. Tabor, Toledo, Ohio, assignor, by mesne assignments, to Craft Master Corporation, Toledo, Ohio, a corporation of Delaware

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Int. Cl. B65b 61/08, 3/26; B67b 5/00
U.S. Cl. 53—15 5 Claims

ABSTRACT OF THE DISCLOSURE

A method and apparatus for closing open-topped containers each of which has a cup-shaped body and an outwardly extending rim, with a press-in lid having a similar rim and a depressed central portion that is adapted to be mated in the open top of the body, with the respective rims in juxtaposition. The method includes the step of resiliently supporting the container beneath its rim and the apparatus has an upwardly biased tubular support in which the container is nested for this purpose. The apparatus has a convex plunger which is moved downwardly to engage the central depressed portion of the lid, to deform it downwardly and to thrust it into the open upper end of the body and into engagement with the liquid in the body. Continued downward movement of the lid forces the liquid up along the deformed convex surface of the depressed central portion of the lid, expelling air from beneath the lid, and immediately thereafter the lid is seated in the body with the rims in juxtaposition. The method comprises the foregoing steps. The apparatus includes multiple supports and plungers in a pattern shown as being reticulated in a six-by-six group in order to simultaneously close a group of containers and to cut them out of a multipocket sheet of similar configuration. Each plunger has an annular shoulder around and spaced upwardly from its convex end which cooperates with a circular edge on a cavity in an aligned die plate, through which one of the tubular supports extends, to cut out the closed containers from the continuous pocketed sheet in which the group is formed. Each die cavity also has an ejector movable upwardly through the tubular support for ejecting a closed container therefrom.

While the type of individual liquid container to which the instant invention relates is not in itself broadly new, certain modifications in its structure have been incorporated in accordance with the teachings of the instant invention in order to facilitate the carrying out of the method and the operation of the apparatus which do embody the instant invention.

Small liquid containers of the type comprising a cup shaped, open top body having a radially directed flange around the edge of its open top and a cap which is snapped into the open top and which has a similar flange and a recess mating in the open top of the container, have been used for packaging small quantities of oil paints such as those which are supplied with conventional paint-by-number hobby craft painting sets. While containers of this type may be utilized for the packaging of small uniform quantities of liquids other than oil paints, such as cream, maple syrup, ketchup or other foodstuffs, cold cream, face lotion or other cosmetics, shoe polish, oil and various other liquids and semiliquid materials, these containers have been found perculiarly advantageous for paint-by-number sets and, when closed in accordance with the teachings of the instant invention at high speed and in large quantity, have been found very suitable for that use.

However, when a container of the type herein involved was closed by merely forcing a cover or lid having a central depression into mating relationship with the open top of a container body, a quantity of air was trapped between the upper surface of the liquid in the container and the entering recess of the cover. As the cover was forced into place, very frequently the increasing compression of the air trapped beneath the cover caused a small quantity of the content liquid to flow through the opening created by the escaping air. This prevented an air tight closure and frequently resulted in oxidation or other deterioration of the content liquid, as well as leaking containers.

It is, therefore, the principal object of the instant invention to provide a method and an apparatus for closing liquid containers of the type described rapidly and securely with virtual elimination of all imperfectly closed containers and in such fashion as to expel air which has been trapped beneath the lids when such containers have been closed in manners according to the prior art, without causing leaks.

This object and other more specific objects and advantages of the instant invention will be better understood from the specification which follows and from the drawings, in which:

FIG. 1 is a plan view of a group of containers of the type involved with the instant invention and illustrating their shape, relative size and spacing, as well as the lines along which they are cut from a continuous sheet according to the disclosure of the instant application;

FIG. 2 is an end view in elevation showing a group of open topped containers, each partially filled with content liquid, and a cover sheet comprising a plurality of lid recesses aligned with the group of containers which it is to cover;

FIG. 3 is a greatly enlarged, fragmentary view, partly in section and partly in perspective, taken from the position indicated by the line 3—3 of FIG. 1;

