(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
18 May 2006 (18.05.2006)

PCT

(10) International Publication Number
WO 2006/051284 A2

(51) International Patent Classification:
B65D 77/06 (2006.01)

(21) International Application Number:
PCT/GB2005/004313

(22) International Filing Date:
8 November 2005 (08.11.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0424680.7 9 November 2004 (09.11.2004) GB
0424810.0 10 November 2004 (10.11.2004) GB

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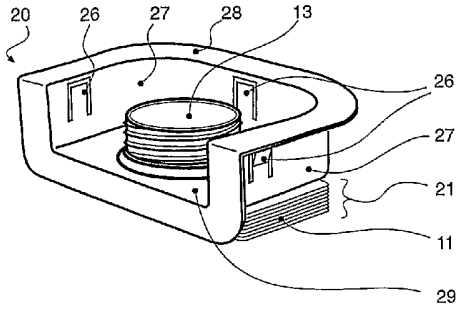
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) **Title:** BAG CARTRIDGE WITH ANTI-TORQUE COLLAR



(57) **Abstract:** A collapsed bag cartridge (20) for Bag-in-Box (BIB) carton packaging, is configured for installation as a self-contained module in an aperture (24) in a pre-assembled carton (12) wall; the bag cartridge features a collapsed bag (110 in a compact folded format (21) with a locating and retention collar (12) upon a bag neck (13) of complementary profile to the carton aperture; with complementary inter-fitting ribs and slots (18,129), in collar aperture rim upstand (17) and bag neck (13) for closure anti-torque action.

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Bag Cartridge with Anti-Torque Collar

This invention relates to so-called Bag-In-Box (BIB) carton packaging suitable for diverse flowable materials, such as liquids, gels, granules, pellets, capsules, sachets, chunks, crystals, flakes or powders.

Terminology - BIB

The term BIB is used herein for convenience to embrace packaging with inner and outer structures of different materials. A prime category features a relatively soft deformable inner liner or bag and a relatively stiff, hard outer box or carton. The inner structure is impermeable and sealable for contents enclosure - whilst the outer structure need not be, but rather serves as a protective outer cover.

Fundamentally, inner and outer structures are made separately and independently by different processes and brought together for contents fill. This contrasts with, say, continuous sealed tube carton technology, such as represented by TETRAPAK ™

Particular BIB concerns are carton case assembly erection, bag (liner) insertion, inflation and fill. BIB offers the prospect of collapse format, both before and after use, with attendant savings in so-called in-bound logistics and post-usage disposal.

Thus BIB obviates shipment and storage of empty containers preparatory to contents fill. However, BIB does require mechanised assembly preparatory to fill, and thus additional facilities and operations at or prefacing a fill station. These counter savings in transport and storage of empty rigid wall containers. Moreover, BIB fill requires specialised equipment, generally incompatible with that for rigid containers.

Regulatory & Environmental

Regulatory and environmental pressures militate against rigid wall plastic containers, but both bag plastics and card are biodegradable. Moreover, some territories apply import levies upon weight of plastics material introduced, so minimal plastic bag mass is advantageous. Both carton and bag lend themselves to production from materials which can be recycled.

Bag

Although commonly, thin walled for economy of production - and so vulnerable, to puncture, tear or rupture - a bag lends itself to collapse before and after use for contents storage. The Applicant has used this to advantage in bag installation.

Carton or Box

A relatively stout outer box or carton offers protection and support to an otherwise vulnerable bag. Mutual bag-carton interaction - and in particular relative location - pose particular challenges for BIB packaging.

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Prior Art - Conventional BIB

In a conventional carton assembly and erection to an open-ended sleeve format is undertaken separately from bag (contents) fill. Bag fill is undertaken through a top neck or spout, before installation of a (threaded) closure cap.

A filled bag is inserted through a carton open (top) end and carton top flaps closed over the bag to create a full enclosure. A bag neck and spout may be submerged within the closed box - accessible by opening a panel or hatch. Alternatively, the bag neck or spout penetrates a localised aperture in a box top flap.

Mechanisation

In conventional mechanisation for mass production and on-line fill, a case-erector is employed for carton assembly erection and flap closure. For sealing a carton closed, hot melt adhesive is applied to mutually overlaid panel faces and/or tape is overlaid upon carton edges. However, adhesive and thin wall bags are generally incompatible - and this has proved a deterrent quality control concern in BIB adoption. Moreover, top entry bag insertion dictates an open top carton configuration with closure panels or flaps - requiring a discrete taping security step for retention.

Applicant's Earlier Technology

The Applicant has BIB technology with various (branded) improvements, including ...

JERRIBOX (™)

The Applicant has devised a bespoke BIB container - branded JERRIBOX (™) - in which a special locating collar is fitted between inner bag liner and outer box carton, to allow fill on a fill line originally intended for rigid wall containers such as plastics jerrycans.

The Applicant has also devised a collapsible flat pack pre-assembled format, in which a collapse folded bag is sandwiched within a collapse folded carton wrap - but for a protruding neck - itself held captive by a locating and entrainment collar.

The Applicant has further devised pneumatic bag inflation - branded PULSE PA(C)K (™) - to effect, or at least assist, bag and wrapped carton erection into a 3-D form, preparatory to fill. A continuous or discontinuous (time / amplitude) 'controlled' individual pneumatic pulse or pulse stream is envisaged for this.

Challenges arises in assembly, erection and contents fill of such JERRIBOX (™) containers. Thus conventional carton case erectors cannot handle collapsed JERRIBOX (™) containers without some modification. The Applicant has devised re-configured case erectors and a bespoke machine dedicated to bag erection and fill from a collapsed form within a collapsed carton.

For use on a fill line, in particular with diving or plunging head fillers, a protruding bag spout must be prevented from retreating into an outer carton by bag deformation and collapse. The Applicant's collar between bag neck and carton aperture captures and inhibits bag neck axial movement in relation to the carton.

Bag Orientation

Bag angular orientation or indexing within the carton is also a factor, particularly for rectangular bags. With a bag collar intervention between bag neck and carton, bag disposition reflects relative locations of bag and collar, along with collar and carton. Complementary inter-fitting, say rectangular, collar and carton aperture profiles inhibit relative collar and carton rotation. For bag neck screw closure fitment and tightening bag anti-rotation or anti-torque provision is desirable.

Statement of Invention

According to one aspect of the invention
a BIB carton comprises
a bag location and retention cartridge or capsule,
configured as a compact module,
mounted upon or entrained with a bag neck
for insertion from outside the carton,
into a (pre-formed) carton panel aperture.

Alignment & Anti-Torque

An optional feature is complementary inter-fitting collar and neck profiles. An example would be a serrated collar aperture and radial protrusions on a bag neck. These are conveniently disposed adjacent a bag neck ring which interacts with the circumference of a collar aperture, or an upstand rim there-from.

The module is self-contained and pre-fabricated - with bag ready for mounting and deployment. The cartridge can feature a bag location and retention collar such as previously devised by the Applicant, but adapted to facilitate bag installation - specifically by admitting bag (collapse) pre-fold.

It is easier to handle and insert a pre-collapsed bag into a carton than an erect one, with less risk of bag snagging, tear or perforation. Thus, such a cartridge represents an alternative to interleaving of flat bag and carton before erection - a technique also

conceived and pioneered by the Applicant.

External Installation

A cartridge can be installed from externally of a carton - a radical departure from BIB convention. Indeed, the carton can be fully erected and sealed into a closed 3-D form, merely leaving exposed a modest profiled aperture for cartridge insertion. Thus carton completion need not be delayed pending bag installation.

Carton Profile

The carton aperture desirably has flat sides to contact corresponding flat sides on a bag collar. A rectangular aperture and collar bounding profile are convenient, but other flat-sided, polygonal forms could be used.

Complementary curvilinear forms might also be contrived, given consideration to geometry for mutual interfit, retention, location and anti-rotation.

Pre-formed Carton Aperture

A carton aperture to receive a cartridge - or rather its location and retention collar - is desirably pre-formed. Thus an aperture could be die cut as part of an elongate laid-flat strip 2-D carton blank, preparatory to folding over into a closed loop 3-D form.

Pre-Perforation of Carton Aperture Delineation

As an alternative to pre-cut out, a micro-perforated aperture delineation might be pre-imprinted as a weakening line into a carton panel. This preparatory local wall thickness reduction and weakening facilitate punch through displacement to reveal an aperture, upon cartridge forced insertion. One location is desirably at an edge between top flap and side wall - so as not to undermine stiffness - by contriving aperture bounding edges in orthogonal panel faces.

Push Fit Cartridge Insertion

Unusually for BIB, cartridge insertion can be undertaken for an assembled and closed carton, by push-fit and snap-action edge rim retention lugs.

Frangible Collapsed Bag Tie

A cartridge features a collapse (say concertina) folded bag disposed within a frangible or burstable enclosure, wrap or bag (of say thin paper), with optional bounding closure tie, and a location and retention collar entrained to a back neck.

Bag Within Collar Confines

A collapsed bag can sit within the bounding confines or footprint of a peripheral rim upstand of a cartridge collar, or as a snug cluster under a collar tray. The collapsed bag should be unencumbered by its temporary enclosure, to remain freely deployable - say, upon contents fill, with optional preparatory pre-inflation (air) pulse burst. A

compact pre-assembled cartridge protects the bag until deployed within a carton and is more readily shipped, stored and handled - so better suited to automated mechanised assembly lines.

Cartridge Packing

Pre-assembled cartridges could be stacked upright in a grid array in a carton tray, readily accessible for pick-and-place collection by a robotic arm. A plunger nose penetrating the collar, or rather the bag neck aperture, could be used, or a modest suction, to grip a selected cartridge for withdrawal from its shipment packaging tray. A standard case erector could be adapted for full carton assembly, erection, end flap closure, bounding edge tape seal and /or panel bonding - preparatory to mechanised cartridge insertion by, say, a robotic pick-and-place arm.

Anti-Torque Bracing

A bag neck or spout must be braced against screw closure cap fitment and tightening to seal - otherwise the neck, and with it the bag, would twist and deform. This requires interaction between bag and box. The cartridge, or rather the collar part of the cartridge, has a reception aperture for bag neck insertion.

The collar aperture edge rim can be profiled as a slightly raised, resiliently deformable snap-action interfit with a threaded bag neck. Coarse circumferential segmentation or serration of such a collar aperture upstand rim and co-operative interaction or interfit with a complementary ribbed profile or at least radial lugs upon a bag neck collar.

Interfit of collar aperture recesses and bag neck ribs or lugs provides anti-rotational action and the interfit of a rectangular profile collar bounding edge with a rectangular carton aperture braces collar to carton. So overall, bag neck rotation upon threaded closure cap screw tightening is inhibited. The collar aperture upstand and bag neck collar abutment also inhibits bag neck retraction under downward load of, say, a plunging head filler.

Bag-Collar Entrainment vs Integration

Bag neck and collar can be mutually entrained discrete elements (with say snap action interfit of profiled collar aperture and bag neck) or integrated (say with a unitary moulding) upon bag production. Entrainment favours pre-assembly of a collar and collapsed back in a compact cartridge forma. Additional features could be integrated with the collar - say for carton retention and handling.

Integrated Clip

The collar desirably has an integrated retention 'clip' profile for interaction with carton panel edges. Clip action allows for spring action by resilient deformation of collar wall and/or carton panel edge.

Unitary Cartridge Module

The cartridge as a unitary module can thus clip - say with positive snap-action - into a carton wall aperture.

Recessed Tray Profile

The recessed tray profile with inset bag neck or spout of the Applicant's PCT/GB2004/002609 could be adopted. The tray serves for spillage containment and local carton wall protection. In that PCT case, options for integration of bag neck and collar and bag installation from outside a carton were envisaged.

The present invention provides improvements in modular wrap, location and retention. A tray collar preserves an overall rectangular carton profile with bag in situ and a spillage containment shield helpful as a splash guard in original contents fill and subsequent user pouring - card carton material being vulnerable to moisture wetting.

Collapse-Fold Bag + Collar

Pre-Wrapped Bag Cartridge

In a particular construction, a bag, pre-collapsed within frangible (paper) outer shroud, has a neck entrained or integrated with a locating collar. This pre-assembly is ready for installation as a unitary module into an aperture in a carton wall, such as a top closure flap and/or side panel.

Pre-Insertion

Such a bespoke collapsed bag and entrained locating collar can be pre-inserted - ie before bag inflation and contents fill. 'Whole body' insertion in a larger than conventional BIB carton (bag neck) aperture is envisaged. In some variants, (cartridge) insertion could be combined with a carton closure step - by co-operative interfit between collar and carton flaps.

Initial carton erection and closing could leave (part or fully) open top flaps for interaction with the collar, before flap closure and sealing. A so-called 'crash-lock top and bottom carton end flap configuration could be contemplated. This would admit of manual or simple mechanised operation - say with pre-glued panels for bonding on mutual flap (closure and overlay) contact.

Closure - Lock

The collar could itself form a carton (top flap capture) closure or lock. Such a closure might supplement, or even substitute for, conventional carton flap closure techniques such as tape or adhesive bonding.

Carton Re-configuration

The carton configuration admits of re-design over conventional end flap closures.

Collar - Carton Interfit

Thus, collar and split flap interaction could be substituted by collar and carton wall aperture interfit. Insertion action would reflect collar interfit - with, say, selective use of deflection, slide and/or rotation.

One-way Insertion

A one-way insertion mode would be desirable to inhibit inadvertent unseating and withdrawal under transit vibration, handling and bag inflation forces. Vigorous mix shaking as in paint industry use would be and example. An irreversible insertion without visible evidence of interference could serve as a tamper evident closure.

Manufacture - Moulding

As to collar manufacture, whilst low cost (tooling) vacuum forming techniques might be employed. For more elaborate forms, such as integrated clip, injection moulding is envisaged. Further features might then be incorporated in a common mould tool, without disproportionate cost. For longer runs, injection moulding would allow more elaborate feature integration - such as of collar and bag neck.

Recycling

Ready reversal of installation and/or break out and isolation of component elements upon BIB container discard after use lends itself to re-cycling. Thus a collar moulding and bag could qualify in the same plastics recycling category and are readily separated from the carton itself in another category.

Collar (Clip) Retention

The collar desirably features retention clips for interaction with carton panels or panel edges.

Discrete Clip

Discrete individual clips may be employed, say with a one-way spring wedge or detent insertion action. A serrated depending tang, spike or stud allows one-way insertion in a complementary panel aperture, by temporary deflection of panel edges - but inhibits removal by abutment with panel underside faces.

Edge Clip Profile

Alternatively, a fragmented or continuous resiliently deformable edge profile may be adopted. This profile is deflected upon insertion just sufficiently to fit within a carton panel mounting aperture, whereupon it springs back to inhibit withdrawal by engaging panel inside faces. Continuity may run around the entire clip periphery or segmented in juxtaposed runs along clip side edges.

Flex Floor

For a collar configured as a shallow tray, with a peripheral upstanding edge wall and top flange or lip overlay, a conical tray floor profile admits flexing. Reversal of such

flexing to stable profiles on either side of an (unstable) flat plane in turn drives the walls outward or inward - for panel aperture insertion or location- retention.

Flexible Bag

Bag collapse pre-supposes a flexible bag (wall) - admitting rolling and/or folding without permanent set or damage and restitution of unfurled format.

Pillow Bag

A free-form so-called pillow bag - which is volumetrically compatible with, and whose outer profile conforms to, the inner profile of an outer carton containment - could be employed. That said, rectangular format bags, with seams dictating a pre-constrained outer profile, complementary with carton capacity, could be used.

Roll / Fold Orientation

A bag roll or fold axis orientation transverse and/or about the bag neck axis may be adopted. Bag orientation is facilitated by correction collar positioning and retention by carton closure. Alternatively, a concertina or successive mutual overlay, fold may be employed. Multiple individual fold axes, in selective combination across and/or along or parallel to a bag neck axis, could cumulatively contrive a compact cartridge form. Yet such a cartridge could be readily expandible - without snagging - in, say, the manner of a parachute, to an unencumbered, fully-deployed form, ready for contents fill.

Carton Configuration

An insertable from exterior bag-collar cartridge frees up top closure constraints upon carton configuration. Thus split top carton flaps could be replaced by a continuous wrap. Alternatively, multiple top flap configuration could be adapted for collar mounting - say to allow insertion in one plane, followed by insertion in another plane. Reliance would then still be placed upon a final taping of top and/or side flap seams to secure overall carton closure. Bag inflation could be contrived to promote carton (top flap) closure - ie a proportion of filled bag weight could be transferred through neck locating collar, to the top flaps. The collar itself could be configured to promote carton (top - side) flap closure.

Collar Portion Interfit

Discrete complementary opposed collar portions could be configured for co-operative locking interfit upon installation around a protruding neck spout.

Collar Slot - Slide Action

A collar edge slot could allow (lateral) sliding insertion of carton panel edges. Slot depth could allow either solid or corrugated carton card materials. Slot walls could retain a modest resilient spring action to grip inserted carton layers.

Split / Hinged Collar

A split and/or hinged collar configuration could facilitate installation and promote carton closure.

Frangible Restraint Tie

A restraint tie, such as a tape, band or cord, could wrap around a collapsed (rolled and/or folded) bag to preserve collapsed condition until severed or fractured preparatory to, or upon bag deployment. A 'self-destruct' tie, or overall bag wrap or sheath - ie one which failed (eg rupture or burst) upon intentional bag inflation load - could help protect the collapsed bag cartridge in the interim.

Sheath Format

A sleeve or collar sheath format would suit a cylindrical bag roll about the bag neck axis. A pneumatic pulse inflation could burst or rupture such restraint, without damage to the bag wall itself.

Inflated Bag - Split Collar Interaction

Bag inflation could promote or secure split collar installation by, say, bag top wall contact bias against a collar underside, to resist collar fold or collapse. Thus, for example, reversible cone collar floor action could be triggered by contact with inflated bag top wall shoulders, in turn to flip collar walls outward into secure location with carton top panel / flap edges.

Pre-tensioned Bag Wall

A bag wall pre-tensioned or biassed to impart an inherent roll-up or collapse fold tendency or pre-disposition could be contrived to keep a split collar ready for installation. That is, bag collapse into a compact pack would accompany collar element (re-)disposition.

Residual Contents Discharge

Once bag contents have been discharged ,while the bag remains within a carton, the bag cartridge could be removed and the bag rolled and/or folded to promote residual contents discharge. A bag with a permanent memory or set for reversion to a collapsed form would impart contents discharge bias throughout its temporary storage role. Such a set could be imparted by differential local heat treatment and/or wall stretch or thickening upon initial bag fabrication such as from a continuous tube, or as post-fabrication treatment by applying a heated tool.

Flat Pack

Operationally, collapsed bag cartridges and collapsed cartons could be delivered to a fill location. This eases so-called 'inbound logistics' and minimises local storage space requirements. Bag cartridges suitable for a variety of carton shapes and sizes also simplify stock requirements.

Carton Liner

A bag cartridge is compatible with a carton liner, inserted upon initial carton erection, before end flap closure and before bag cartridge installation.

Retained Collar

A retained collar keeps a bag cartridge in place under disturbing vibrations in transit and supplements the effect of a filled bag weight in pulling the bag down inside a carton. Thus a combination of bag seat upon a carton base and hang from a collar seated into a carton top keeps the bag deployed and collar in place.

Bias Weight

A bias weight could be attached to a bag, say at a bottom edge, to promote bag deployment. An example would be a slab of dense material, or even the carton wall material in individual or multiple layers. A weight profile complementary to the inner carton wall profile would help bag and carton alignment. Rounded edge forms could discourage snagging between weight and inner walls. The weight could feature a cushion or pillow bag to absorb and dampen impact shock upon the carton.

Air entrapped below the weight could act as a cushion damper against the sudden impact shock of bag inflation or contents fill. An expandible profile mass, such as a base slab with fold-up/down peripheral walls, could be employed to fit within a carton inner profile upon bag deployment. This would preserve bag and carton mutual alignment and inhibit bag snagging.

Overall Costs

Overall a bag cartridge offers low fabrication and assembly costs - competitive with conventional BIB structures and rigid walled jerrycans.

Terminology - Cartridge - Capsule

The term collar is used herein to embrace either discrete element or integrated with bag neck formats.

Embodiments

There now follows a description of some particular embodiments of a bag cartridge with anti-toque profile according to the invention, by way of example only, with reference to the accompanying diagrammatic and schematic drawings, in which:

Bag Cartridge

Figures 1A through 1C show progressive deployment stages for a bag cartridge of the invention from initial rolled and taped format to fully deployed or at least unrolled;

NB ... full bag erection is upon contents fill, with optional preparatory (air) pulse inflation - after bag insertion in a carton, as reflected in Figure 3C;

Figure 1D shows an alternative collapse rolled bag format about a bag neck axis and temporary containment in an enclosure, wrap, tie collar or sheath;

NB ... A particular example would be a paper bag, burstable upon a preparatory air pulse applied through the bag neck for bag deployment.

Figures 2A and 2B show collar fitment of a bag cartridge of Figures 1A-1C to an erect pre-assembled carton, through a pre-formed carton aperture with which the collar is a snug interfit;

NB ... Installation can be entirely from externally of a fully assembled, erected, closed and sealed carton.