FIG. 4 is a still further enlarged, vertical sectional view, showing two individual containers partially filled with liquid and at a first step in the method embodying the invention;

FIG. 5 is a view similar to FIG. 4 but illustrating a successive step in the method of the invention and fragmentarily and in section, some of the elements of the apparatus embodying the invention;

FIG. 6 is a view showing one of the containers with its lid seated in its open top and illustrating a step subsequent to that illustrated in FIG. 5;

FIG. 7 is a view similar to FIG. 6 but showing a successive step wherein the individual containers and their lids are severed from a continuous web of containers;

FIG. 8 is a fragmentary plan view on a still further enlarged scale showing an individual container with its lid in place and illustrating how it is severed from the web remaining in the cover and container sheets;

FIG. 9 is a fragmentary, vertical sectional view taken along the line 9—9 of FIG. 8;

FIG. 10 is a fragmentary view in elevation with parts broken away, of an apparatus embodying the instant invention as designed for simultaneously closing thirty-six containers according to the invention;

FIG. 11 is a fragmentary, vertical sectional view, taken along the line 11—11 of FIG. 10;

FIG. 12 is a fragmentary, vertical sectional view, showing a single unit of the apparatus illustrated in FIG. 10 and drawn on a greatly enlarged scale, the apparatus being shown in its open position with a container and a lid in a position corresponding to FIG. 4;

FIG. 13 is a view similar to FIG. 12 but showing the apparatus with the container parts in approximately the relative positions illustrated in FIG. 5;

FIG. 14 is a view similar to FIGS. 12 and 13, illus-

trating a slightly later step with the container and its lid being in the position shown in FIG. 6;

FIG. 15 is a view similar to FIGS. 12–14, and showing the container in a position similar to FIG. 7; and

FIG. 16 is a view similar to FIGS. 12–15, but illustrating the final ejection of a sealed container from the apparatus of FIGS. 10 and 11.

METHOD OF THE INVENTION

In discussing the method embodying the invention, reference made particularly to FIGS. 1–9 inclusive, of the attached drawings.

In FIG. 1, there is shown a plan view of a group of thirty-six individual closed containers **20**, as provided by a multipocketed sheet **21** and closed by a cover sheet **22**, according to the invention. Each of the containers **20** thus comprises an individual pocket **23** in the sheet **21** and an individual recess **24** in the cover sheet **22**. The pockets **23** and recesses **24** are arranged in their respective sheets **21** and **22** in the same pattern, and in FIG. 1 this pattern is shown as comprising thirty-six pockets **23** and recesses **24**, in a reticular arrangement, six wide and six long. All of the pockets **23** have the same internal volume, the same size, and the same configuration, and all of the recesses **24** are similarly spaced on center to center distances and are of such size and shape as to frictionally mate in the open upper ends of the pockets **23**.

The pocketed sheet **21** preferably is fabricated by vacuum forming of the individual pockets **23** so that all of the pockets **23** are the same size, shape, orientation and volume, and also in order to reduce the thickness of their bottoms **25** (FIGS. 2 and 3). After pocketing the sheet **21** to form the group of pockets **23**, the sheet **21** also comprises a planar web **26** which, in the package illustrated in the drawings, extends between the respective pockets **23** and outwardly from the outermost rows thereof. Finally, after closing, sealing and cutting, for the formation and removal of the individual containers **20**, the web **26** remains as a square sheet through which thirty-six enlarged holes of a diameter equal to the outside diameter of cover rims **27** and body rims **28** have been punched.

Each of the pockets **23** forms a container body and each body is filled with a measured quantity of content liquid indicated by the reference number **29**. The volume of content liquid **29** is less than the internal volume of one of the individual pockets **23** (FIG. 4) by a volume substantially equal to the displacement volume of one of the recesses **24** in the cover sheet **22**, so that after the individual containers are closed, and the air trapped beneath the lids is expelled, each individual container **20** will be completely filled with content liquid.

After punching out the individual containers **20**, the cover sheet **22** is also left as a web **30** of the same size and configuration as the planar web **26** which remains in the sheet **21**.

While the containers **20** illustrated in the drawings are shown as having circular rims, it will be readily apparent as the description proceeds that a circular shape is not essential either for the package **20** or for the rims **27**, **28**, and that other shapes within limits such as ovals, or even squares or rectangles could be utilized.

After all of the pockets **23** of a pocketed sheet **21** have been filled with measured uniform quantities of content liquid **29**, or after but a single pocket **23** for a single finished container **20** has been filled with a measused quantity of content liquid **29**, the pocketed sheet **21** or the individual pocket **23**, is positioned in place and either a cover sheet **22** comprising a plurality of properly spaced recesses **24**, or an individual lid comprising a rim **27** and a recess **24**, is positioned over the open top or tops of a pocket **23** and in axial alignment therewith as illustrated in FIG. 4.

Referring now to an individual pocket **23** and lid recess **24**, but with the realization that for the group thereof shown in most of the drawings, the same steps would prevail, it is first necessary to support the rim **28** of the body pocket **23**. As illustrated in FIG. 5, the rim **28** of an individual body pocket **23** is planar, being a part of the web **26** and it may be conveniently supported by the upper planar end of a tubular support **31**, or by a ring having a flat surface or any other similar means. The center of the central recess **24** of a lid is next deformed downwardly, for example, by engagement with a plunger **32** having a convex end **33**. The plunger **32** is then moved downwardly moving the lid into the open upper end of the pocket or body **23** until the undersurface of the recess **24** where it is deformed, engages the surface of the content liquid **29**. It will be observed in FIG. 5 that at this point in the closing process, the rims **27** and **28** do not contact each other and that by deforming this central portion of the recess **24** downwardly, it is also slightly deformed around the circular margin where its bottom **25** meets the cylindrical portion of the wall of the recess **24**.

As the recess **24** is further deformed downwardly (FIG. 6) and moved inwardly against the content liquid **29**, the liquid flows upwardly and outwardly along the undersurface of the recess **24** being displaced by the intrusion of the deformed central portion of the recess **24** thereinto, and sweeping or expelling air upwardly radially and outwardly between the corners of the flanges **27** and **28**. Because the central portion of the recess **24** is displaced to a substantial degree, as shown in FIG. 6, the interior volume of the now closed container **20** is less by a small quantity than it was before the recess **24** was thrust thereinto and deformed to the extent illustrated in FIG. 6. In order to compensate for this reduction in volume produced by the substantial deformation of the bottom of the recess **24**, the bottom **25** of the pocket **23** bulges downwardly and slightly outwardly at its lower corners as is also illustrated in FIG. 3.

According to the method of the invention, by reason of the downward deformation of the center of the recess **24** and the movement thereof into contact with and below the surface of the content liquid **29** to produce the results shown by comparing FIGS. 5 and 6, substantially all the air within the pocket **23** and trapped beneath the cover recess **24** is expelled radially outwardly between the flanges **27** and **28** just prior to their movement into close juxtaposition as shown in FIG. 6. The respective inner diameters of the pocket **23** and outer diameters of the recess **24** are, of course, so chosen as to result in a tight friction fit therebetween after they have been moved to the position illustrated in FIG. 3.

According to the invention, the now closed individual container **20** is severed from the pocketed sheet **21** and cover sheet **22** by cutting the sheets **21** and **22** along a line spaced outwardly from the perimeter of the open top of the pocket or body **23** as is illustrated in FIG. 7. In this figure, the plunger **32** is shown as moved below the initial horizontal level of the pocketed sheet **21** and cover sheet **22**, shearing these sheets along a circular line indicated by the reference number **34** in FIGS. 7, 8 and 9 to leave the rims **27** and **28** extending radially outwardly from the individual container **20**. This also leaves the webs **26** and **30** as the remainder of the pocketed sheet **21** and cover sheet **22**, respectively.