That said, sliding insertion from one free side edge of a residual open top flap, pre-closure, remains an option - as reflected in Figure 10C.

Figures 3A through 3D show successive installation stages for a collapsed bag cartridge of Figures 1A-1C, culminating in bag neck or spout closure cap fitment and screw tightening (resisted or braced against by in-built anti-torque provision);

Figures 4A through 4D show a bag cartridge with pre-collapse folded bag upon a collar with integral multiple discrete resiliently deformable (edge) retention clips;

NB ... A tapered entry nose clip profile allows ready one-way insertion, but an end abutment ledge inhibits inadvertent dislodgement or removal.

Figures 5A through 5D show a bag cartridge collar with alternative integral retention clips to Figures 4A-4C;

Figures 6A through 6D show a bag cartridge collar with continuous peripheral clip side wall and edge profile;

Figures 7A through 7D show a bag cartridge collar with multiple discrete depending retention spring clips integrated with a peripheral rim flange;

Figures 8A through 8D show a bag cartridge collar rim configured as a bag enclosure boundary wall;

NB ... bag profile could be adapted (say, locally waisted) to skirt around such a fence upon bag deployment, so the protective shield thereby afforded for a collapse folded bag does not impede or prejudicially deflect bag deployment.

Figures 9A through 9D show a bag cartridge with convoluted, stacked multi-layered bag collapse fold for offset 'directed' deployment;

Figures 10A through 10C shows a bag cartridge with collar edge slot (slide insert) interaction with a bespoke carton top flap and wall configuration;

Figures 11A through 11G show a bag cartridge with collar edge slot (slide insert)

interaction with another bespoke carton top flap configuration to Figures 10A -10C;

Figures 12A through 12F show a bag cartridge with collar location and push-fit locking tab;

Figures 13A through 13C show a bag cartridge with deformable (flex) wall collar retention;

Figures 14A through 14I show a cylindrical barrel configuration bag cartridge with collapsed bag containment in a drum collar with depending locking and spill tab;

Figures 15A through 15E show a barrel or drum bag cartridge with reversible flip action recessed / pop-up collar for a captive bag neck.

Figures 16A through 16D show a bucket or pail format carton fitted with a compact shallow drum lid bag cartridge having a wide-span contents access aperture;

Figures 17A through 17C show mechanised bag cartridge installation, by an automated 'pick-and-place' robotic arm, into a carton top - side aperture, with umbilical feed of contents and/or pneumatic inflation;

Anti-Torque Provision

Figures 18A through 18D show enlargement detail of location-retention collar and bag neck co-operative anti-torque (and anti-plunge) interaction for bag cartridge installation;

More specifically:

Figure 18A shows a scrap front elevation of a collar with bag neck insertion from below; a neck retention and thrust ring is apparent, for interaction with a collar aperture rim upstand, more apparent inf Figure 18D;

Figure 18B shows a scrap section, taken along the line B-B' in Figure 1C, of bag neck and collar of Figure 18A installed in a carton top recess;

NB ... a carton wall instep is depicted for collar support, but could be omitted in favour of a carton aperture corresponding to the collar footprint - reliance then being place d upon collar self-support span between aperture edges;

Figure 18C shows a plan view of the installed collar and bag of Figures 18A and 18B, showing collar aperture segmented profile;

Figure 18D shows a local sectional enlargement of collar retention by neck shoulder and anti-rotational complementary interfit of neck and collar rim profiles;

Bag Pre-Insertion in Carton

Figures 19A through 20B reflect bag pre-installation within a carton as a collapsed flat folded sandwich, prior to location and retention collar fitment from the opposite side of

a carton wall to the intervening bag - and are included for completeness as an alternative to bag pre-collapse fold within a cartridge format.

The intention is to depict the wider applicability of an anti-torque feature between collar and bag neck - for both pre-installed bag and collapsed bag cartridge formats.

It also follows that a bag, whether presented as an open face or flat-pack, or pre-collapsed, could be introduced from within a carton, or rather from an inside face of a residual open top flat, with a retention collar presented afterwards.

Taken in the context of the foregoing provisos ...

Figures 19A through 19C show successive stages of bag insertion and collar fitment in relation to a collapsed flat pack carton sleeve wrap;

More specifically:

Figure 19A shows a collapsed flat - albeit not wrapped or over-folded - bag liner without closure cap juxtaposed with a collapsed carton sleeve wrap;

Figure 19B shows a collapsed carton sleeve wrap;

Figure 19C shows a local enlargement detail of Figure 19B with location and retention collar installed upon a bag neck protruding through a carton wall aperture to mutually entrain carton and bag;

Figures 20A and 20B show a fully assembled collapsed flat pack carton with installed flattened - but not compact folded - bag;

The bag and carton interfit of Figures 19A through 20B can be replaced by a pre-collapsed bag cartridge as reflected in preceding Figures 1A through 17C and following Figures 21A onwards;

More specifically:

Figure 20A shows threaded closure cap juxtaposition with a protruding bag neck;

Figure 20B shows closer cap rotary threaded installation and tightening, with collar-bag neck and collar carton aperture co-operative (anti-torque) inter-fit;

Reverting to the bag cartridge format, various cartridge and carton configurations and relative dispositions are explored in Figures 21 et seq.

Figures 21A through 21E show assembly of a bag cartridge from collar fitment to the neck of a collapse folded bag disposed within an outer wrap with frangible tie, for installation into a carton aperture;

More specifically ...

Figure 21A shows a cartridge of assembled collar and wrapped collapse folded bag,

with closure cap omitted for clarity to reveal anti-torque interfitting abutment profiles on bag neck and collar aperture;

Figure 21B shows mutually aligned wrap folded bag and collar juxtaposed for interfit - ie collar mounting upon bag;

Figure 21C shows pre-assembled bag cartridge juxtaposition with a carton aperture;

Figure 21D shows cartridge installation upon a carton, with closure cap fitted (albeit this would be undertaken finally after contents fill);

Figure 21E shows a variant collar aperture and bag neck interfit profile, for unique indexed bag angular orientation;

Thus diametral slots in a bag collar aperture rim correspond to diametral ribs on a bag neck;

Figures 22A through 22H reflect a bag fold and wrap sequence for a bag cartridge of mutually entrained bag and (neck) collar;

More specifically ...

Figure 22A depicts juxtaposed collar, frangible tie wrap strip, and bag (neck);

NB the tie strip has an inherent weakness about the neck aperture - and advantage is taken of this for strip rupture upon bag inflation; a transverse diametral weakness to failure line is depicted in broken line, and indeed could be expressed as strip pre-perforation;

Figure 22B shows an interfitted collar, bag neck and laid flat bag;

Figure 22C shows an initial longitudinal bag fold about a line tangental to a bag neck;

Figure 22D shows a subsequent reverse fold of underlying folded bag panel about a line tangental to the bag neck, but on a diametrally opposed side;

Figure 22E shows a further longitudinal fold to create a strip of width corresponding to the bag neck - or thereabouts;

Figure 22F shows an intial transverse fold of the longitudinal fold stack, and this is followed for further over-folds to create the compact folded bag of stacked panels or leafs of Figure 22G;

Figure 22G shows in fold of wrap strip to envelop the collapse folded bag;

Figure 22H shows joining, by edge overlap taping and/or bonding, of the bag wrap;

Figures 23A through 23 D show an alternative bag enclosure, configured as a more solid card sleeve wrap, which also provides a modest bag deployment bias and guidance mass upon wrap rupture and bag release;

NB ... Whilst a more robust card wrap strip could be installed between bag and neck collar, as with Figure 22A, mounting upon the bag itself allows modest distributed bag wall loading;

More specifically ...

Figure 23A shows juxtaposed folded bag and under-tray of a folded over card panel - mounted by an adhesive tape strip;

Figure 23B shows opposed under tray panel ends wrapped around the bag, and tucked under a bag neck rim;

Figure 23C shows insertion of a completed bag cartridge in a carton aperture;

Figures 23D shows bag deployment upon release of the bias mass, whose attachment to the bag underside promotes bag opening; in doing so, the under tray expands by unfolding of a side panel, to occupy the internal span of the carton and so help guide bag movement;

Figures 24A and 24B show multiple bag cartridge installation in a common carton or boundary;

NB ... bag cartridges could be used for complementary contents - as, say, a promotional retail item, also useful upon consumption;

More specifically ...

Figure 24A shows dual bag cartridges disposed at opposite sides of a carton;

Figure 24B shows quadruple bag cartridges in a segmented carton - or a cluster of nesting cartons of complementary form, in this case a triangular foot print; these could be shrink-wrapped to preserve the cluster until broken up for use;

NB ... multiple carton contents could be depicted by carton marking or delineation;

Figures 25A through 25E show variant dispositions of bag cartridge in cartons of different shapes and sizes;

More specifically ...

Figure 25A shows a bag cartridge fitted at an edge with neck orientated sideways, rather than end-on;

Figure 25B shows the arrangement of Figure 25A fitted to an opposite carton end;

Figure 25C shows a curved profile collar fitted to a tall thin carton;

Figure 25D shows a triangular profile collar fitted to a longitudinal edge of a wide shallow chest style carton;

Figure 25E shows a collar fitted to a top edge of a tall slender carton format;

Figures 26A through 26D show variant multiple bag installations within a common carton, with respective bag necks sharing a common neck collar piece;

More specifically ...

Figure 26A shows a dual side-by-side bag disposition;

Figure 26B shows a triple bag in a triangular disposition;

Figure 26C shows a triple bag with side-by-side neck disposition;

Figure 26D shows dual discrete bags with respective bag collars at opposite ends of a carton;

Figures 27A through 27C show diverse carton formats;

More specifically ...

Figure 27A shows a polygonal - in this case hexagonal - carton footprint;

Figure 27B shows a triangular carton footprint;

Figure 27C shows a semi-circular carton footprint;

Figures 28A through 28D show drum, bucket or pail carton variants, with wide mouth necks occupying the entirety of a carton end wall;

More specifically ...

Figure 28A shows carton formation by wrapping a panel around an end tray configured as a bag cartridge;

Figure 28B shows an assembled carton of Figure 28A fitted with a local neck alternative to a removable end panel;

Figure 28C shows a flip top lid alternative to Figure 28B;

Figure 28D shows a circular lid alternative to Figures 28B and 28 C for the wrapped bucket container of Figure 28A;

Figures 29A through 29B depict variant cylindrical carton formats - designated by the Applicant as 'CARDBOARD BOTTLE' ™;

More specifically ...

Figure 29A shows an exploded view of a narrow cylindrical carton with opposed end caps configured as bag cartridges, for a double-ended format, with the option of dual

alternative contents fill;

Figure 29B shows an assembled carton of Figure 29A , with one end closure revealed - the other could be a blanking cap for a single content package;

Figure 29C shows a drum carton variant with dual semi-circular end caps configured as bag cartridges for respective discrete individual contents bags disposed side by side;

Such an arrangement would allow complementary contents fill, such as red and white wine (DUO VIN(0)™ or DEUXVIN™);

Figure 29D shows an assembled drum of Figure 29C;

Figures 30A and 30B show different depth drum cartons, such as of Figures 29A through 29D, with a common bag cartridge, deployed to matching depth;

More specifically ...

Figure 30A shows a translucent view of a drum carton with internal bag concertina collapse folded to less than its full capacity to suit a shallow drum depth;

Figure 30B shows a deeper drum carton, such as of Figure 30A, with the bag extended to take advantage of the full drum depth;

Thus a given bag cartridge diameter and variable expansion bag could suit a range of drum depths and attendant volumes - say, a 0.5, 1.0, 1.5 and 2.0 litre capacity for liquids from water or milk, through juice, to wine;

Figures 31A through 31C depict a rolled sleeve carton drum construction;

More specifically ...

Figure 31A shows a bag with oppose end fitments - one a neck collar, the other a blanking cap - laid flat upon a card sheet, preparatory to assembly;

Figure 31B shows initial rolling of the bag and card wrap about mutually aligned collar and end cap set upright therefrom in a common rolling axis;

Figure 31C shows an assembled tube with outer card wrap edges tape sealed or bonded;

The initial flat format of bag and card allows compact stacking in a cassette format ready for assembly;

Figures 32A through 32C depict a flip-top closure for a bag cartridge;

More specifically ...

Figure 32A shows a side elevation of a self-sealing hinged lid flap fitted to a neck collar

Figure 32B shows a closed flip top lid recessed within a shallow depth collar tray;

Figure 33C shows the flip top lid of Figure 33B open about a minimal live hinge connection;

Figures 33A and 33B depict a ring-pull closure for a bag cartridge;

More specifically ...

Figure 33A shows a sealed ring closure set into a collar tray;

Figure 33B shows a pulled open ring closure;

Figures 34A and 34B show a semi-circular flip lid, with wrap around edge seal;

More specifically ...

Figure 34A shows the lid open;

Figure 34B shows the lid closed;

Figures 35A and 35B depict an integrated collar and bag neck configuration;

More specifically ...

Figure 35A shows an integrally moulded convoluted fold funnel extension of an otherwise conventional bag neck;

Figure 35B shows the funnel extension of Figure 35A flipped over to create a circumferential collar;

NB ... Collar As Carton Wall

Figures 28A-D, 29A-C, 30A-B and 31A-C reflect a blurring of distinction between bag cartridge and carton. Thus a cartridge,or rather a collar, can serve as or substitute for a carton end wall. This 'liberates' the carton configuration from conventional flat folded-over, tuck-in panel constructions - not least as interaction of (collar) end caps and intervening carton wall can replace carton end flaps, with associated tape edge seal and bonding. It follows that the term carton used herein should be broadly interpreted to include such transitional or merged forms which the present invention admits.

Extended collar configurations could serve as carton side walls - ie not merely end wall closures. An example could be any of Figs 28 through 31, but particularly the 'CARDBOARD BOTTLE' ™of Figure 29B. An example is included in Figure 29B1

Referring to the drawings ...

The drawings are presented in a diagrammatic illustrative style, with simplification for ease of comprehension - it is believed without laborious detailed description, beyond

the general principles outlined and taken with the component list.

An assembled JERRIBOX (™) BIB container 10 - reflected in Figures 2B and 3D - features an outer carton 14 enshrouding an internal bag liner 11, with a protruding neck or spout 13 entrained by a location and retention collar 12.

Collar 12 serves to locate - and in the present invention also retain - in an aperture in carton 14. Collar 12 thus represents a 'constructive intervention' between bag 11 and carton 12. As the collar 12 is now united with a pre-collapse folded bag 11 in a so-called bag cartridge 20 according the present invention, overall a bag cartridge 20 interacts with a carton 12. Indeed, as will be described later, a bag cartridge 20 can subsitute for what would otherwise be carton (side or end) wall.

Container 10 is assembled from pre-fabricated components or sub-assemblies. A principal sub-assembly of the present invention is a so-called bag cartridge, capsule or cassette module 20, combining a compact collapse folded bag 11 within a collar 12. Compact means that the bag 11 is collapsed to a format 21 within the footprint, span or embrace of a collar 12. Bag 11, and optionally part of collar 12, are within a protective temporary outer enclosure or wrap, such as a paper strip 90 (omitted for clarity in most Figures).

A principal assembly consideration is bag cartridge 20 installation by insertion from outside a pre-assembled carton 14. Traditional BIB has located a pre-filled bag into an open top of a partially pre-assembled carton. Earlier proposals have used a bag and carton united - even pre-joined (bonded) before assembly. It is envisaged that bag cartridge 20 could be produced off-site and simplify container assembly.

Bag cartridge 20 features a rolled and/or folded up bag 21, within a frangible strip wrap 90, or optionally secured by a (temporary) frangible tie band 22. Diverse roll and/or fold bag collapse modes are tenable - such as the transverse (to neck axis) roll of Figures 1A -1C - but a prime fold sequence is elaborated in Figures 22A-H.

Figure 1D shows bag roll about a neck axis - with an outer containment wrap, sheath or sleeve fitted. Other bag collapse (fold) modes are explored later. Bag 11 thus remains in a compact condition 21 - readily handled and installed - until ready for deployment - say by pre-inflation or contents fill, but only after installation in a carton 14.

A thin-wall bag 11 is vulnerable to snagging, puncture or tear, but when collapsed or gathered - say rolled or (reverse / concertina) folded - to within compact format 21 presents a more robust massed 'bulk'. Thus a bag compact 21 is a robust self-contained element, not dependent upon carton 14 for its integrity. A seamless or freeform pillow bag 11 format could be employed. This differentiates it from past bonded bag and carton outer panels, such as GB959306.

Collar 12 could be a discrete element entrained with, or captive upon, neck 13, say by a retention rim, shoulder washer or circlip. Alternatively, an integrated neck 13 and collar 12 - as a unitary element (along with depending bag) could be contrived - say as part of bag production. Integration frees up collar 12 and neck 13 design - to admit more diverse forms. Figures 35A-B depict a formative example. Similarly, tie wrap 22 might be integrated with collar 12 or neck 13 - or indeed bag 11.

A band or strip tie 22 would spread wrap loads over the bag 11 wall, to obviate local constrictions or kinks. An overall sleeve or collar would also serve. Alternatively, a draw cord running through external bag wall loops or pocket seam could be used.

The basic elements of bag cartridge 20, bag 11, bag compact 21, collar 12 and carton 14 admit of considerable variation - which is explored, albeit not exhaustively in the drawings, which concentrate upon simpler formats believed generally self-explanatory on their own account and in conjunction with the component list footnote hereto.

Thus Figures 1A-1C reflect a basic bag cartridge.

Figure 1D a rolled bag sheath and pull-off deployment refinement for bag roll about (or alongside) a bag neck axis.

Figures 2A-2B reflect bag cartridge installation in a carton aperture to preface bag inflation and fill.

Figures 3A-3D reflect an installation sequence.

Figures 4A-4D reflect clip-action retention of bag cartridge collar in a carton aperture - reliant upon clip material resilience;

Figures 5A-5D reflect clip action using carton edge resilience;

Figures 6A-6D reflect a combined slot and clip action for collar location, with reliance upon carton edge resilience;

Figures 7A-7D reflect a collar rim with depending fastener spikes for insertion into carton top panel perforations;

Figures 8A-8D reflect a continuous collar edge re-entrant profile for carton aperture edge retention, along with depending collar to create a reception pocket for a collapsed bag;

Figures 9A-9D reflect bag multiple stacked offset fold for combined downwards and sideways deployment upon inflation and/or contents fill;

Figures 10A-10C reflect dual slotted bag cartridge collar mounting in carton top and side slot in overlaid top flap panels; reliance is thus not place upon a collar clip action as such nor undue carton edge deflection; but an overall carton closure is achieved;

Figures 11A-11G reflect slot mounting of a bag cartridge collar in both carton top and side panels, with a variant carton top flap panel configuration;

Figures 12A-12F reflect bag cartridge retention with a collar locking flap with lock pin through carton side wall perforations;

Figures 13A-13C reflect resiliently deformable bag cartridge collar upstand with side shoulders for carton aperture location;

Figures 14A -14I reflect a rotary locating and retention bag cartridge collar configuration, with interlocking of a depending spill lip;

Figures 15A-15E reflect active collar pop / flip up-down action by a reversible conical collar floor profile, along with a cylindrical barrel rolled bag profile;

Figures 16A-16D reflect a, bucket-style BIB format with large neck spanning most of the footprint;

Figures 17A-17C reflect mechanised insertion and co-ordinated bag inflation and/or contents fill;

Figures 18A through 20C detail anti-torque provision.

Installation - Operation

It is envisaged that a light-weight, 'pick-and-place' robotic arm 81 mounted upon a traveller rail 83, would pick up a pre-prepared bag cartridge 20 from a storage dispenser, such as a feed chute, or a pre-packed matrix tray assembly (not shown*). The bag cartridge 20 would be gripped by the neck 13 or collar 12 and a temporary sealing connection made to a pneumatic supply in readiness for bag inflation.

Selected bag cartridge 20 would then be carried to a carton 14, aligned and inserted - by, say, a translational and/or rotational (twist) action into a carton aperture 24.

A precise pneumatic pulse would be applied to inflate and deploy the bag 11 until firmly and snugly up against a carton 14 inner walls. The operation would allow controlled bag positioning, orientation and deployment.

Bag Cartridge Retention

Bag cartridge retention is desirably supplemented by bag 11 inflation and/or contents fill. Thus, say, a bag top shoulder could bias collar locking - say, from below.

A larger collar could allow bag cartridge utilisation for BUCKET BOX ™ style containers, with an access aperture span at, or close to carton footprint.

Figures 16A-D reflect this.

Larger collars and apertures offer even greater control over bag location and orientation, for satisfactory and consistent deployment. Diverse closure styles, not necessarily screw closures, but flip lids, could also be adopted, say to mirror user familiarity with metal cans or plastics tubs or buckets with integrated handles.

Wine Box

A closure with control valve, such as a wine box ON/OFF tap stopper could be substituted. A pop-up, retractable neck or spout could be contrived with bag 11 inflation and/or fill - so the bag 11 provides a spring cushion support. A conical profile,

resilient collar upstand could impart a spring up or down action to a captive bag neck. For wine-box use, a tap stopper could be carried. Neck installation mid-carton footprint would provide centrally disposed access. Figures 15A-E explore an example.

Anti-Torque

A rectangular or flat-sided collar 12 profile could locate within a rectangular carton top panel aperture - for anti-torque resistance to screw closure tightening upon fitment.