Immediately after the cutting step in the method, (illustrated in FIG. 7), the restraining forces previously exerted on the rim **28** of the body pocket **23** are released and the force which previously had deformed the cover recess **24** is also released. By reason of the relatively thinner bottom **25** of the container **20**, as compared to the bottom of the container lid recess **24**, a balance of hydrostatic forces results in dimpling the bottom of the container **20** upwardly while leaving the central portion of the recess **24** convexed slightly downwardly as can best be seen by reference to FIG. 9.

As can also be seen by reference to FIG. 7, immediately after the cut line 34 has been produced and the individual container 20 is free of the webs 26 and 30, the edges of the rims 27 and 28 are retained in juxtaposition by frictional engagement with the inner surface of a circular die pocket 35 in which the tubular support 31 moves. This frictional engagement with the outer peripheral edges of the rims 27 and 28 prevents distortion thereof and possible leaking prior to the time when the deforming pressure on the bottom of the recesses 24 and on the bottom 25 of the pocket 23, has been relieved.

Although the tubular support 31, plunger 32 having a convex end 33, and die pocket 35, are illustrated in FIGS. 5–7, inclusive, these are but illustrative of means which may be employed for manipulating the container elements in accordance with the teachings of this invention.

APPARATUS OF THE INVENTION

In FIGS. 10 and 11, there is shown an apparatus suitable for the automatic closing, sealing and cutting out of thirty-six individual containers 20 from a pocketed sheet 21 and cover sheet 22 as shown in FIG. 1 of the drawings. The apparatus comprises a base 40 upon which are erected upright frame members 41 which support a heavy cross plate 42. A thirty-six pocket die plate 43 rests upon and is conventionally secured to the cross plate 42. At least two vertical guides 44, one at each end, are mounted in the heavy cross plate 42 and extend upwardly parallel to each other at opposite sides of the machine. The guides 44 are engaged in ears 45 of a travelling cross plate 46 that is connected by suitable yoke structure 47 to a rod 48 of a hydraulic or pneumatic ram, generally indicated by the reference number 49. The upper ends of the uprights 41 are tied to each other by structural end plates 50 and 51 which also support the body of the ram 49.

The travelling cross plate 46 dependingly supports a plurality of the plungers 32, each being secured to the cross plate 46 by a machine bolt 52 as shown in FIG. 12. The plungers 32 are coaxial with and arranged in the same pattern as, the corresponding die pockets 35 in the die plate 43. The cross plate 42 also has a plurality of counter bores 53 aligned beneath the die pockets 35. The diameters of the die pockets 35 are the same as the outside diameters of large cylindrical sections 54 of the plungers 32. Each of the die pockets 35 has a central bore 55 extending downwardly through the die plate 43 concentrically with the die pocket 35 and with the counter bore 53 therebelow, and a concentric guide bore 56 extends downwardly from the counter bore 53 through the cross plate 42.

One of the tubular supports 31 is mounted in each of the die pockets 35 and central bores 55 with its lower end extending down into the counter bore 53. The tubular support 31 has an outwardly directed support flange 57 at its upper end, the outside diameter of the flange 57 being slightly less than the inside diameter of the die pocket 35. The inside diameter of the tubular support 31 at its upper end, is only slightly greater than the outside diameter of one of the body pockets 23 so as to provide a fairly snug fit and to support the sidewalls of the body pocket 23 during the closing operations. At a distance beneath the outward flanges 57, somewhat greater than the maximum depth of one of the die pockets 23 or a closed container 20, the tubular support 31 has an inwardly directed inner flange 58 which supports a flat head 59 of an ejector 60, having a stem 61 which extends downwardly through the open bottom end of the tubular support 31, and through the counter bore 53 and the guide bore 56 to a level beneath the bottom surface of the cross plate 42. All of the lower ends of the ejectors 60 are secured to a thrust plate 62 (see also FIG. 10) by suitable machine screws 63 and the thrust plate 62 is rigidly connected to an ejector cylinder 64 mounted on the base 40.

A spring 65 (FIG. 12) surrounds the stem 61 of the ejector 60 interiorly of the tubular support 31 and bears against the undersurface of the inwardly directed flange 58 and the bottom of the counter bore 53 to bias the tubular support 31 upwardly. An snap ring 67 in the outer surface of the tubular support 31 near its lower end, engages with the bottom edge of the die plate 43 at the central bore 55 to limit the upward movement of the tubular support 31, so as to position the upper surface of the outwardly directed flange 57 at the same horizontal level as a top surface 66 of the die plate 43.

Each of the plungers 32 has a cylindrical section 54 which mates closely with the die pocket 35 and which terminates in an annular shoulder 68 surrounding a plunger tip 69 on which the convex end 33 is formed. The plunger tip 69 extends cylindrically from the shoulder 68 a distance substantially equal to the depth of the cover recesses 24 and the convex end 33 protrudes beyond that depth a sufficient distance to produce substantial central and downward deformation of the bottom of a cover recess 24, as has been described above.

A web stripper plate 70 has a corresponding number of bores 71 surrounding the lower ends of the cylindrical portions 54 of the plungers 32. The stripper plate 70 has the same configuration as the planar web 26 of the pocketed sheet 21 and the web 30 of the cover sheet 22 after the several containers have been closed and punched out of these respective sheets, i.e., it is a substantially square plate with thirty-six evenly spaced circular bores 71. The stripper plate 70 is hung from the travelling plate 46 by corner bolts 72, each of which slides vertically in a guide hole 73 drilled at the respective corner of the travelling plate 46. Heads 74 of the four bolts 72 limit the downward movement of the stripper plate 70 to a level where its lowermost surface is just below the level of the shoulders 68 (FIG. 12). Striker blocks 75 are secured on the inner sides of each end of the end plates 50 and 51 and are vertically aligned with the heads 74 of the bolts 72 so that when the travelling plate 46 reaches its uppermost position (FIGS. 12 and 16), the heads 74 of the bolts 72 will strike their respective striker blocks 75 thrusting them downwardly to the lower limit of their travel relative to the plungers 32.

The apparatus illustrated in FIGS. 10 and 11 has a clearing bar 76 mounted on the end of a horizontal rod 77 of an air cylinder 78 (FIG. 11) supported by a bracket 79 secured to the base 40 and cross plate 42.

Operation of the apparatus just described for the closing and cutting out of containers of the type herein involved, comprises the following sequence of steps:

A pocketed sheet 21 comprising, in the illustrated embodiment, thirty-six pockets 23 arranged in a six-by-six reticulated pattern, is filled with measured charges of content liquid 29 on apparatus designed for that purpose. As previously mentioned, the volume of content liquid inserted into each of the pockets 23 is less than the volume of the pocket 23 by a difference substantially equal to the displacement volume of a particular package lid recess 24. Ideally, as was explained above with reference to FIG. 9, the volume of content liquid 29 is slightly less than the difference mentioned above in order that the balancing of the hydrostatic forces will produce the configuration of a container 20 as shown in FIG. 9.

The operator orients the filled pocketed sheet 21 with the upper open ends of the tubular supports 31 and inserts the individual pockets 23 at least partially into their open upper ends. The operator then places a cover sheet 22 over the pocketed sheet 21 with the recesses 24 aligned with and resting in the open tops of the body pockets 23, as shown in FIGS. 4 and 12.

In the following further discussion, reference will be made to an individual body pocket 23 and cover lid recess 24 as it is individually put through the successive closing, sealing and cutting off steps, and as illustrated in FIGS. 12, 15, 14, it being understood that, of course, the entire group of thirty-six body pockets 23 and lid

recesses 24 are identically treated on the apparatus shown in the drawings.