Cartridge Wrap

A one-sided or overall cartridge thin layer, peelable (shrink) wrap may be fitted for secure pre-installation. A frangible sheet gauge, allows rupture upon bag inflation and unroll / unfold without impediment.

Grip or Handle

With due consideration to entrainment clip loading and top panel closure security, a locating collar profile may incorporate a finger grip recess or cut-out to the inside of a bag neck, to facilitate carton tip and pour. Alternatively, a recessed, but pull-up, movable handle may be incorporated in the collar - if cost considerations allow. Handle or profiled finger grip cut-outs may also feature in carton wall panels.

Neck / Spout Disposition

A neck or spout may be offset to one side of a bag top for larger capacity bags lending themselves to tip and discharge pour from one side. For smaller, say milk or juice, carton sizes readily grasped single-handedly, a neck may be disposed more centrally, say marginally to one side of a longitudinal (upright) axis.

Bucket or Bin

For a more squat container profile, such as a bucket or bin, a larger span bag neck and locating collar would suit. A top opening and closure might span a major part, if not the entirety, of a container footprint. The collar could then play a greater structural role in the overall container.

Bag Seam Disposition

Bag panel fabrication (weld) joint (reinforcement) seams may be co-operatively disposed with carton corners or panel junctions. Thus, say, a bag seam may be disposed diagonally between opposed carton corner edges.

Bag Orientation + Deployment

Bag orientation is facilitated by collar alignment upon collar 12 insertion into a complementary carton aperture 24 and bag 11 deployment by pneumatic inflation. Collar 12 and bag neck 13 interfit and orientation are explored in Figures 18A-C.

An individual JERRIBOX (™) BIB container 10 features an outer carton 14 enshrouding

an internal bag liner 11, with a protruding neck or spout 13 entrained by a location and retention collar 12. Collar 12 is configured as an open-sided shallow tray 29, with upstanding peripheral side and rear walls 27 with top rim flange 28 surmounting a carton top panel 25/32/37. An open front face is thus exposed between out-turned front face flanges surmounting a carton front wall panel 33. This provides clearance for contents discharge pouring from neck 13 and allows drainage of spillage containment upon collar floor 29 by collar walls 27. An optional depending spill lip flange also wraps the upper margins of carton front face. A collar floor 29 upstand 17 interacts with a neck 13 base shoulder retention ledge, rim or shoulder 15. Upstand 17 depth is chosen to accommodate carton wall thickness, whether solid or corrugated.

Carton 14 features an inset top recess at one side. Figures 18A-C show a rectangular aperture 34 in carton top seat or step, with an instep ledge 85, accommodates the collar 12 tray profile, without protruding above carton top (closure flap) panel 84.

Anti-torque features of bag neck 13 and collar 12 are more apparent from Figures 18C and18*D. Thus an aperture 16 in collar 12 has a shallow flared rim upstand with a series of circumferentially spaced radial notches or slots 18 to accommodate corresponding radial tongues or ribs 19 at the base shoulder of back neck 13.

Co-operative tongue / rib 19 and notch / slot 18 interaction can also serve for collar 12 entrainment upon bag neck 13, with carton wall sandwiched therebetween - as is more apparent from Figure 18B. Thus a marginal interference fit between ribs 19 and slots 18 could be admitted.

Rotary indexing and entrapment of neck 13 and collar 12 could also be contrived by complementary interfit of collar upstand 17 and neck shoulder 15. That is ribs 19 and slots 18 could temporarily align for collar mounting then misalign for collar 12 capture. Modest bag 11 pre-twist and then relaxation rotation would suffice to accommodate such indexing. Alternatively, a separate locking collar or circlip (not shown) could be fitted to neck 13 after collar 12 fitment, to retain collar 12 securely in place.

Only a marginal local base stem (shoulder) portion of neck 13 below closure cap location threads need have locating ribs 19. Ribs and slots alternate on both collar 12 aperture 16 and neck 13 stem. Effectively, complementary serrated or 'dog-tooth' neck 13 stem and collar 12 aperture 16 profiles co-operatively inter-fit and interact.

A bag 11 and carton 14 assembly sequence, culminating in capture of bag neck 13 by locating collar 12 is reflected in Figures 21A through 21D. Reliance is placed upon juxtaposition of neck 13 of a pre-collapsed bag 11 with a corresponding aperture 24 in a carton top flap panel .

The carton 14 is pre-assembled as a sleeve wrap and collapsed bag 11 inserted from one open end. An alternative envisaged in a companion patent application of the Applicant is carton 14 wrap about a web fed flat bag 11.

Figure 19C shows collar 12 presented to pre-fabricated instep in carton 14 top panel, ready to receive and locate protruding bag neck 13.

Figure 19A reflects a collapsed bag 11 in collapsed flat-pack carton 12 sandwich with

protruding aligned bag neck 13 located - and held captive by - collar 12, ready for neck closure cap 38 (threaded) fitment.

Figures 20A-B depicts closure cap 88 fitment - albeit in practice a closure cap would not be fitted until bag contents fill within a 3D erected carton.

Thus, more realistically, both Figures 21A and 21B could be regarded as relating to erected and filled 3D BIB cartons.

In principle, a pre-fitted closure cap 88 could be inserted, along with bag neck 13 - with collar 12 aperture 24 sized to pass over it, so a closed rather than open-ended bag neck is located. That said, again, closure 88 fitment is traditionally post fill - so removal pre-fill and re-instatement would be additional - and redundant - steps, particularly for carton assembly close to a fill station. A temporary cap might be installed to prevent contamination of bag inner capacity. Alternatively, a temporary neck cap seal, removed and discarded or punctured upon fill, might preserve bag internal condition - say for contents for human consumption, such as edible oils. A sterile bag could thus be contemplated.

Figure 24A shows a split contents box of twin juxtaposed bags with respective neck collars at opposite sides. Such an arrangement might be used for complementary products, such as different fruit juices, or red and white wine.

Figure 24B shows a multiple - in this case quadruple - segmented BIB variant with triangular footprint quadrants nestled within an outer rectangular format. Graphic delineation and/or background colour infill could express the sub-division visually, but within a common contiguous carton shell. In use the carton would simply be turned to present a selected quadrant neck for access. A multi-head fill line (not shown) might be used for simultaneous fill of respective quadrant contents.

A discrete cruciform footprint liner might be located between internal bag quadrants, for mutual isolation and (end-to-end) stiffening, bracing and support. Segmentation of the carton itself is an option - with discrete carton quadrants (with respective internal bags) entrained within, say, a shrink-wrap sheath. Again, each quadrant has a dedicated neck, location and retention collar.

Collar profiles admit of variation from rectangular profiles, as explored in Figures 25A through 25F. Collar 12 and neck 13 would be profiled to suit target contents fill and dispensing. Figure 3C depicts the diversity of potential flowable content forms, including - but not limited to - liquids, gels, pastes, chunks, tablets, capsules, pellets, granules, flakes and powders.Indeed, subject to test, any fragmented material form could be considered - with appropriate sizing and shaping of bag access aperture. Thus, for example, apertures representing a much large proportion of a carton end might be adopted to facilitate free-flow discharge - or even insertion of a ladle or scoop. Provision might be made for bag or even overall carton squeeze locally to reduce cross-section and promote contents discharge - as with, say, pastes.

Neck / Spout Disposition

A neck or spout may be offset to one side of a bag top for larger capacity bags lending

themselves to tip and discharge pour from one side. For smaller, say milk or juice, carton sizes readily grasped single-handedly, a neck may be disposed more centrally, say marginally to one side of a longitudinal (upright) axis.

Bag Seam Disposition

Bag panel fabrication (weld) joint (reinforcement) seams may be co-operatively disposed with carton corners or panel junctions. Thus, say, a bag seam may be disposed diagonally between opposed carton corner edges.

Mix 'n' Match

Features described may be variously mixed and matched to suit operational requirements. It is not feasible to show every such permutation or combination of features.

Phrases bracketed - vis { ... } - alongside claim numbering - are for ease of reference and as such form no part of claim interpretation or scope.

VARIANT DIVERSITY

Carton Configuration

Although predominantly rectangular or polygonal flat sided cartons have been described and illustrated, as more readily fabricated from initially flat sheet material, curvilinear forms might be contemplated. A prime curved form would be a cylindrical wrap - say about plastics end caps with integral bag location collar functionality.

Indeed full-span end caps could dictate an outer cross-sectional form or footprint, with variable spacing to accommodate differential sleeve depth.This could apply to diverse end cap profiles, including rectangular, polygonal segmented, arcuate circular, oval or conic sections. An intervening sleeve set between opposed end caps could be simpler than a conventional carton, with potentially less material usage or waste and more flexible assembly. A carton sleeve could be severed to a desired length from a continuous extruded tube.

Pre-formed tubes of pre-impregnated or pre-sealed material, such as employed with TETRAPAK (™) cartons could be employed. Along with a sealable bag, this could provide a measure of double seal protection - albeit contingent upon sealing interfit of end caps and intervening sleeve.

Bag-Liner Configuration

Similar considerations of variant form apply to the bag or liner. Whilst generally complementary bag and carton forms may be desirable to usable maximise internal volume or capacity, disconformity may be employed to leave free pockets for other uses. An example would be supplementary discrete cushion bags for impact or drop resistance - putting to advantage a gap between carton and bag walls.

Unification

Although bag and carton have been shown as discrete elements, carton panels and bag walls could be conjoined or united locally, or even integrated. Such unification could be upon inter-assembly and bag pre-inflation or contents fill.

Sleeve Bag

A bag could be configured as a hollow sleeve, admitting both internal and external carton sleeve disposition in an overall carton-bag-carton sandwich. Such a composite sandwich form could be inflated or contracted whilst retaining relative disposition of elements. A bag neck could be disposed in mid carton wall span. A neck collar could be configured as a surrounding guidance funnel into the back neck. This could be helpful for drainage into a bag from an overlying reservoir. Thus, say, a used oil container could be contrived in a sump drain format for sealed waste disposal.

Component List

Figs 1A-3D et seq

10	BIB container
11	bag / liner
12	location + retention collar
13	neck or spout
14	carton
15	neck rim / shoulder
16	collar aperture
17	collar rim flange upstand
18	collar rim serrations: notches / slots
19	neck rib /tongue
20	bag cartridge
21	rolled / folded bag
22	bag wrap
23	wrap tie
24	carton aperture

Figs 4A-D

25	carton panel edge (aperture 24)
26	collar retention lugs
27	collar side wall
28	collar top flange
29	collar base / floor tray

30

Figs 5A-D

31	rigid collar wall ribs / protrusions

32 flexible panel edge (aperture 24)

Figs 6A-D

33 (front) panel edge upstand (for slot 36)
34 bull nose continuous rib / protrusion
35 face flange
36 slot 36 (face flange 35)

Figs 7A-D

37 (stiff) carton top panel
38 spiked rib (re-entrant profile)
39 carton panel aperture (rib 38)

Figs 8A-D

40 bag cartridge
41 collapsed (concertina) folded bag
42 pocket housing
43 retention rim
44 location slot (face flange)

Figs 9A-D

45 bag cartridge
46 wrap around collapsed bag fold
47 wrap around + side fold bag
48 bag cartridge with slotted location flange
49 location flange

Figs 10A-C

50 carton
51 top side flaps
52 side flap cut out
53 top rear flap
54 rear flap cut-out
55 front wall cut-out

Figs 11A-G

56 carton
57 top flap
58 top flap cut-out
59 edge aperture

Figs 12A-F

60

61 front flap
62 location + rentention studs
63 reception apertures (carton front wall)

Figs 13A-C

64 edge rib
65 flex wall collar

Figs 14A-I

66 drum cartridge
67 front flap
68 barrel body / bag receptacle
69 carton aperture

Figs 15A-E

70 funnel mounting flange
71 flex wall
72 edge clip location profile
73 barrel body / bag holder
74 carton aperture

Figs 16A-D

75 cartridge disc
76 shallow circumferential wall
77 rim location clip
78 rim top flange
79 rim handle
80 bucket carton

Figs 17A-C

81 robotic pick-and-place arm
82 suction cup
83 traveller rail

Figs 18A-D

84 carton top panel
85 carton instep ledge (optional)
86 carton front panel

Figs 19A-20B

88 closure cap

Figs 21A-21D

<refs 11-22>

Figs 22A-B

89 longitudinal bag folds
90 bag wrap strip

Figs 22C-H

91 reverse fold
92 transverse fold

Figs 23A-D

93 mounting strip
94 card wrap
95 outfold panel
96 abutting card ends

Figs 24A-25E

97 dual bag cartridges
98 multiple bag cartridges
99 carton sub-division
100 contents diversity

Figs 26A-D

100 multiple bags in common collar

Figs 27A-C

101 polygonal carton
102 triangular carton
103 semi-circular carton

Figs 28A-D

104 rectangular end cartridge
105 folded carton panel wrap
106 bottom tray
107 fill neck
108 flip top lid
109 disc lid

Figs 29A-29D

110 cardboard bottle
111 barrel end cartridge

112 cardboard tube carton
113 end blanking disc
114 end cartridge
115 split semi-circular end cartridge
116 multiple bag end cartridge

Figs 30A-B

117 partly deployed (concertina folded) bag
118 variable capacity bag end cartridge
119 fully deployed bag
120 stub carton
121 tall carton

Figs 31A-C

122 end cartridge collar
123 blanking disc end
124 bag liner
125 card outer wrap
126 rolled tube carton

Figs 32A-34B

127 flip lid
128 ring pull closure
129 lid with edge rim

Figs 35A-B

130 convoluted funnel
131 flip over neck collar

Fig 3C

150 content diversity

Claims

1. {Bag Cartridge}

A bag cartridge (20)
for a Bag-Box (BIB) container (10)
comprising a pre-collapse folded or rolled bag (21)
entrained with a location and retention collar (12)
configured for co-operative interfit
with a carton (12) wall aperture (24).

2. {Pre-Collapsed Bag}

A bag cartridge (20) for a BIB container (10)
comprising a bag (11),
pre-collapsed into compact format,
say by roll and/or fold,
and juxtaposed with a location and retention collar (12),
itself entrained to, or integrated with,
a bag neck upstand 13.

3. {Bag Within Collar Footprint}

A bag cartridge of either preceding claim,
with a bag collapsed within a collar footprint.

4. {Bag Collapse within Collar Enclosure}

A bag cartridge of any preceding claim,
with a bag collapsed within a collar enclosure.

5. {Collar Tray}

A bag cartridge of any preceding claim,
with a collar configured as a shallow tray
with a rim upstand for spillage containment
and as a splash back carton wall shield.

6. {Clip Action Collar}

A bag cartridge of either preceding claim with a clip action collar - such as in a peripheral wall profile - for co-operative (resilient displacement) interaction with a carton panel edge.

7. {Collar Edge Slot}

A bag cartridge of any preceding claim with an integrated slot peripheral collar wall profile for reception of an inserted carton panel edge.

8. {BIB with Bag Cartridge}

A BIB package fitted with a bag cartridge of any preceding claim.

9. {BIB Carton}

A BIB carton comprising
a bag location and retention cartridge or capsule,
configured as a compact module,
mounted upon or entrained with a bag neck
for insertion from outside the carton,
into a (pre-formed) carton panel aperture.

10. {Illustrated Embodiments}

A bag cartridge and/or BIB container assembled from a bag cartridge, substantially as hereinbefore described, with reference to, and as shown in, the accompanying drawings.

11. {Cartridge Assembly - Bag Collapse}

A method of bag cartridge assembly comprising the steps of collapsing a bag by rolling and/or folding into a compact format and juxtaposition with a bag neck.

12. { Restraint Fitment}

A bag cartridge assembly process including fitting a restraint tie or wrap to preserve a collapsed bag format.

13. {Cartridge Installation}

A method of BIB carton assembly comprising the steps of inserting a pre-assembled bag cartridge, of any preceding claim, into a wall aperture in a pre-assembled carton from externally of the carton by local resilient deformation of bag cartridge collar and/or carton aperture profiles and relaxation to secure the bag cartridge by mutual interfit.

14. {Bag Orientation + Deployment}

A BIB assembly process including the steps of bag orientation by collar alignment upon insertion into a carton wall aperture and bag deployment by (pneumatic) inflation and/or contents fill.

15. {Bag Cartridge Installation Machine}

A machine for installing a bag cartridge of preceding claims, with a carrier - such as a robotic pick-and-place swing arm upon a traverse carriage - and a feed line for bag inflation and/or contents fill

16. {Bag Neck Capture + Seal}

A machine of Claim 15 with a bag neck capture and neck seal for umbilical feed line connection.

17. { Collar}

A collar for interfit between a bag liner (11) and a carton (14) comprises a shallow tray with an aperture (24) for locating a bag neck (13), profiled for co-operative anti-rotational interfit with a complementary neck profile.

18. { Interfitting Ribs + Slots}

A collar of either preceding claim, with inter-fitting ribs and slots on collar and neck profiles.

19. {Illustrated Collar Embodiments}

A collar for a BIB container, substantially as hereinbefore described, with reference to, and as shown in, the accompanying drawings.

20. {Illustrated BIB Embodiment}

A BIB container incorporating a collar of any preceding claim.