After the partial insertion of the cover recess 24 into the open upper end of a body pocket 23, the two planar webs 30 (cover sheet) and 26 (pocketed sheet 21) are spaced slightly vertically from each other as is shown in FIG. 12, and, because the pocket 23 is not inserted fully into its tubular support 31, the planar web 26 of the pocketed sheet 21 is also spaced above the top surface 66 of the die plates 43 and the top surface of the flange 57 of the tubular support 31. The operator then actuates the controls to cause the ram 49 to extend its rod 48 downwardly moving the plunger 32 downwardly so that its convex end 33 enters the pocket 24 and begins the deformation of the bottom of the pocket 24 convexly and into contact with the upper surface of the content liquid 29, as shown in FIG. 13. The force exerted against the bottom of the recess 24 deforms the recess 24 downwardly and, compensatorily, slightly bulges the upper areas of the recess 24 as is more clearly shown in FIG. 5. Engagement of the lowermost portion of the now convexly deformed bottom of the recess 24 with the content liquid 29 causes the content liquid 29 to flow outwardly and upwardly along the convex surface of the lid recess 24, expelling air trapped in the body 23 outwardly and upwardly between the engaging surfaces of the recess 24 and the pocket 23.

Further continued downward movement of the plunger 32 (FIG. 14) finally depresses the deformed center portion of the recess 24 fully into the content liquid 29 and, substantially simultaneously therewith, the shoulder 68 of the plunger 32 presses the cover rim 27 and cover sheet web 30 downwardly into juxtaposition with the body rim 28 and the body web 26. Simultaneously with this last increment of movement, and as illustrated in FIG. 14, hydrostatic pressure in the content liquid 29 and the fact of the reduction of the volume within the now closed container 20, causes the bottom of the pocket 23 to bulge downwardly compensating for the fixed volume of content liquid 29 therein.

During the downward movement of the plunger 32 so far described, the stripper plate 70 has performed no function but, as can be seen in FIG. 14, when the two webs 30 and 26 are in juxtaposition against the upper surface 66 of the die plate 43, the stripper plate 70 comes into contact with the top surface of the cover sheet web 30 and retracts slightly relative to the plungers 32 which it surrounds. This lifts the heads 74, the bolts 72 upwardly slightly relative to the travelling plate 46.

Continued downward movement of the plunger 32 (FIG. 15) advances its cylindrical portion 54 into the open upper end of the die pocket 35 with the outer peripheral junction line of the cylindrical portion 54. The shoulder 68 cooperates with the circular corner between the pocket 35 and the top surface 66 of the die plate 43 as a shear, to cut out the individual container 20 along the line indicated by the reference number 34 in FIG. 8. This additional increment of downward movement tightly squeezes the cover rim 27 and the body rim 28 together between the shoulder 68 of the plunger 32 and the flange 57 of the tubular support 31, and moves the tubular support 31 downwardly relative to the die pocket 35, against the spring 65.

The rest position of the ejector 60 is such that even when the plunger 32 has moved to the lowermost limit of its travel (FIG. 15), the head 59 of the plunger 60, does no more than slightly contact the bottom surface 25 of the container 20, but with insufficient force to reduce the volume of the container 20 and thus possibly expel any of the content liquid 29 outwardly between the rims 27 and 28. The stripper plate 70 serves a function during the cutting out operation illustrated in FIG. 15 by resting by gravity upon the juxtaposed webs 26 and 30 thereby helping to retain them against deformation during the shearing action.

Immediately after the shearing step illustrated in FIG. 15, either the operator or automatic controls, actuate the ram 49 to retract the plunger 32 to its uppermost position wherein the heads 74 of the bolts 72 hit their striker blocks 75 to strip the two webs 30 and 26 off of the plungers 32 to which the juxtaposed webs 26 and 30 cling during the upward travel of the plungers 32. The operator may reach into the open front end of the machine to catch these two webs 26 and 30 as they are stripped off the ends of the plungers 32.

Immediately after the upward movement of the travelling plate 46 and the plunger 32, the ejector cylinder 64 is energized to push the thrust plate 62 upwardly and to move the ejector 60 upwardly as illustrated in FIG. 16. When the plunger 32 is moved upwardly, the biasing spring 65 is expanded, returning the tubular support 31 to its upper position wherein the top surface of its flange 57 lies in the same plane as the top surface 66 of the die plate 43. When the ejector 60 is moved to its upper position, the top surface of its head 59 also lies in the same plane as the top surface of the flange 57 and the surface 66 of the die plate 43. The mechanism is shown in this position in FIG. 16.

Thereafter, the clearing cylinder 78 is energized to sweep the clearing bar 76 across above the die plate 43 to push all of the thirty-six containers 20 to one side of the die plate 43 where they tumble down a guide 80 and fall into a suitable container positioned adjacent the apparatus.

Immediately after the retraction movement of the clearing bar 76 to its rest position (to the right in FIGS. 11 and 16), the ejector cylinder 64 is energized to pull the thrust plate 52 and the ejector 60 downwardly to the position shown in FIG. 12, and the apparatus is once again ready for the reception of a subsequent pocketed sheet 21 in which the charges of content liquid 29 have been previously placed, all as described above.

Having described my invention, I claim:

1. A method for closing a liquid container consisting of an open top body having an outwardly extending planar rim and a press-in lid having a similar rim, and a central depressed portion adapted to be mated in the open top of the body, said method comprising, aligning said lid over said body with the depressed portion thereof centered in the open end of said body, resiliently supporting the rim of said body, deforming the center of the central depressed portion of said lid downwardly while moving said lid axially into the open top of said body, and continuing the movement of said lid axially into said body for displacing the liquid therein outwardly and upwardly along the convex center of the lid by the engagement of the center of the lid therewith until substantially all the air within said body is expelled from beneath said lid and the rims of said body and said lid are moved into juxtaposition.

2. A method according to claim 1 in which the material of which the body is formed is less resistant to deformation than the lid material and the step of deforming the body downwardly as the lid is moved axially into the body after contact with the liquid therein and until the rims are in juxtaposition.

3. A method according to claim 1 and the step of shearing the rims of the body and the lid along a predetermined line spaced outwardly from the perimeter of the open top of the body while maintaining the lid deformed against the content liquid.

4. A method according to claim 1 and after the rims are in juxtaposition, the step of frictionally retaining the edges of said rims in juxtaposition while relieving the lid deforming pressure and then relieving the frictional retention of the edges of said rims.

5. A method for closing and cutting out a plurality of liquid containers from a sheet having a predetermined

number of open top cup shaped pockets therein all of which have the same volume, size and shape, and that are arranged in a certain pattern with the sheet forming a planar web therebetween, and into each of which pockets has been placed a uniform volume of liquid that is less in volume than the pocket by a predetermined quantity, said method comprising (1) resiliently supporting said web around the margins of all of said pockets, (2) placing over and in alignment with said pockets, a cover sheet having the same number of recesses therein arranged in the same pattern with the lateral outside diameter of the cover recesses being of a dimension adapted to frictional mate in the open tops of the pockets, the displacement volume of the recesses therein being approximately equal to the difference between the volume of the pockets and the content liquid, and said cover sheet forming a planar web between the recesses, (3) moving said cover sheet downwardly relative to said pocketed sheet for intruding the recessed portions thereof into the open tops of said pockets, (4) deforming the central portions of the recesses in said cover sheet downwardly into contact with the liquid in said pockets, (5) continuing the downward movement of said deformed central portions axially into said pockets for displacing the content liquids engaged

therewith outwardly and upwardly therealong until substantially all of the air in the pockets is expelled from beneath the recesses in said cover sheet and until the recessed portions thereof are seated in the pockets with the webs of said pocketed sheet and said cover sheet in juxtaposition, and (6) cutting said webs along lines surrounding said pockets and spaced from the perimeters of said pockets for severing individual containers from said webs.

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WAYNE A. MORSE, JR., Primary Examiner

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