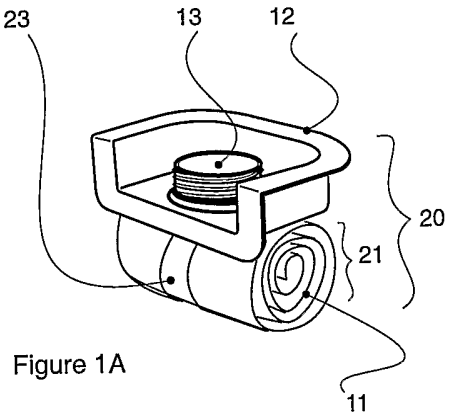


Figure 1A

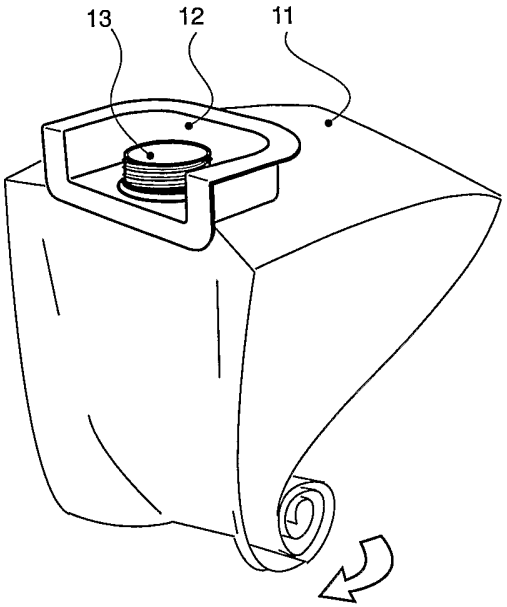


Figure 1B

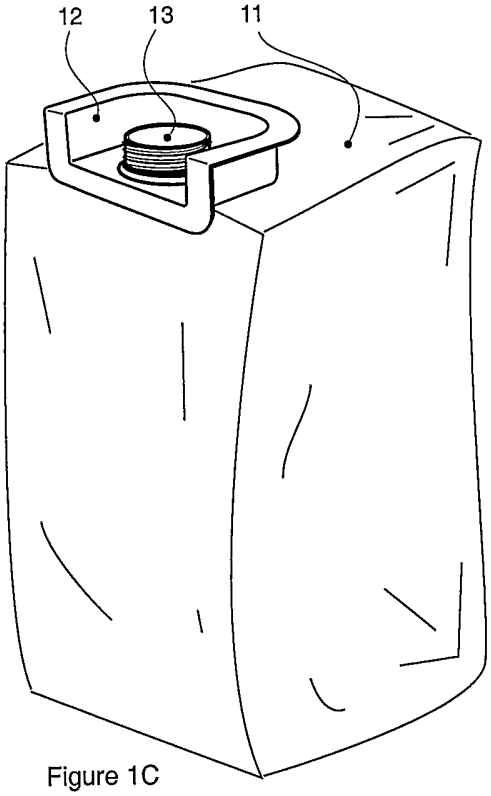


Figure 1C

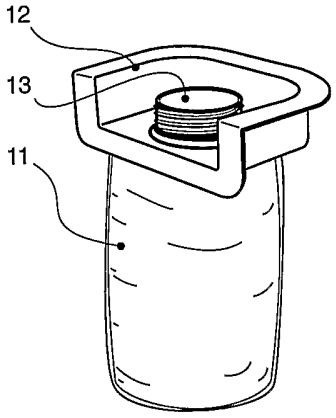


Figure 1D

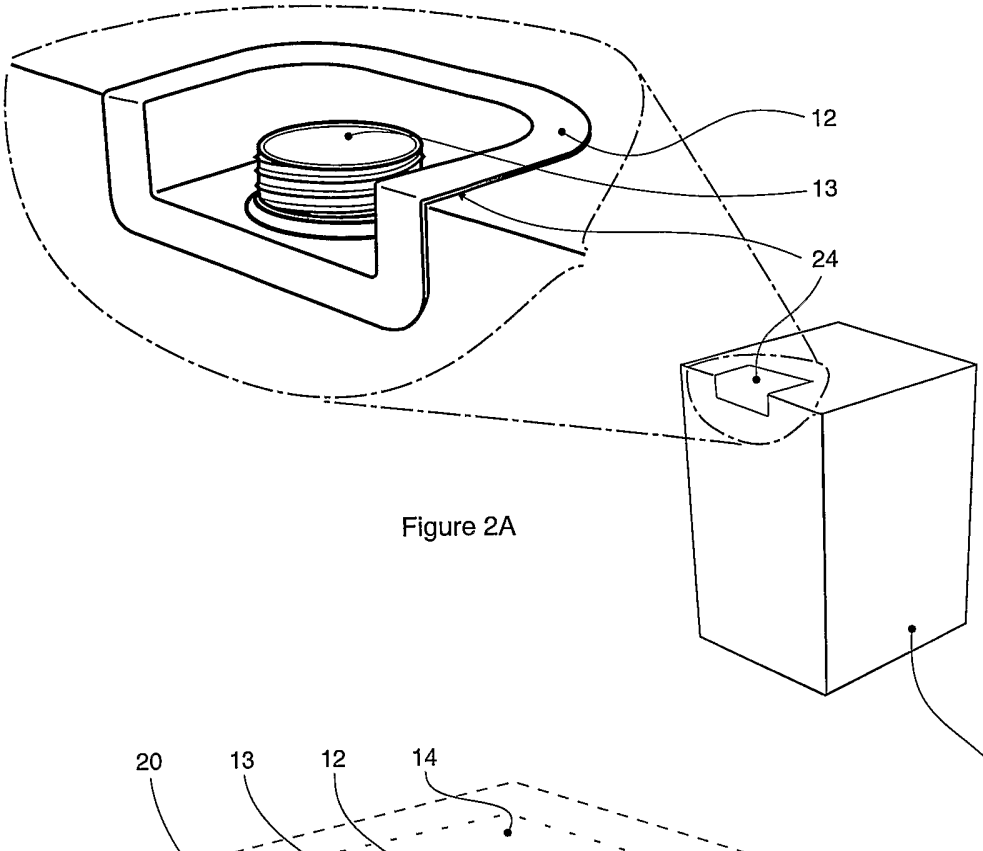


Figure 2A

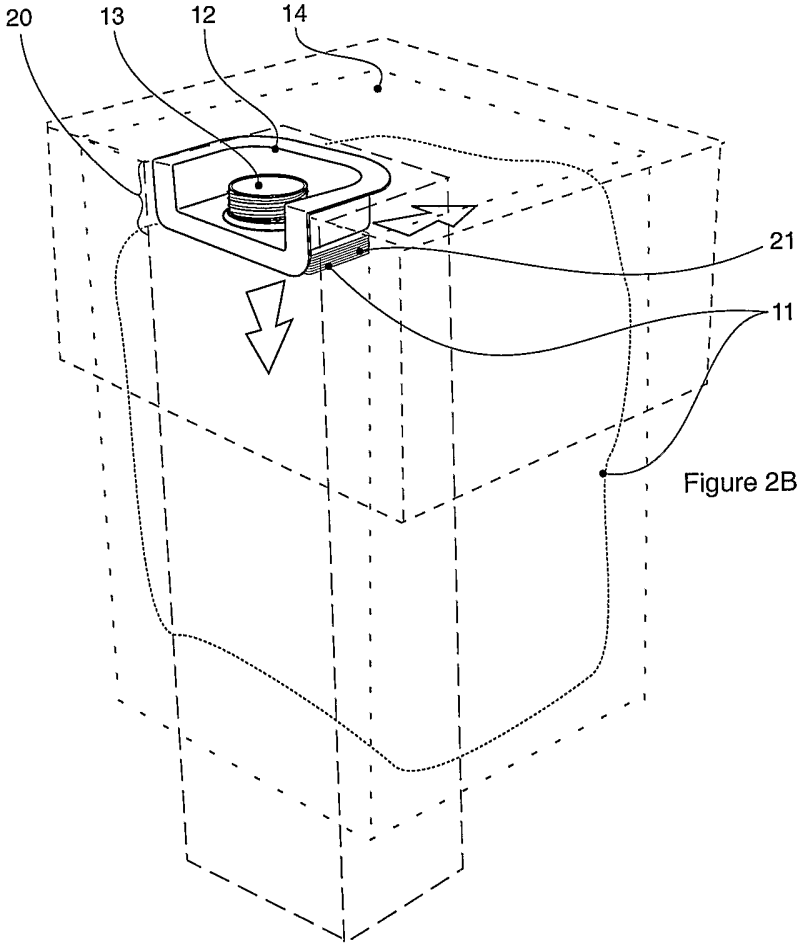


Figure 2B

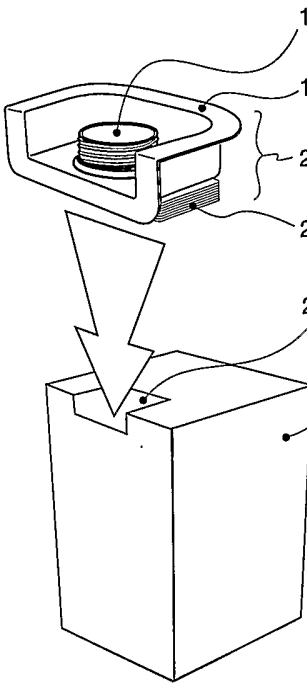


Figure 3A

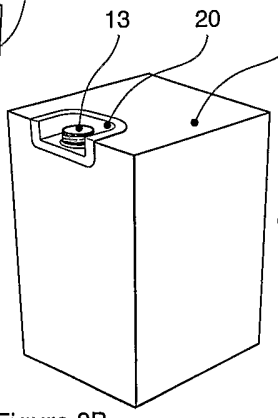


Figure 3B

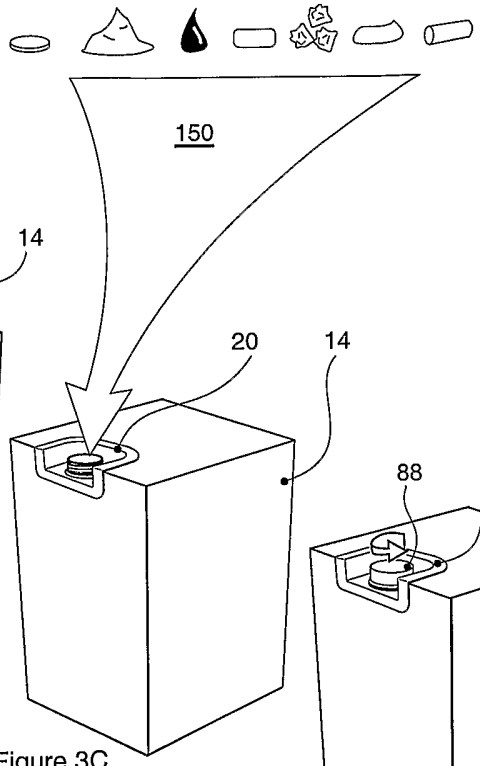


Figure 3C

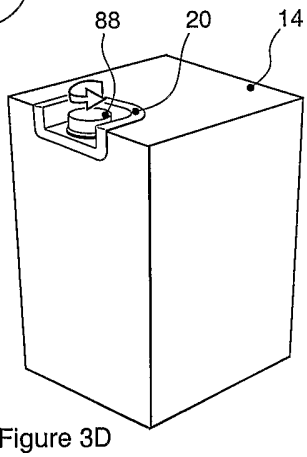


Figure 3D

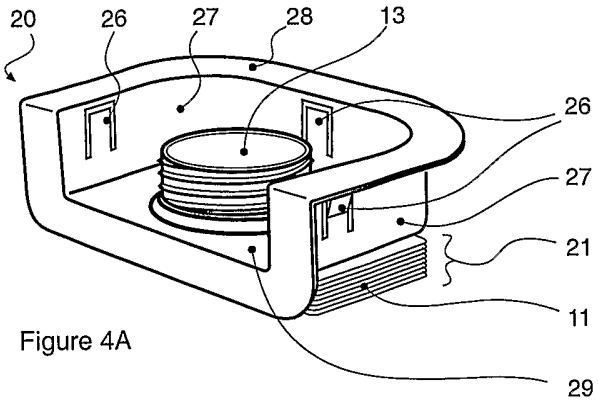


Figure 4A

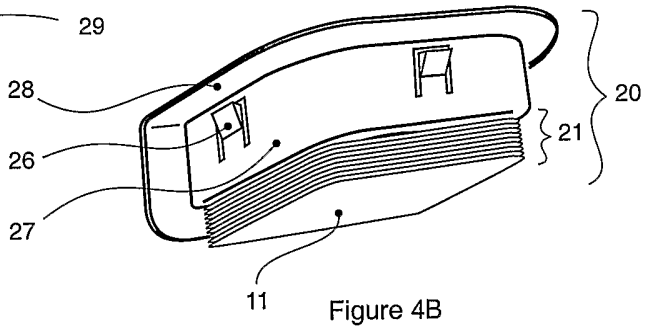


Figure 4B

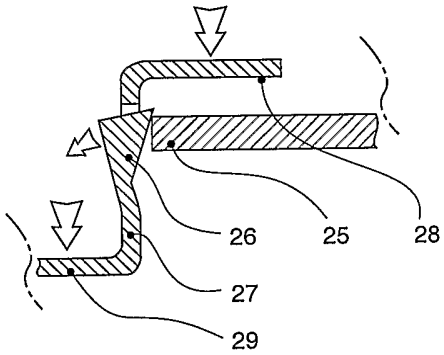


Figure 4C

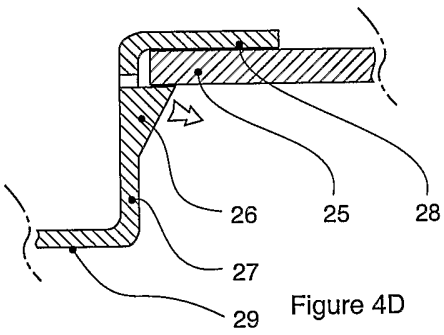


Figure 4D

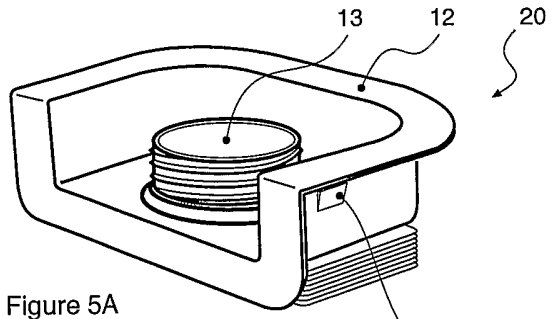


Figure 5A

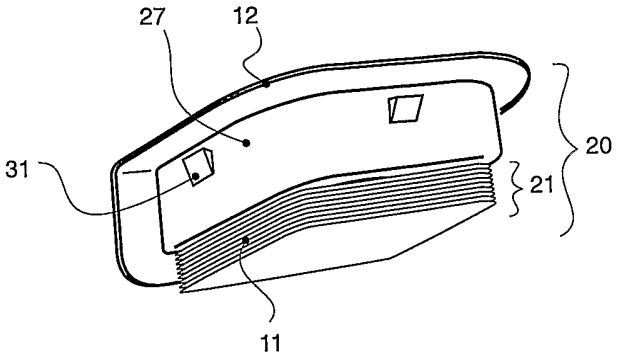
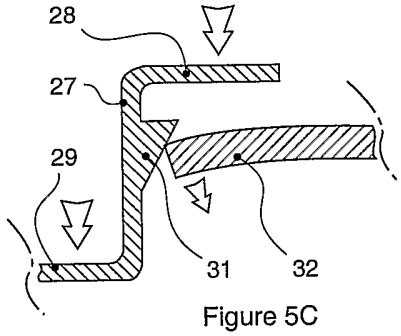


Figure 5B



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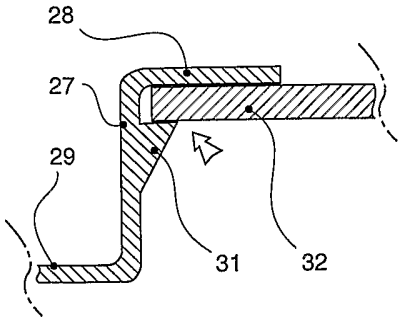

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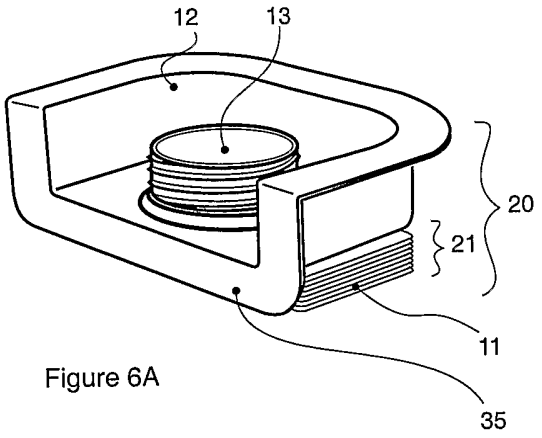
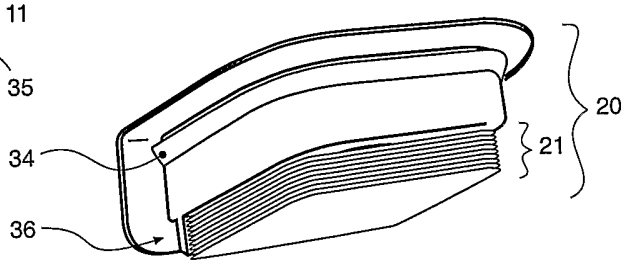


Figure 6A



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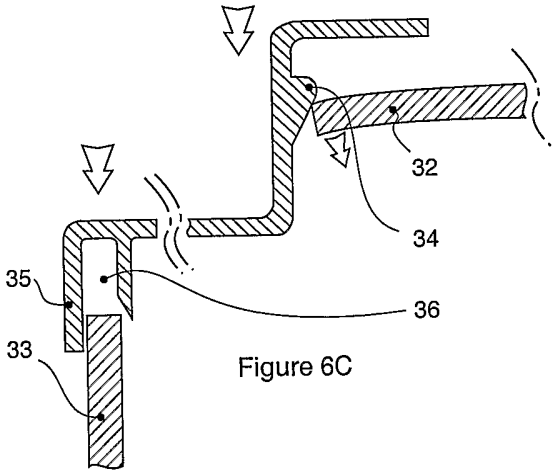
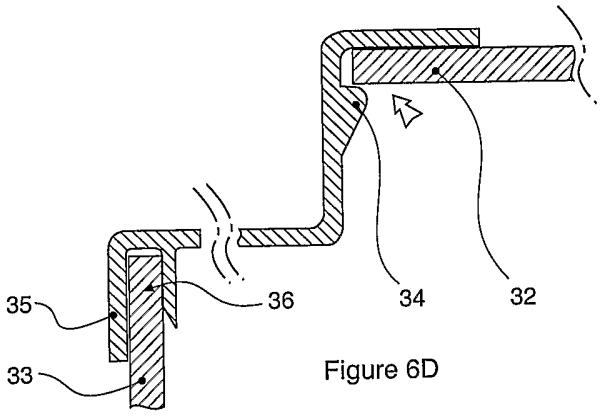


Figure 6C



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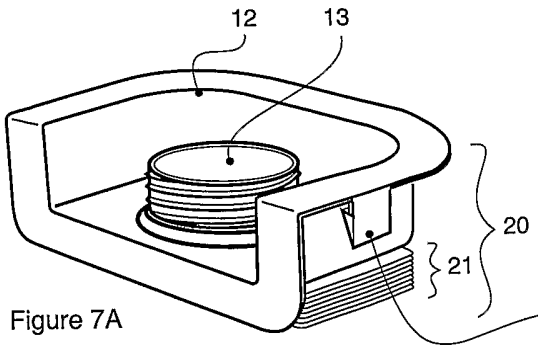
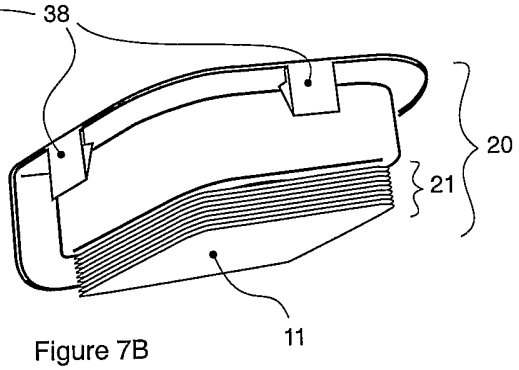


Figure 7A



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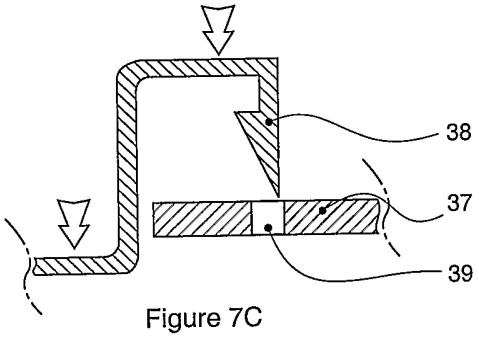

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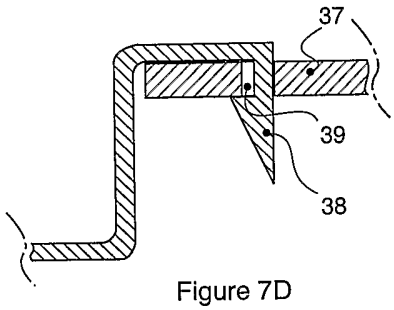

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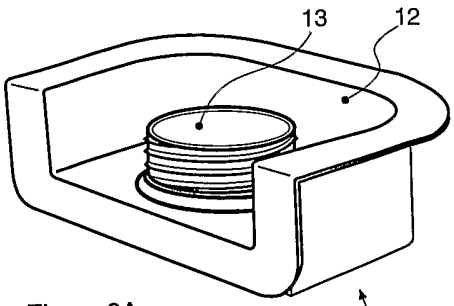
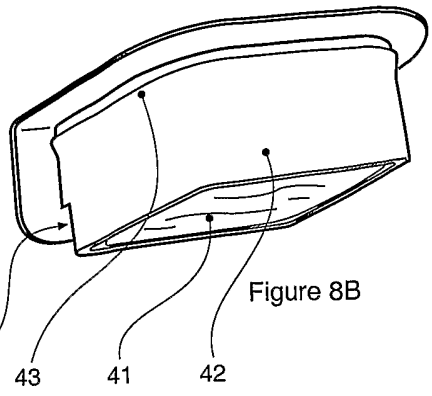


Figure 8A



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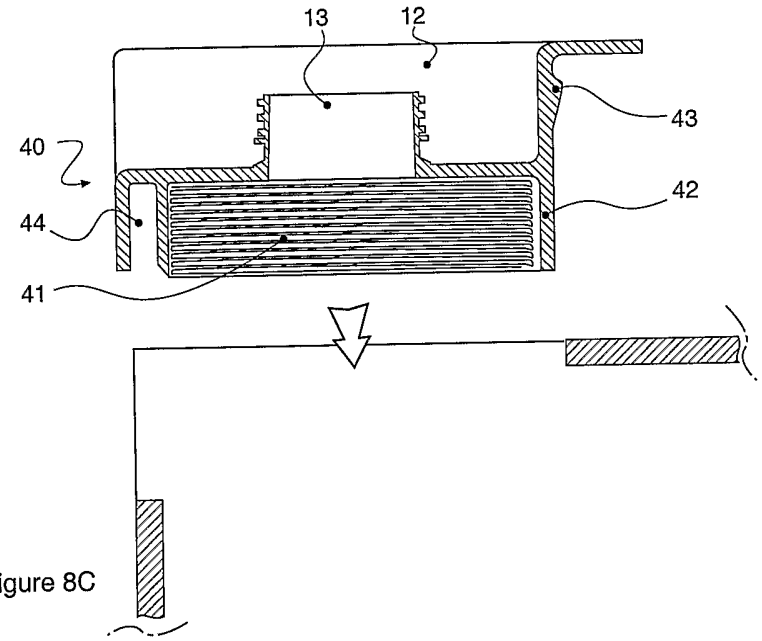

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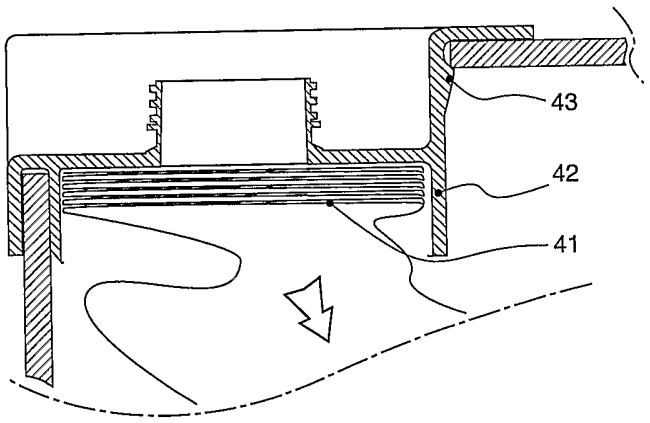

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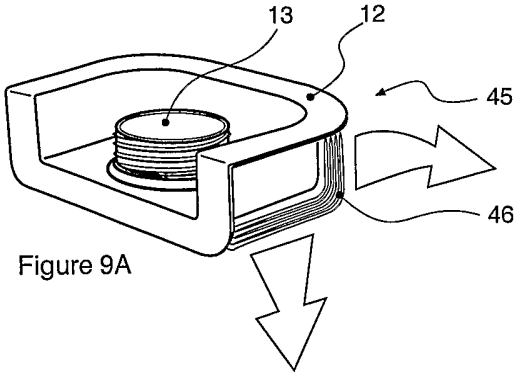


Figure 9A

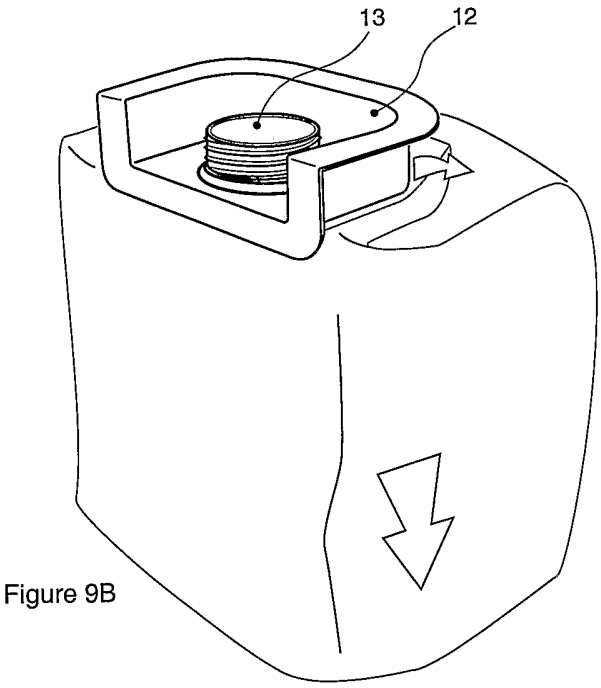
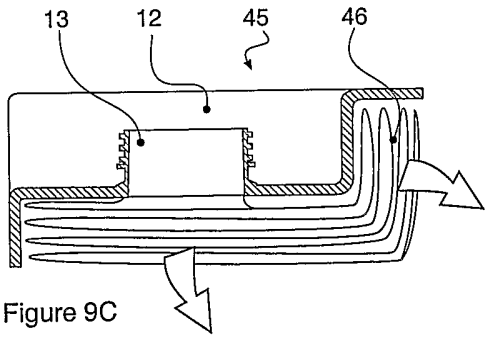


Figure 9B



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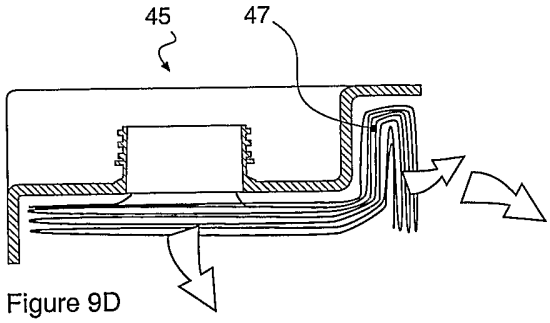

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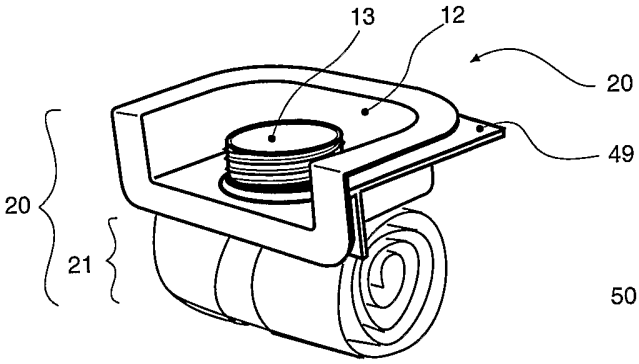


Figure 10A

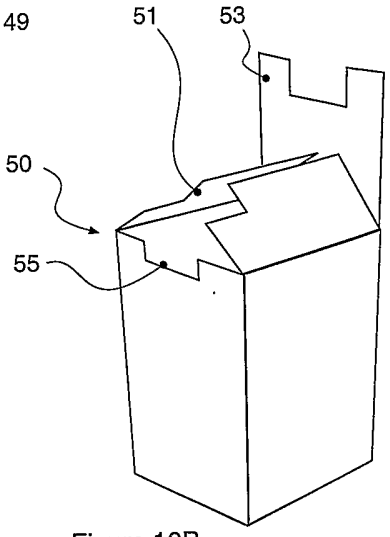


Figure 10B

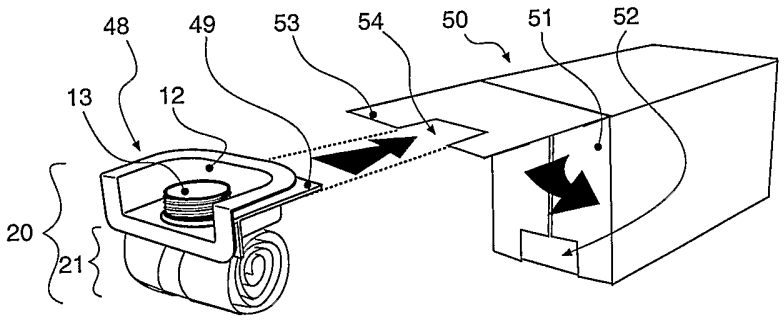


Figure 10C

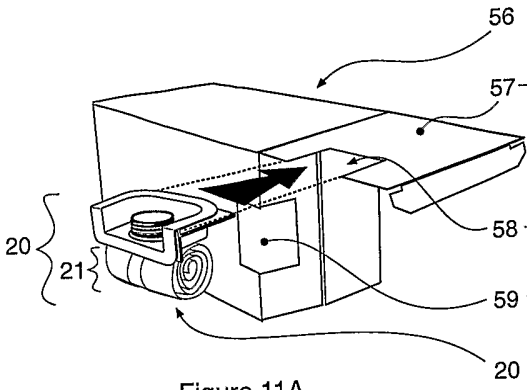


Figure 11A

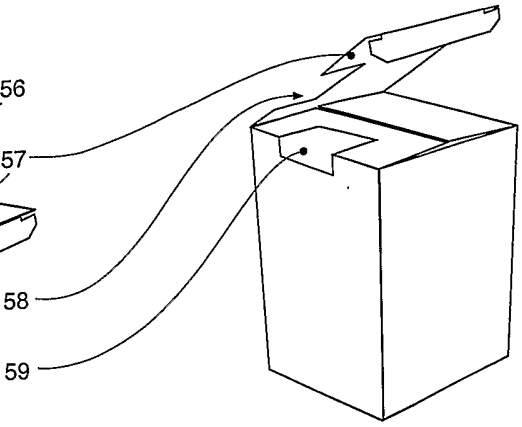


Figure 11B

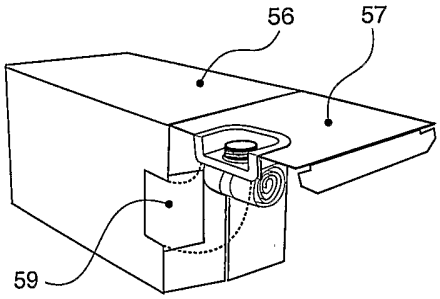


Figure 11C

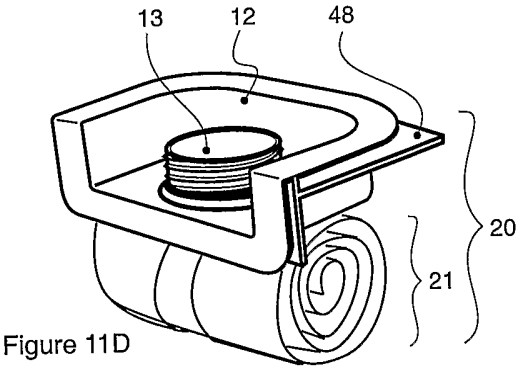


Figure 11D

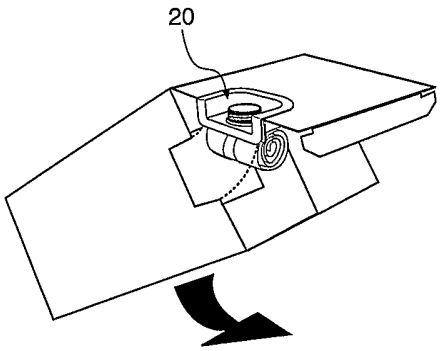


Figure 11F

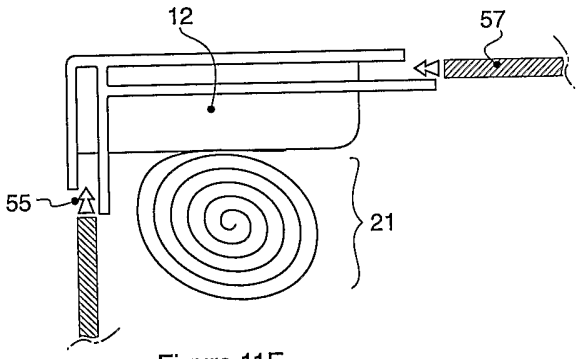


Figure 11E

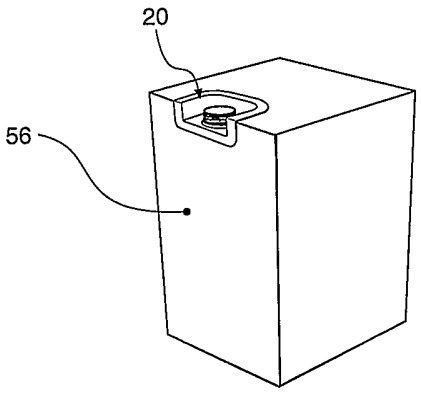


Figure 11G

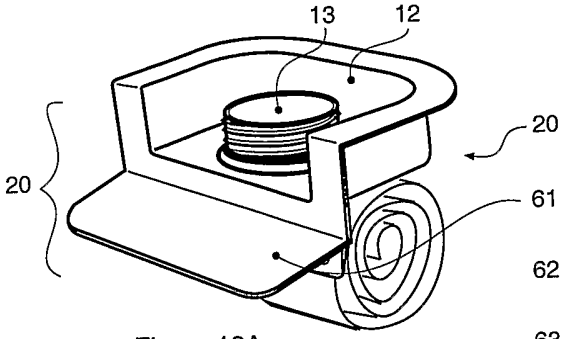


Figure 12A

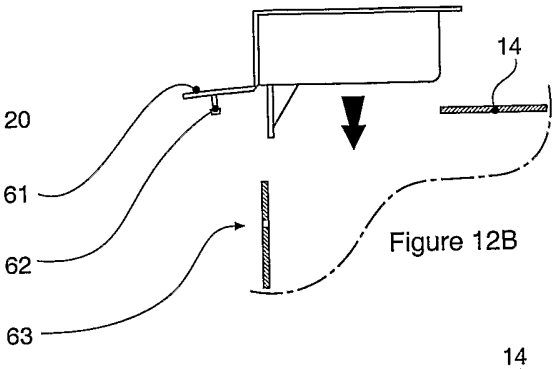


Figure 12B

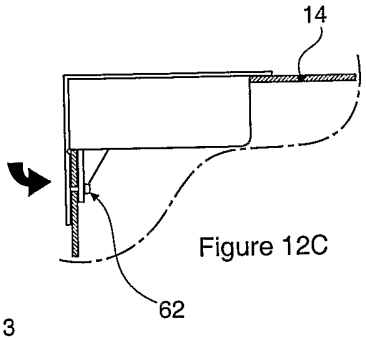
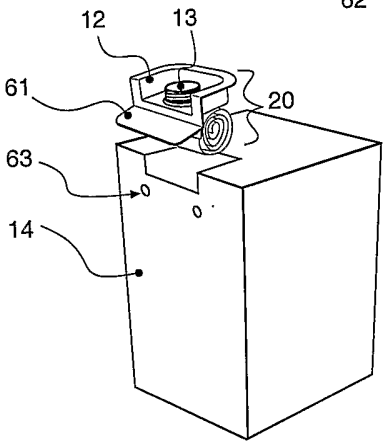


Figure 12C



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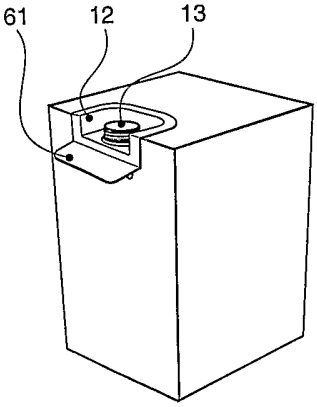

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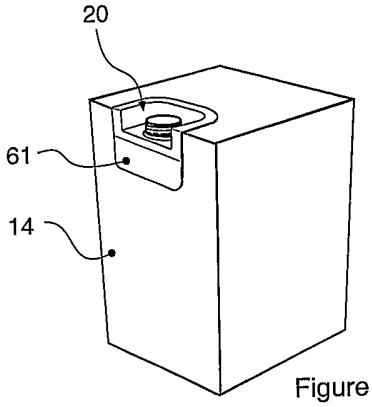

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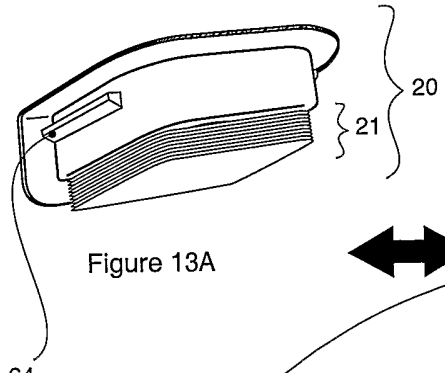

Figure 13A

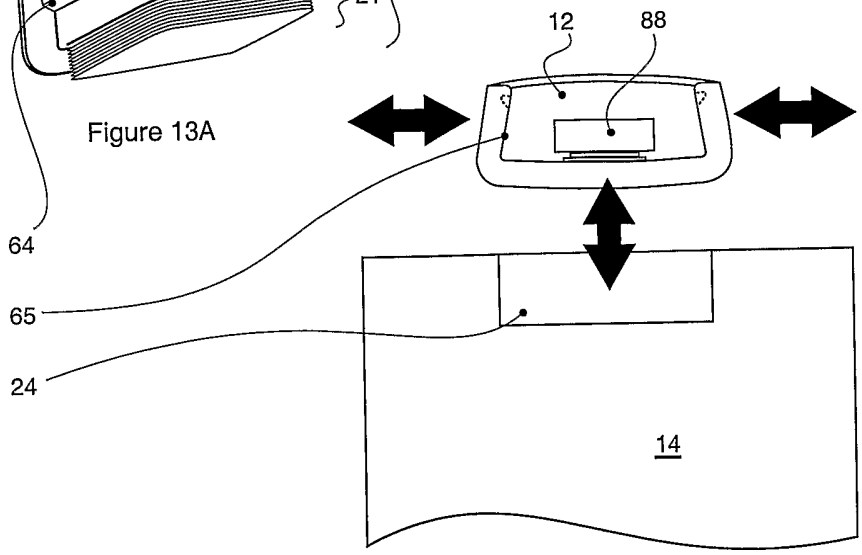

Figure 13B

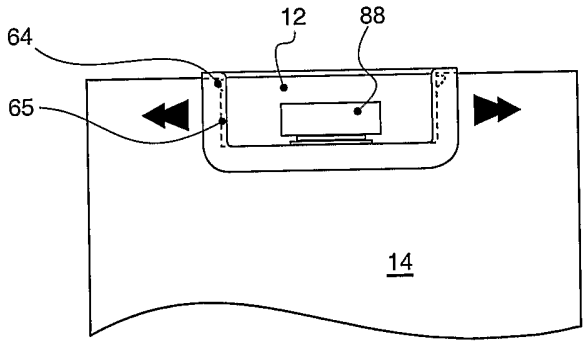

Figure 13C

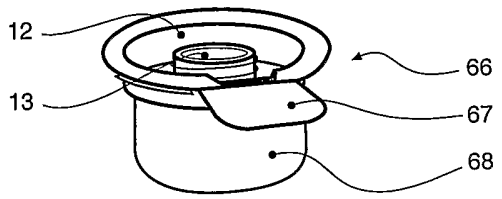

Figure 14A

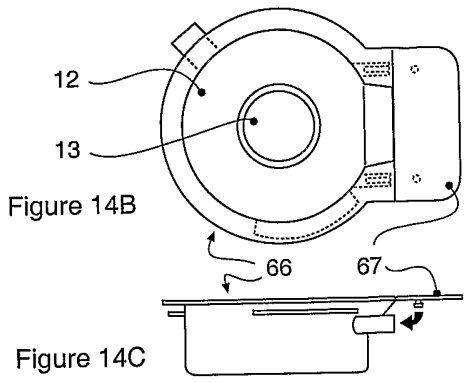

Figure 14B

Figure 14C

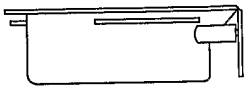

Figure 14D

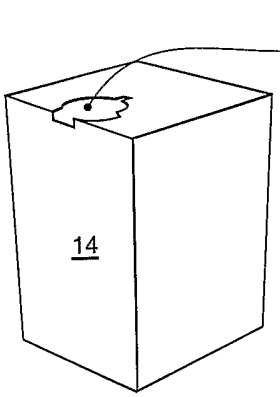

Figure 14E

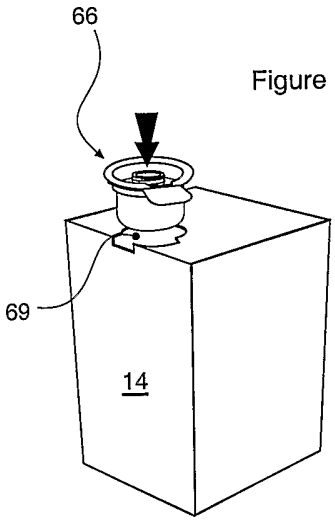

Figure 14F

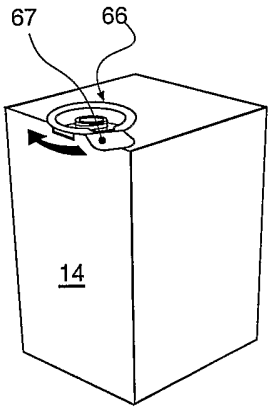

Figure 14G

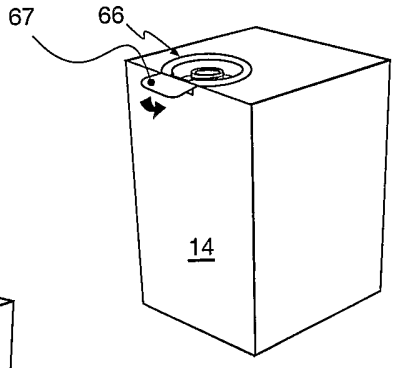

Figure 14H

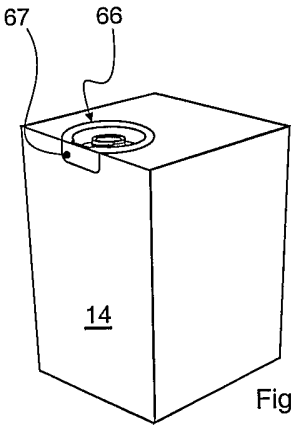

Figure 14I

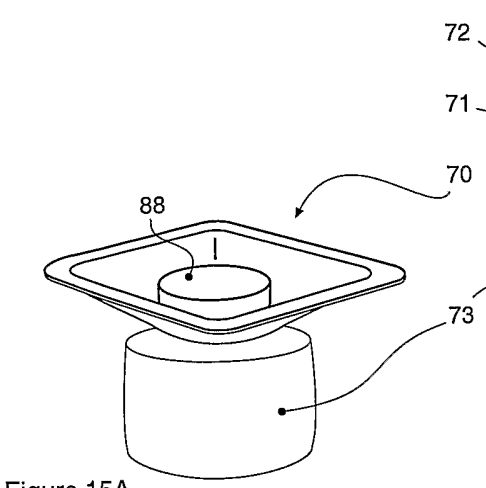

Figure 15A

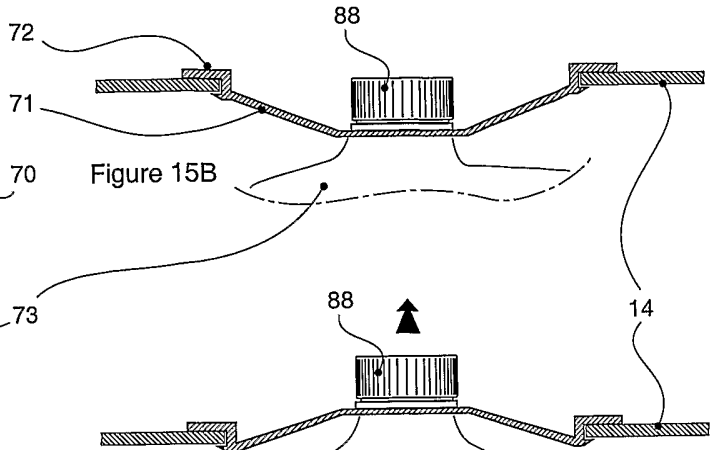

Figure 15B

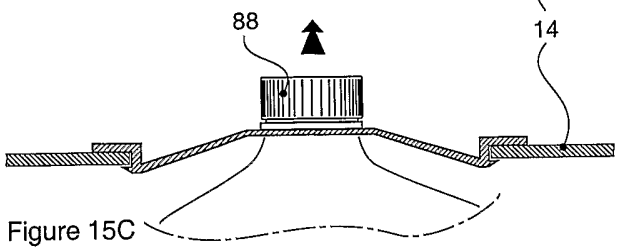

Figure 15C

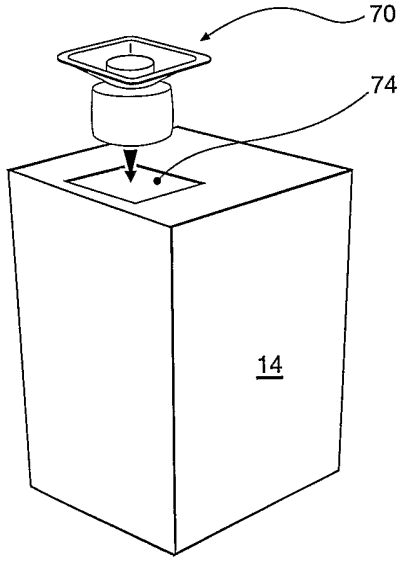

Figure 15D

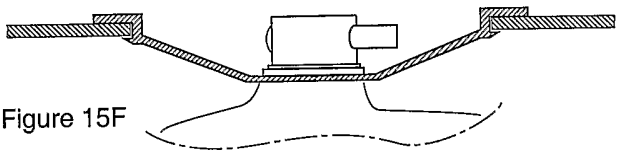

Figure 15F

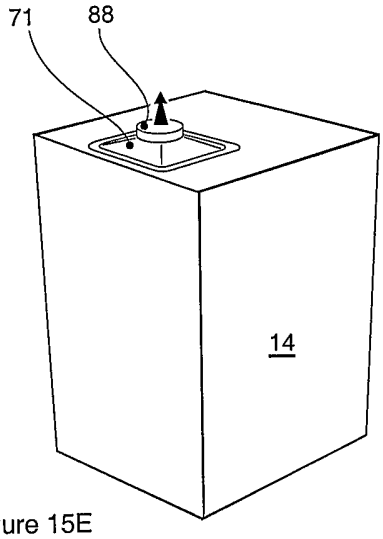

Figure 15E

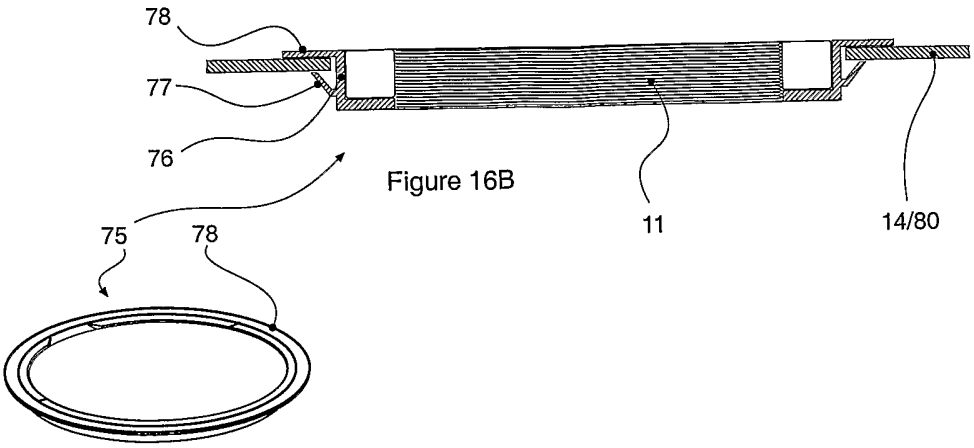

Figure 16B

Figure 16A

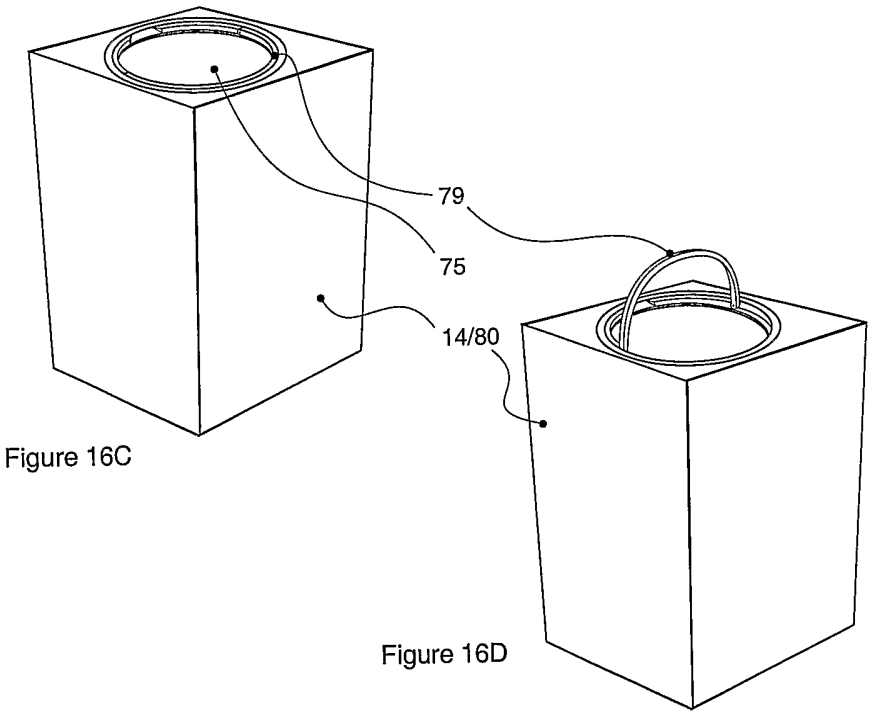

Figure 16C

Figure 16D

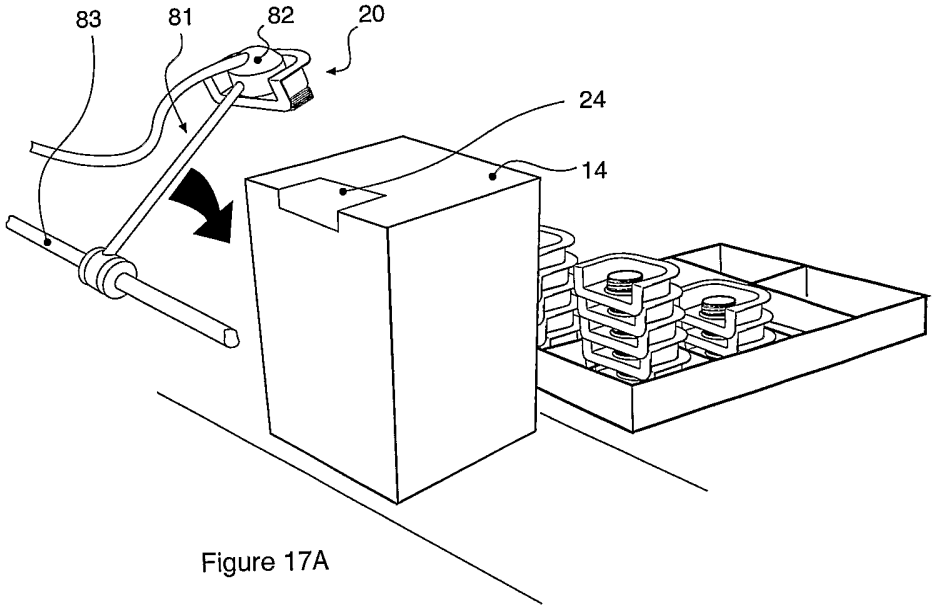

Figure 17A

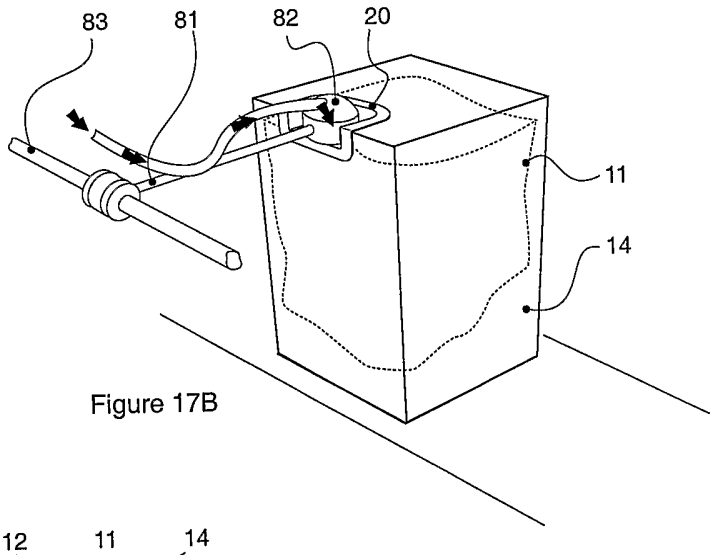

Figure 17B

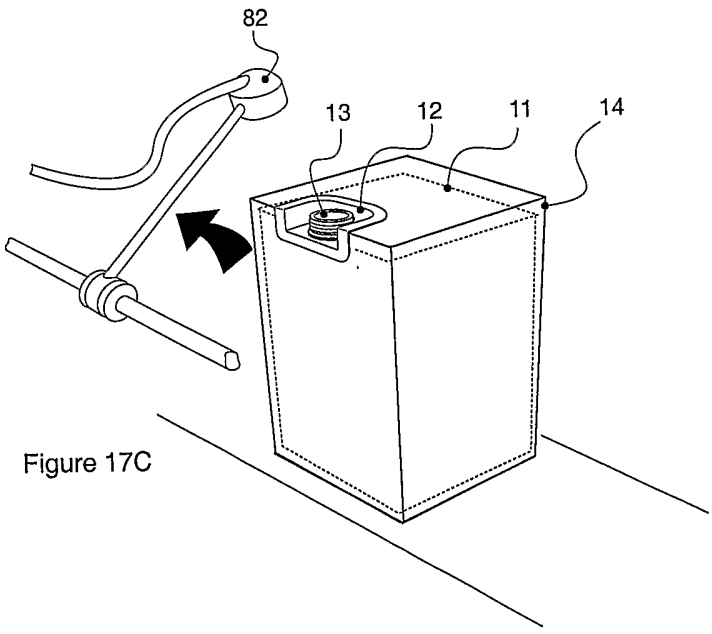

Figure 17C

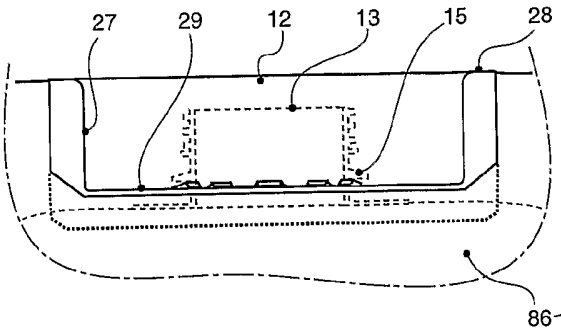

Figure 18A

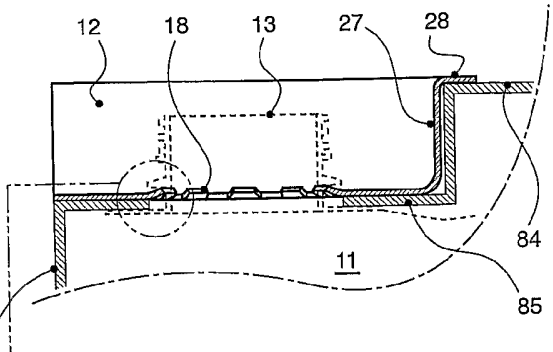

Figure 18B

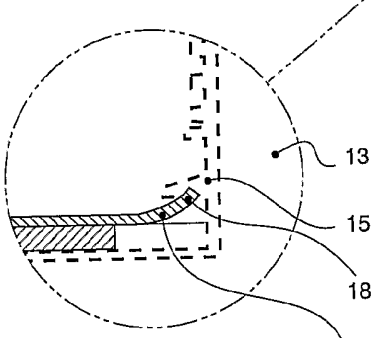

Figure 18D

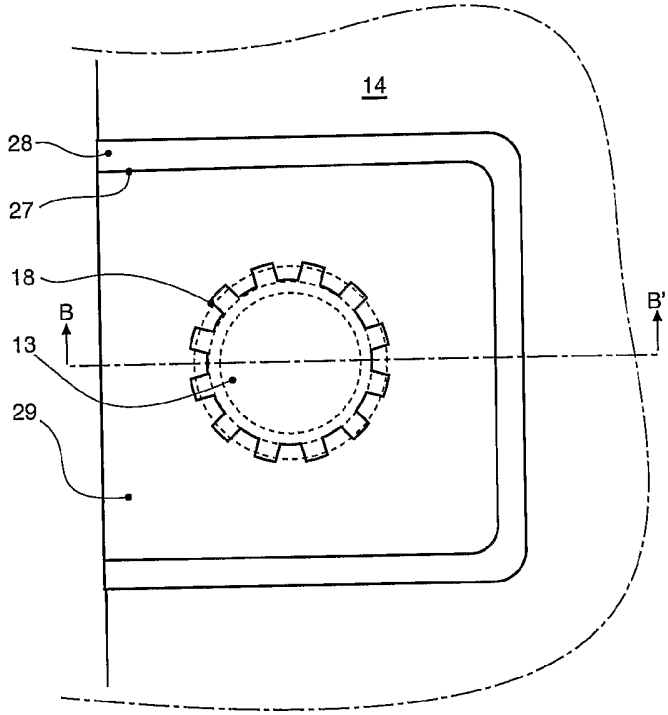

Figure 18C

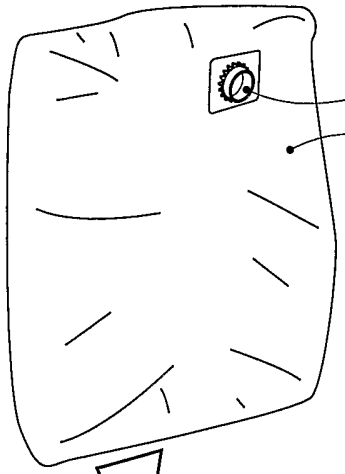

Figure 19A

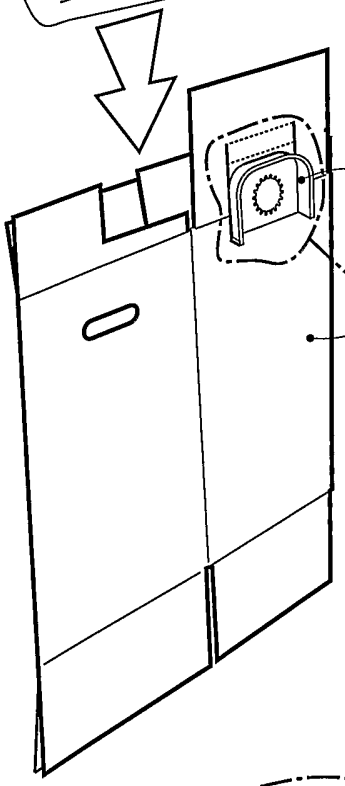

Figure 19B

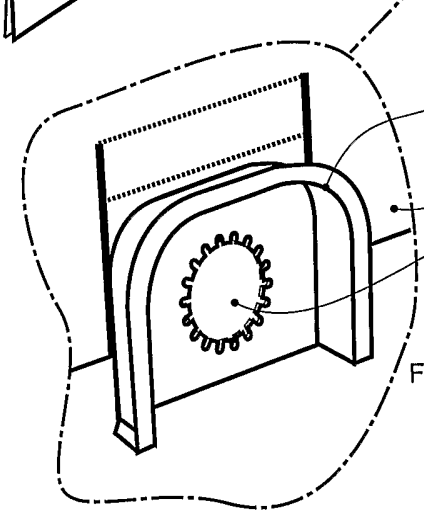

Figure 19C

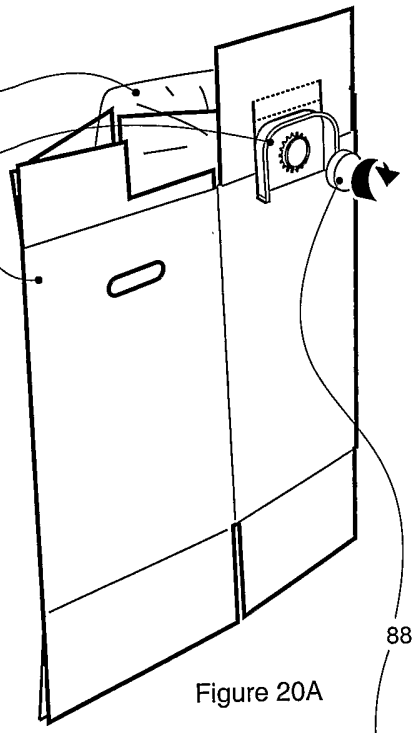

Figure 20A

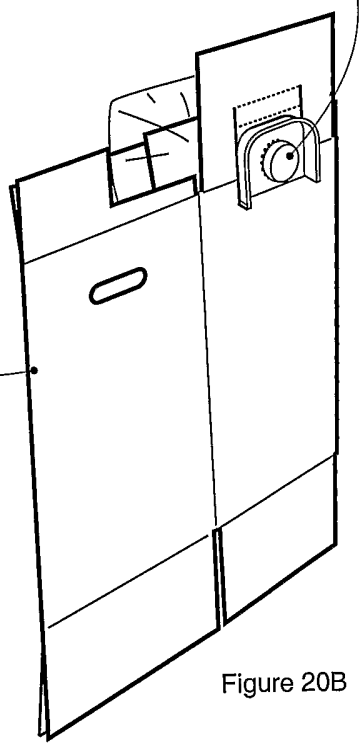

Figure 20B

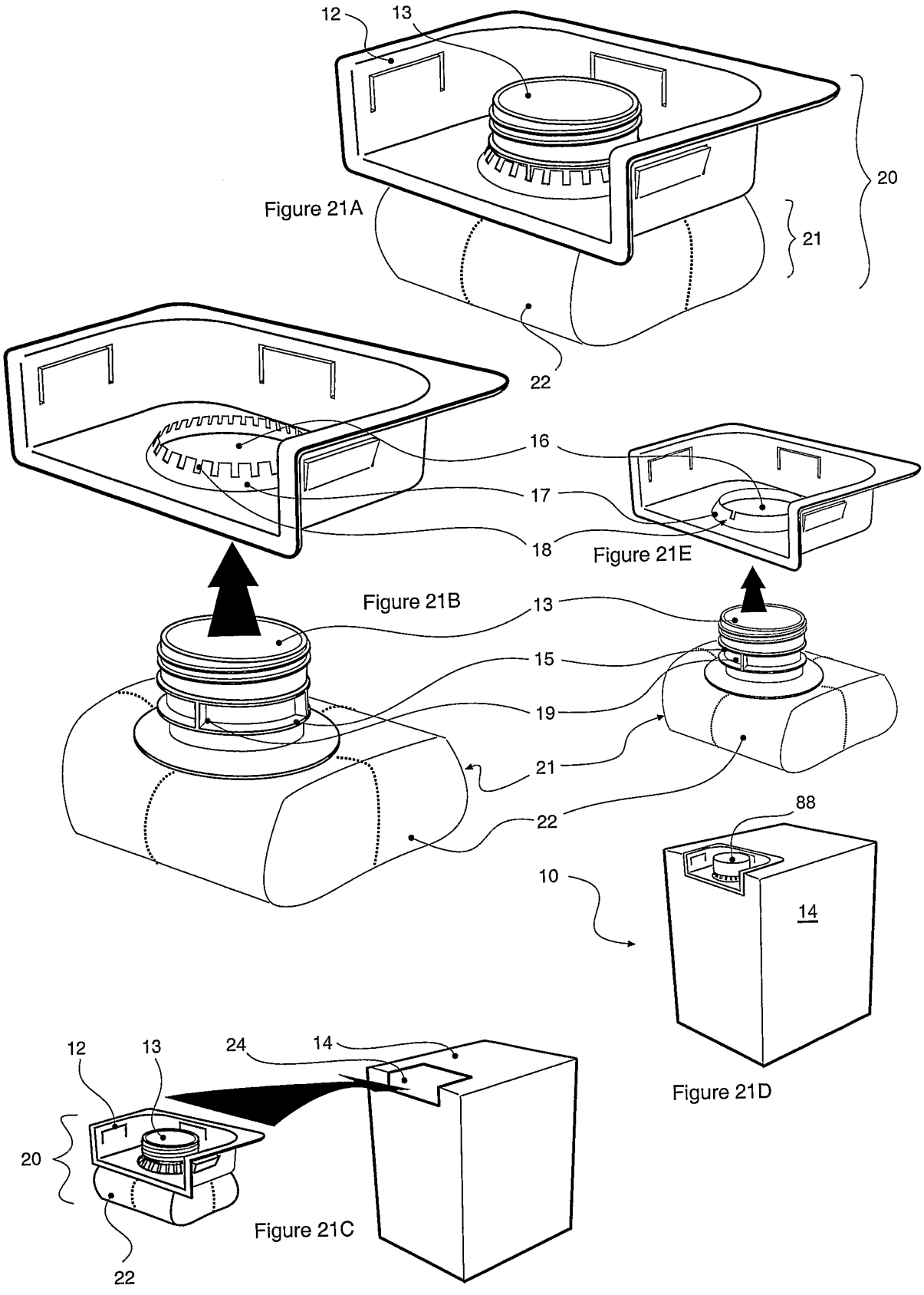
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Figure 21A
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Figure 21E
Figure 21B
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Figure 21D
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Figure 21C

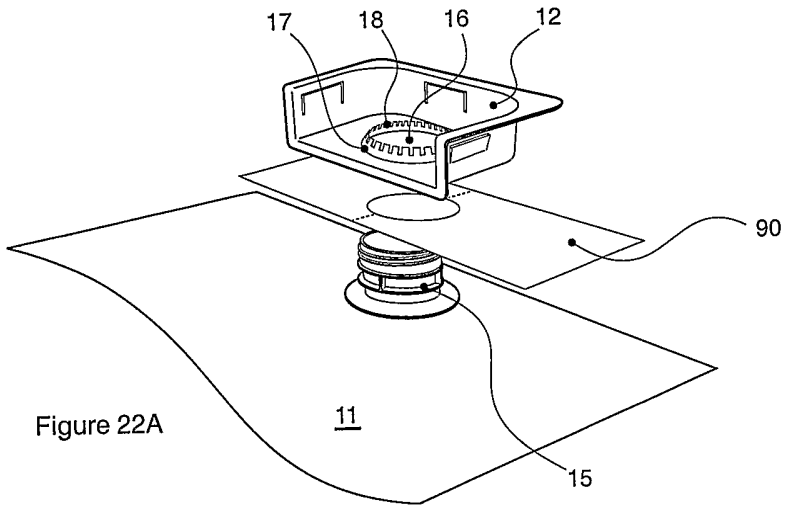


Figure 22A

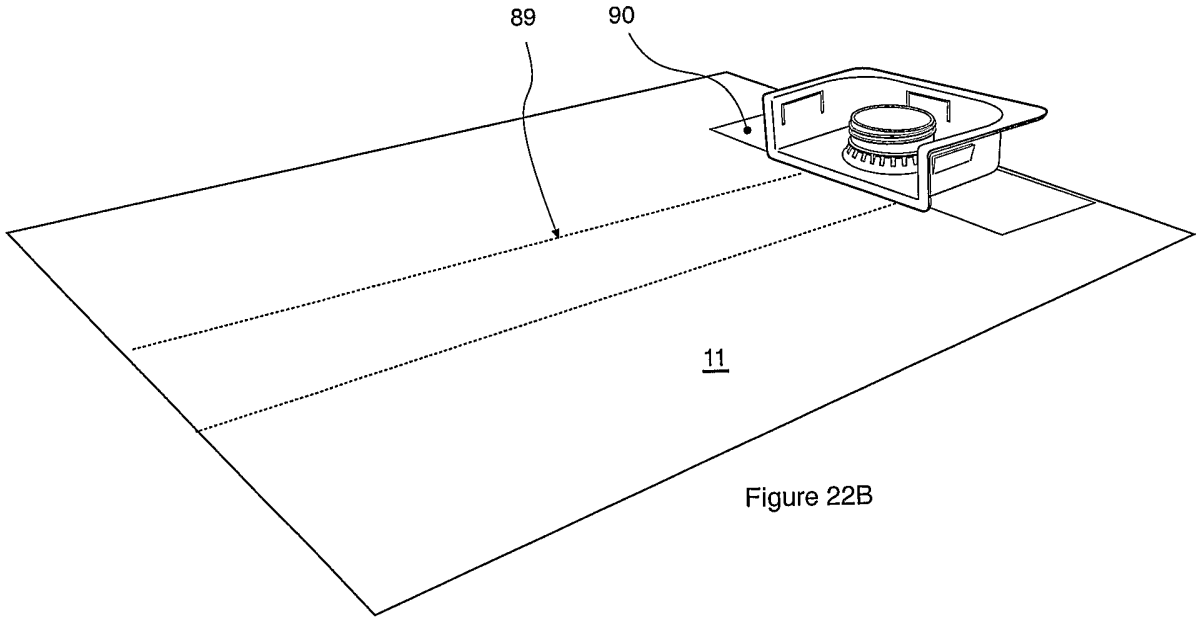


Figure 22B

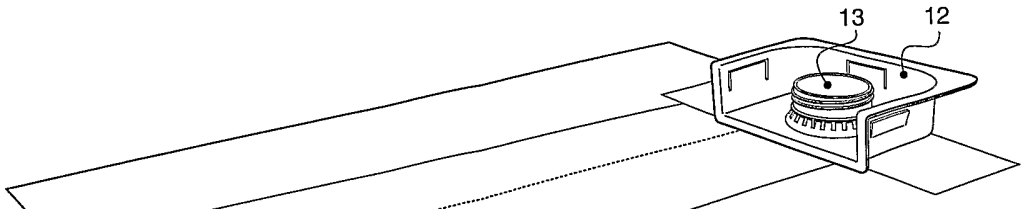


Figure 22C

Figure 22D

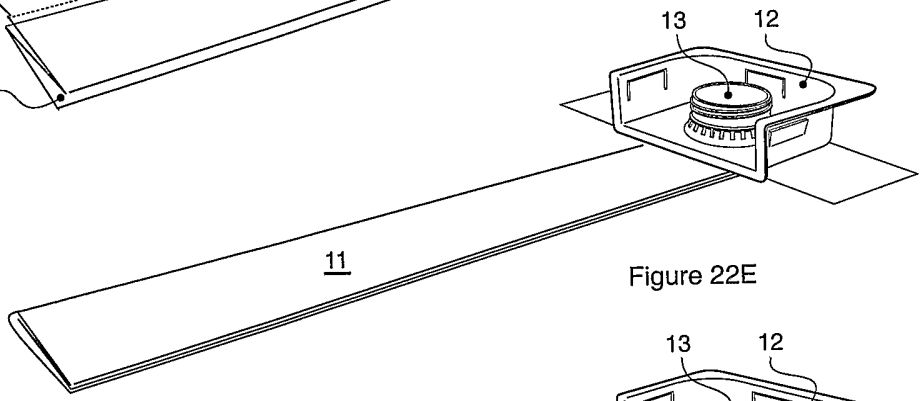


Figure 22E

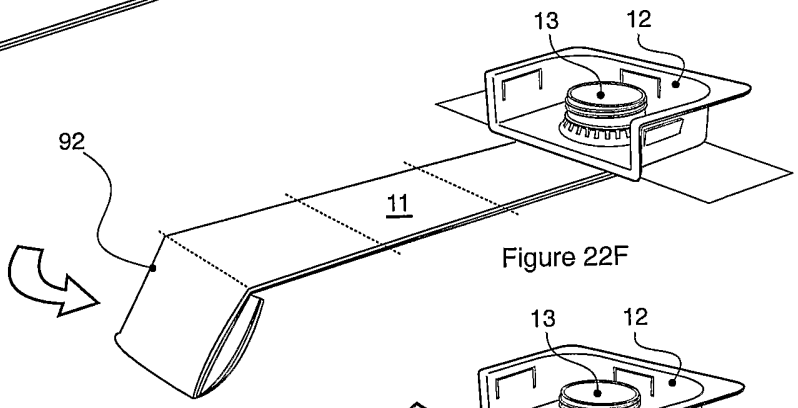


Figure 22F

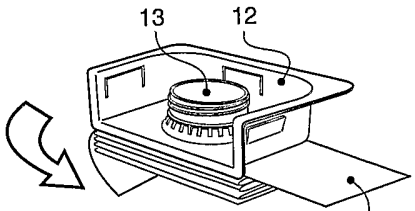


Figure 22G

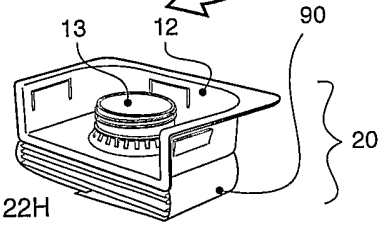


Figure 22H

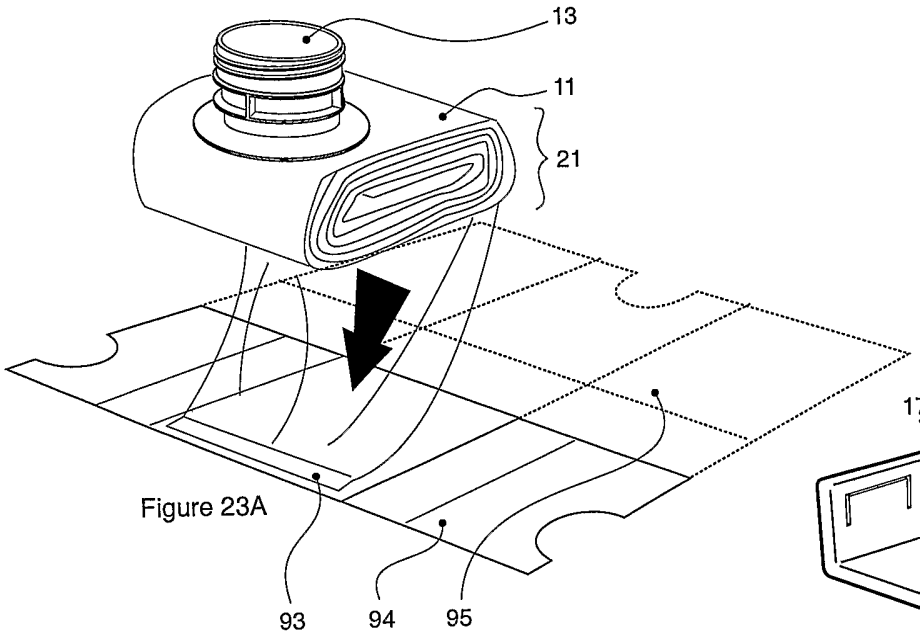
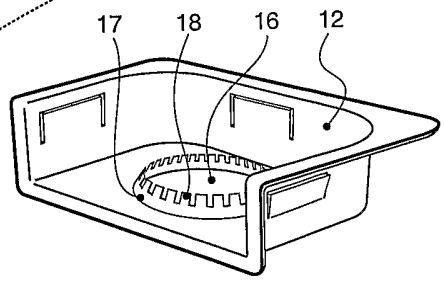


Figure 23A



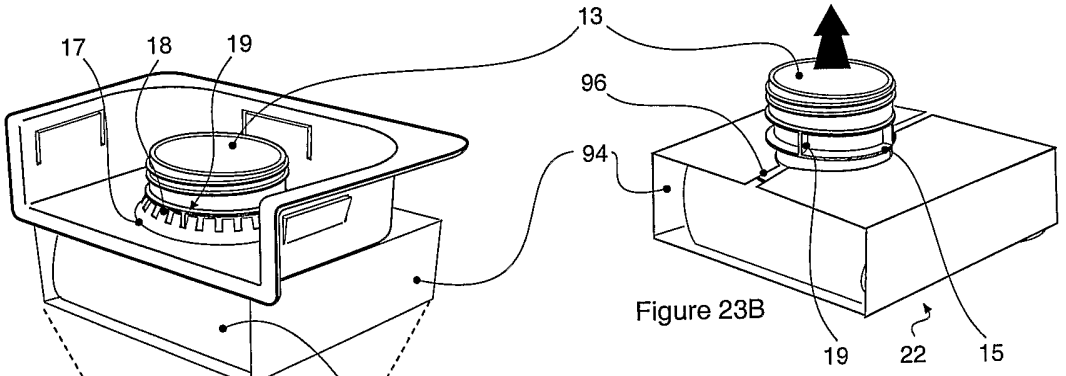


Figure 23B

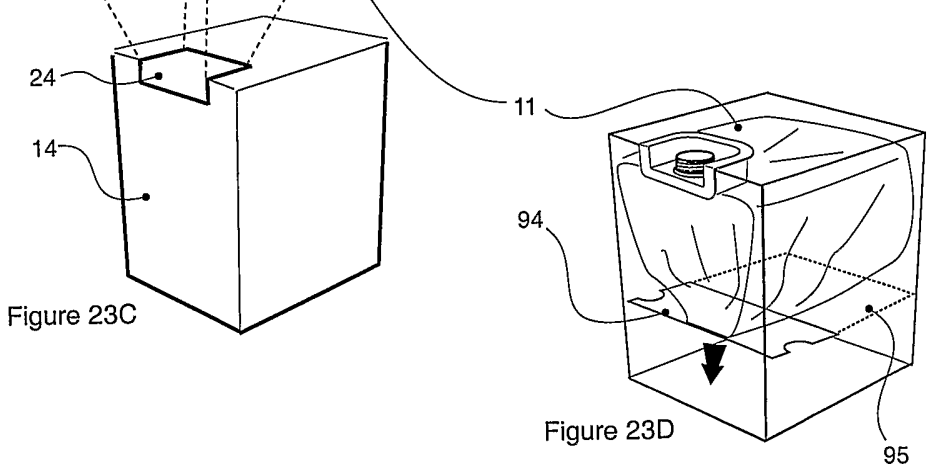


Figure 23C

Figure 23D

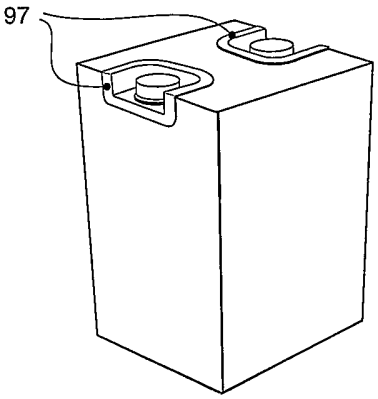


Figure 24A

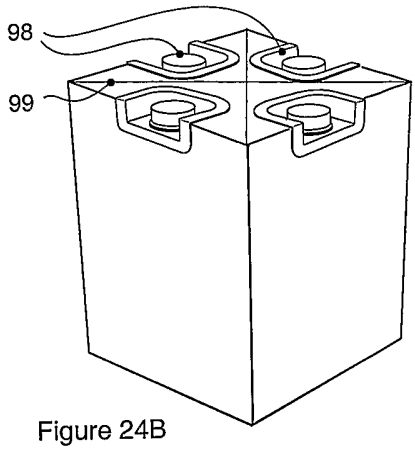


Figure 24B

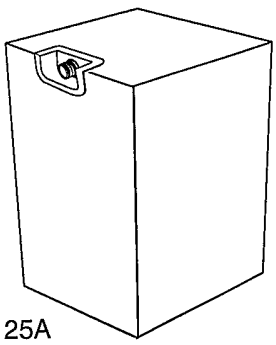


Figure 25A

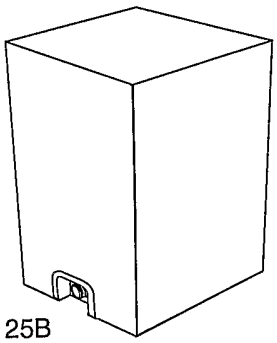


Figure 25B

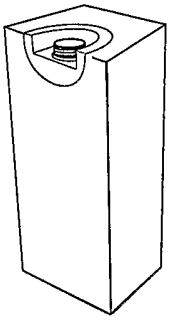


Figure 25C

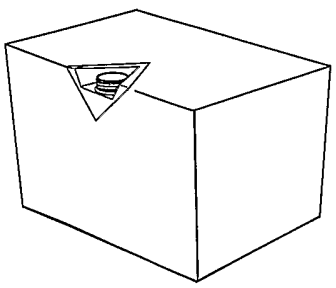


Figure 25D

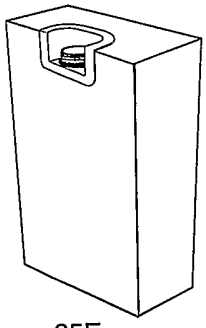


Figure 25E

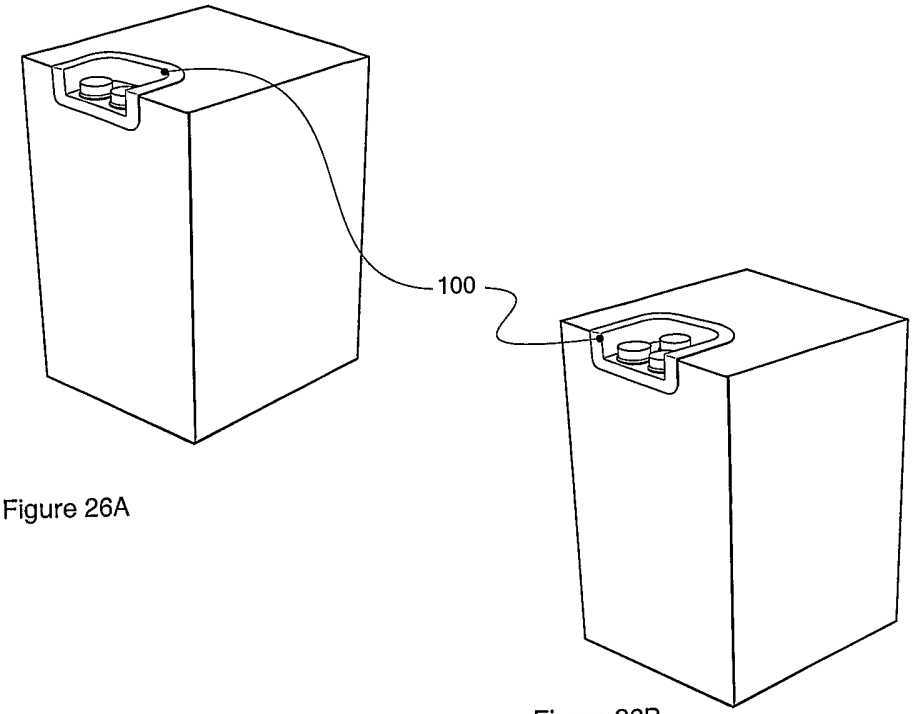


Figure 26A

Figure 26B

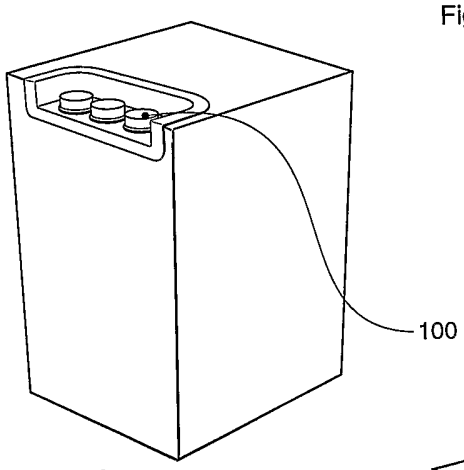


Figure 26C

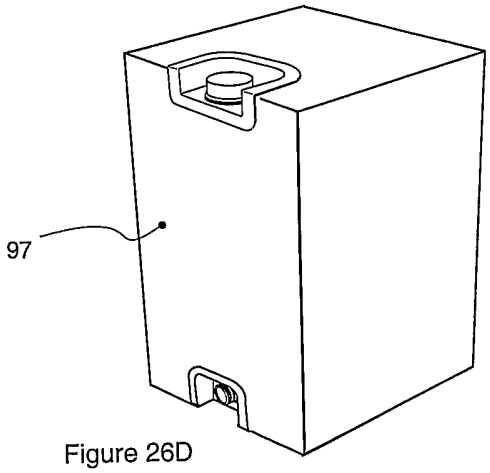


Figure 26D

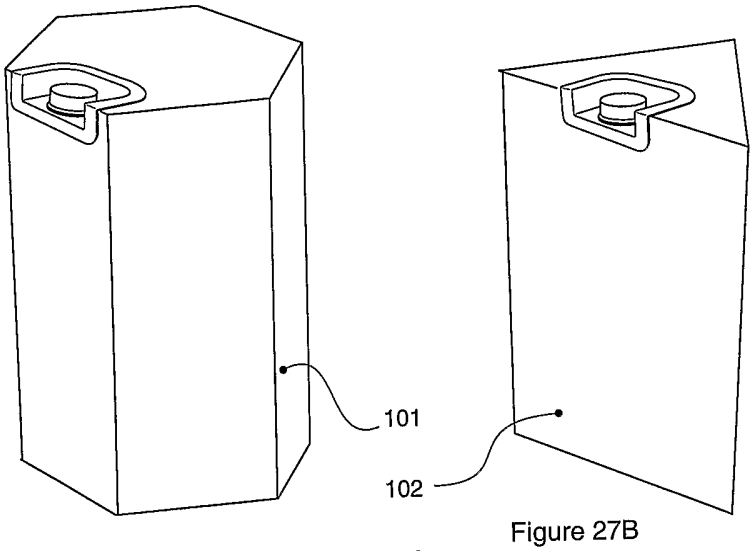


Figure 27A

Figure 27B

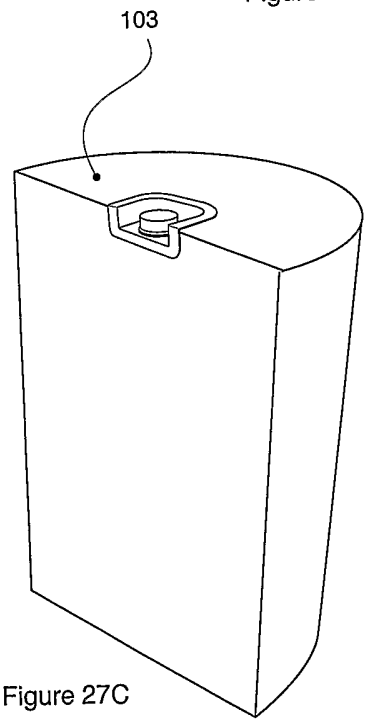


Figure 27C

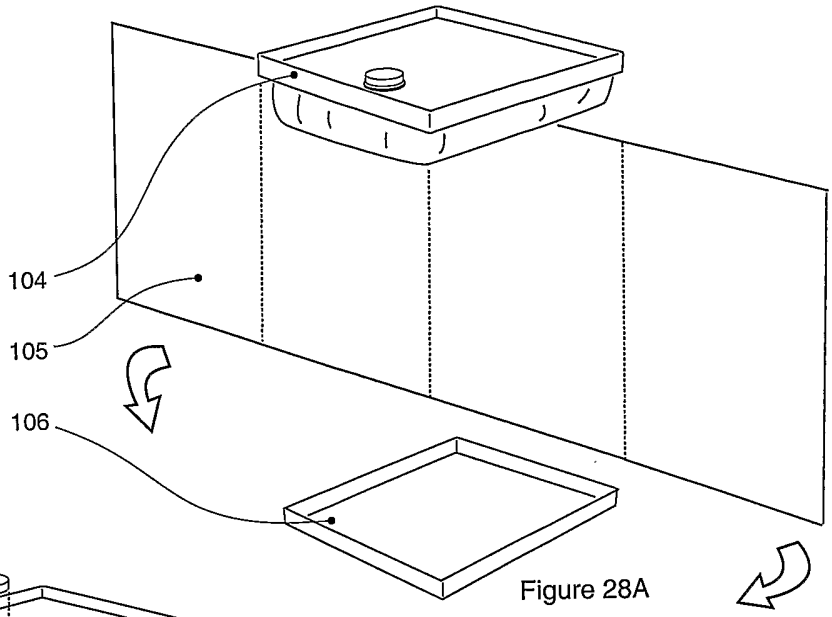


Figure 28A

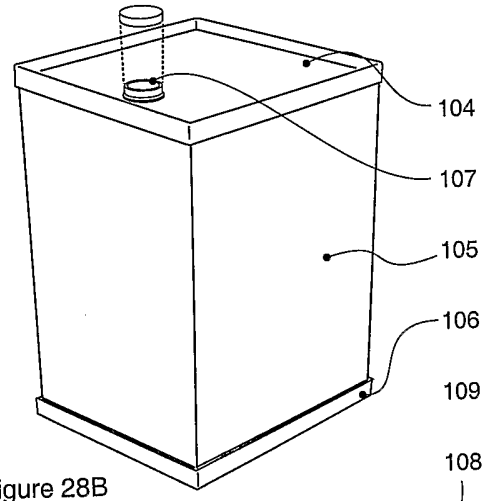


Figure 28B

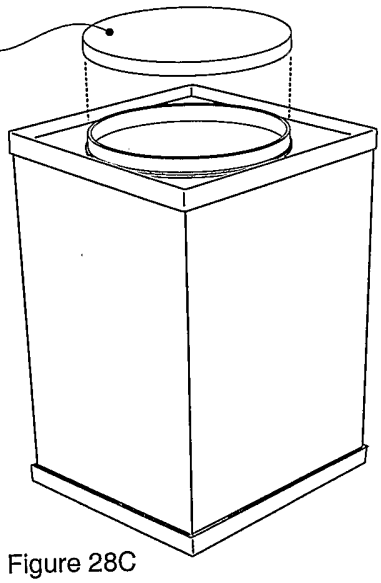


Figure 28C

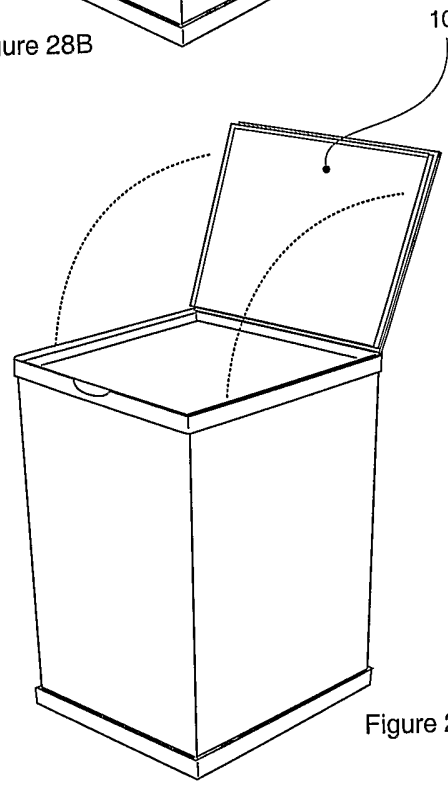


Figure 28D

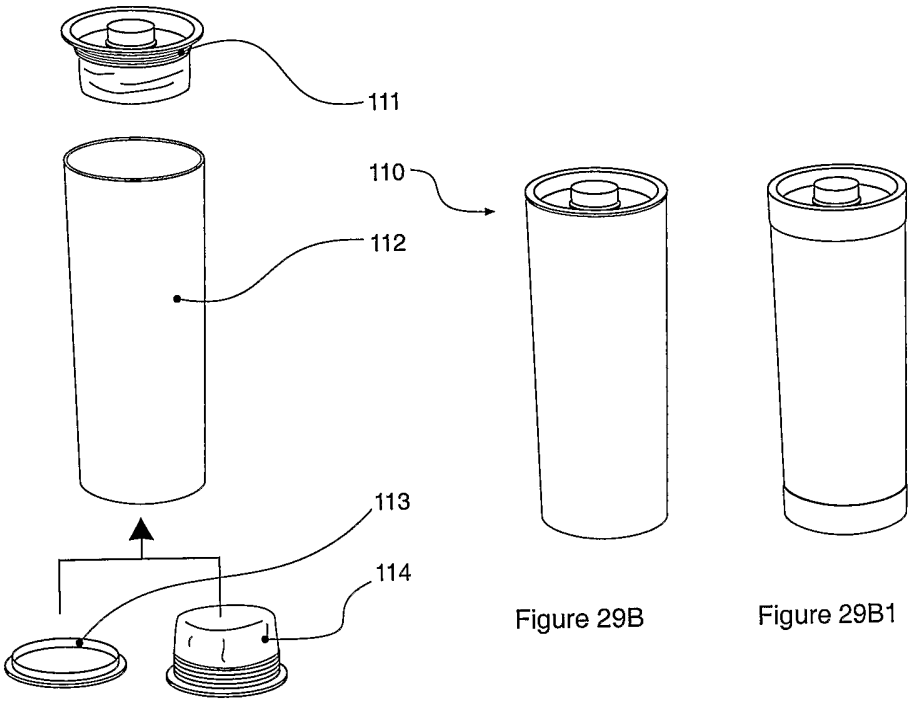


Figure 29A

Figure 29B

Figure 29B1

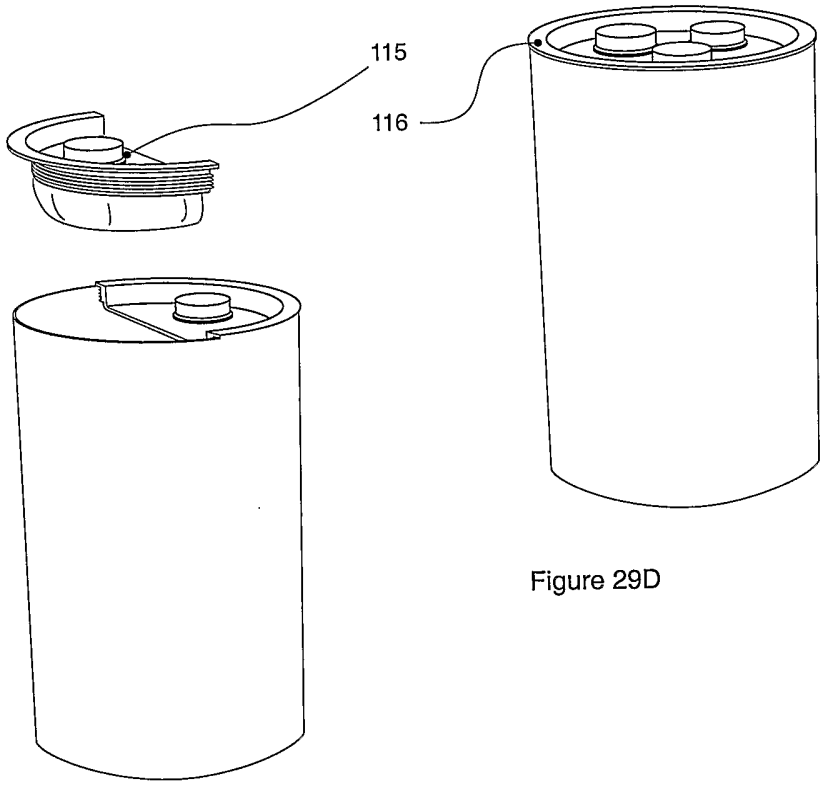


Figure 29D

Figure 29C

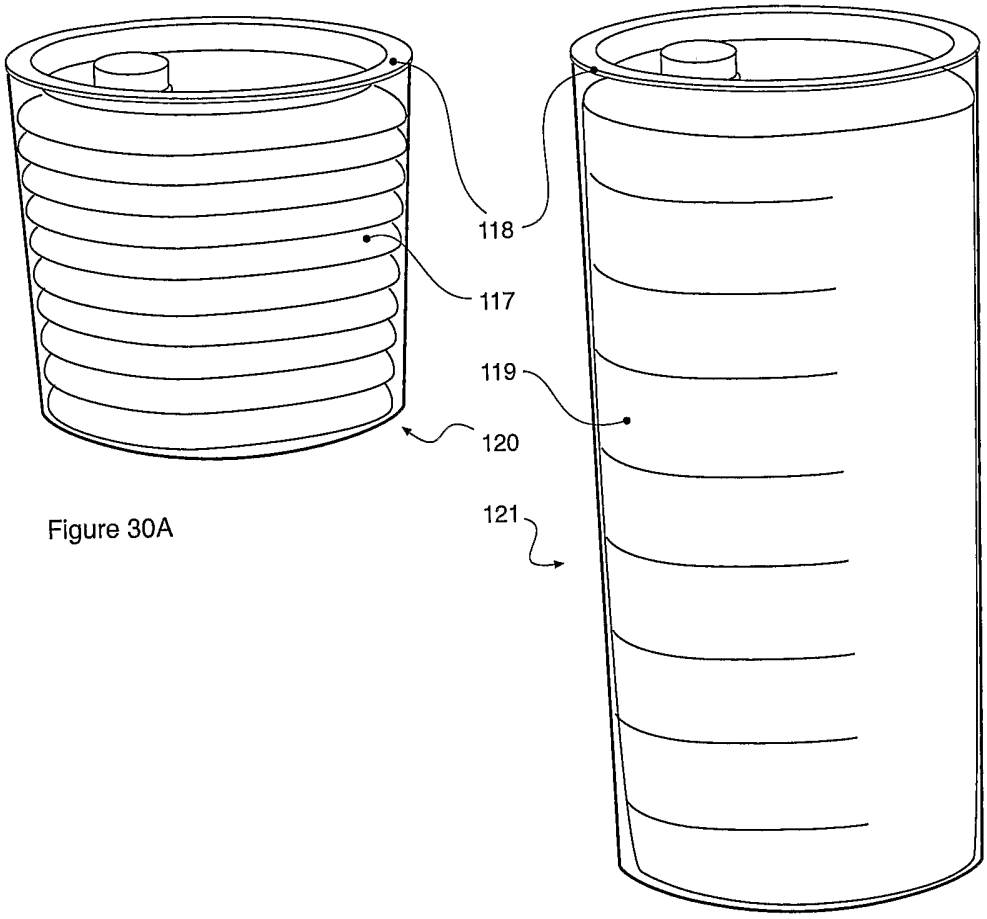


Figure 30A

Figure 30B

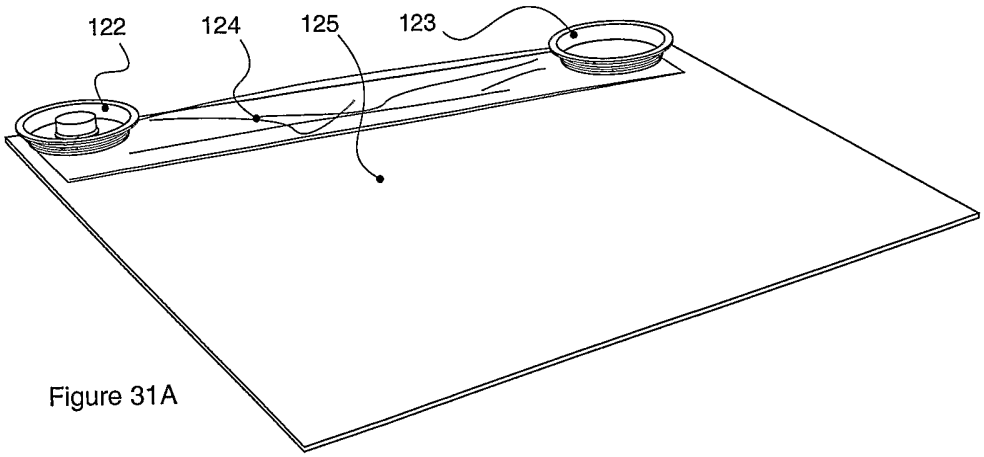


Figure 31A

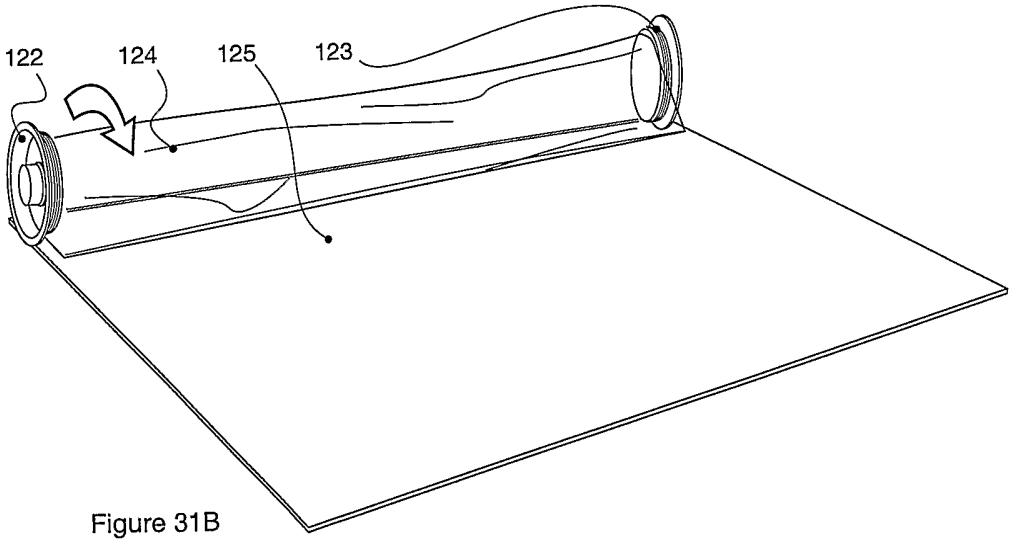


Figure 31B

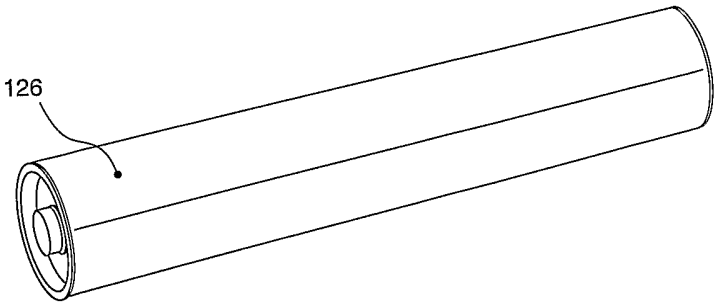


Figure 31C

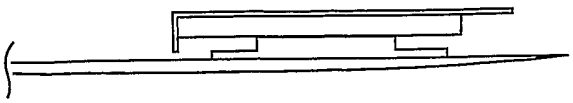


Figure 32A

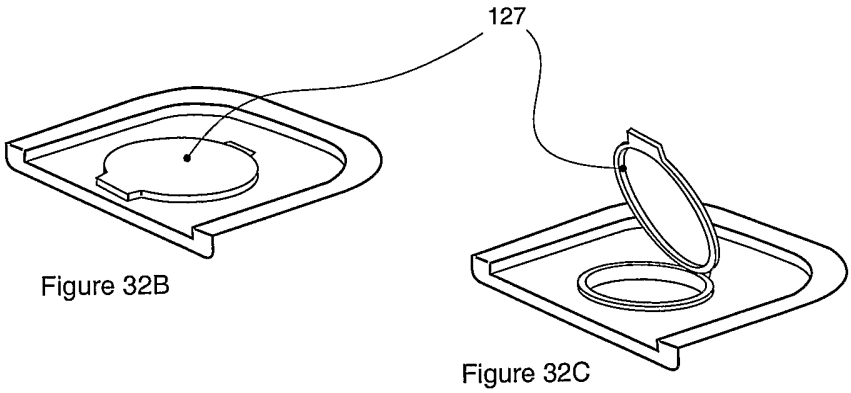


Figure 32B

Figure 32C

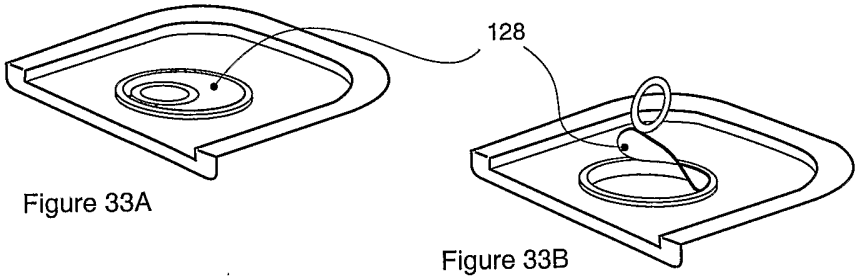


Figure 33A

Figure 33B

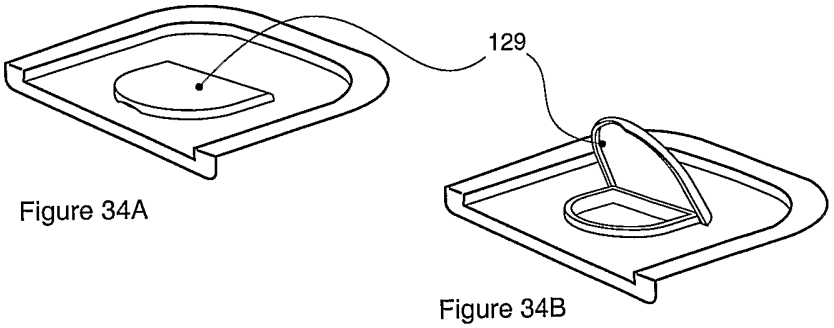


Figure 34A

Figure 34B

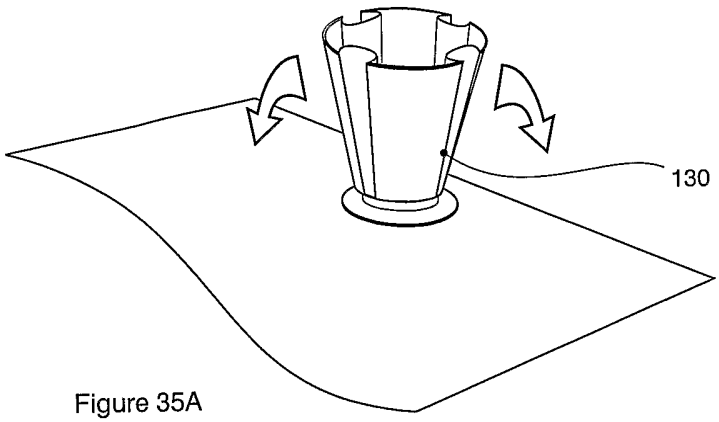


Figure 35A

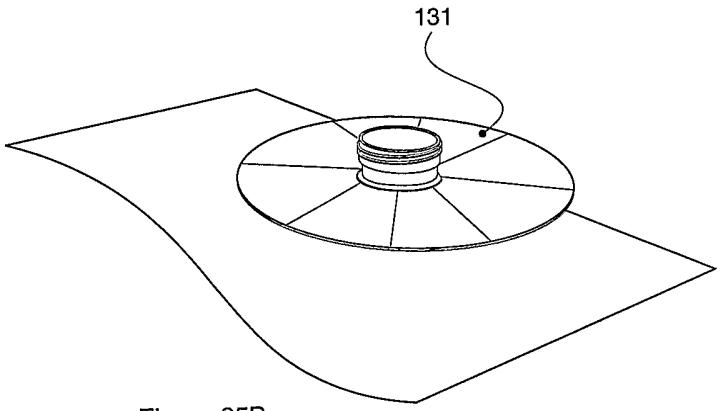


Figure 35B