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(54) Resealable container system for storing paint

Wieder abdichtbares Behältersystem zum Aufbewahren von Lack

Système de récipient refermable destiné au stockage de la peinture

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Description

Field of the Invention

[0001] The present invention relates to resealable container systems for storing paint and other such substances, and in particular, although not exclusively, to resealable container systems based on sheet metal container bodies commonly referred to in the art as metal tins, metal cans, or metal pails.

Background to the Invention

[0002] A wide variety of container systems for storing paint and other substances, such as oils, resins, varnishes, stains, and powders, and food stuffs, such as powders and syrups are known.

[0003] Referring to figs. 1 and 2, one of these known container systems incorporates a metal container, which is substantially cylindrical, and is formed of sheet metal. The cylindrical side wall of the container is formed from a suitably bent piece of sheet metal (e.g. steel or plated steel), and the cylindrical wall is formed from the sheet by making a longitudinal seal using techniques well known in the art (e.g. by appropriate folding, curling, or bending of the sheet edges). These containers are commonly referred to in the art as metal pails, and the bottom end of the container is closed by another piece of sheet metal. Again, well known folding, curling, or bending techniques are used to form a seal between the generally circular piece of sheet metal forming the bottom of the container and the lower end of the container walls. It is known with these metal pails for the side walls to incorporate one or more radially extending ridges formed by appropriate deformation of the side wall material. In this first known container system, the metal side wall of the pail is curled over at its upper edge, radially outwards, to form a container rim. A generally circular sheet metal lid is then used to close and seal the container by fitting on and forming a seal to the container rim. This first type of container lid comprises a plurality of claws arranged around the periphery of the lid. Each of these claws is adapted to be bent so as to clip under the outwardly curved container rim. When all of the claws are clipped in place, the lid is held securely on the metal pail, with the lid forming a seal to the container rim. Each claw typically comprises a respective slot into which a tool, such as a screwdriver, can be inserted to lever the claw from its closed, sealing position, radially outwards and upwards so that the claw disengages from the respective portion of the container rim. When all of the claws have been released, i.e. bent open, in this manner, the lid can be removed from the container. Fig. 1 shows such a system, with some of the claws clipped in place, some of the claws having been disengaged, and one claw being in the process of unclipping using a screwdriver. Fig. 2 shows the lid with all claws opened, the lid being ready for removal from the pail.

[0004] This first known container system has a number of disadvantages associated with it. Firstly, the sheet metal used to form the lid incorporates a large number of potentially sharp edges because of the detail required to define the large number of claws and their associated apertures. Each of these edges thus poses a cutting hazard to a user. Furthermore, the large number of cut edges increase the potential for the lid to rust, if it is formed from ferrous material. Although the lid may be sprayed, coated, painted, or otherwise covered with a rust-inhibiting material, the larger the number of edges, and the greater the total length of the combined edges of the lid, the greater the chance of the rust-inhibiting treatment failing to be completely successful. Another problem is that typically, once the lid has been removed from the pail, it cannot be used to re-seal the pail. Bending of the claws to release the lid typically causes a degree of permanent distortion of the lid, and prevents it from being able to properly reseal the pail. Even if the lid is not substantially distorted when first removing it, it is very difficult for a user to try to reseal the lid to the container by bending back, into their clipping positions, each of the large number of claws. This operation typically requires a degree of strength, and the container system is typically never airtight again. Thus, although this closure system is common in the professional paint market, for closing paint pails, it has numerous drawbacks. An additional disadvantage is that it is technically relatively difficult to automate the fitting of the lids with claws to the pails in a factory or production line. As will be appreciated, a fitting machine must be specially adapted in order to be able to clip each of the claws in place, typically simultaneously.

[0005] In view of the fact that these known container systems utilise lids with claws which, after removal from the pail cannot be resealed, it is known for the lid to have a circular aperture provided in its central portion, and for the system to further comprise a second lid adapted to seal this aperture. The aperture typically has a rim formed by suitable curling of the sheet metal material, and the second lid is suitably arranged so that it can be push-fitted into the aperture and seal it. Then, the container system can be used to contain a large quantity of paint of a certain colour, e.g. a base colour such as white. Then, another colour paint can be added to the paint in the pail to achieve a desired resultant colour by simply removing the second lid (the lid within a lid) and the coloured paint can be simply poured in, without having to disengage the claws to remove the main lid, which would typically result in the container system not being airtight again. Through this second aperture the base colour paint and the added paint can also be mixed, before the second lid is replaced to re-seal the container system. Clearly, this construction is more complex than a simple lid with no aperture, and also requires additional material to make it. The material cut from the main lid to form the aperture is wasted, and an additional piece of material has to be used to form the second lid.

[0006] Another known container system that is reseal-

able comprises a relatively more simple lid for fitting onto the outwardly curled rim of a metal pail. To seal the lid onto the pail and hold it securely in place a ring assembly is used which incorporates a latch or lever. To fit the ring over the assembled lid and container rim the lever is rotated to an open position to expand the ring. In this expanded position the ring is fitted over the loosely assembled lid edge and container rim. Then, the lever is closed to contract the diameter of the ring and so clamp together and seal the lid and container. As will be appreciated, the lever is attached to the split ring component by suitable means, such as a cam arrangement, so that when the latch is in its closed position it cannot spring open. To remove the lid the latch has to be rotated to its open position, again expanding the split ring. Although this system provides a resealable container system, the ring assembly, incorporating the latch is relatively expensive to make, and represents an increase in complexity (it is an assembly in addition to the lid and container). Also, the fitting of the ring and latch assembly to the lid and container body is difficult to automate, and if it requires manual input it results in increased costs.

[0007] An example of another known resealable container system for syrup, paint, or the like material, is disclosed in GB488,243. This document discloses a can configuration which is familiar to consumers of syrup, and to consumers buying paint tins from do-it-yourself suppliers. Rather than the lid fitting onto a rib formed at the upper end of a metal side wall of the can, the container body has a more complicated construction. A ring of material, which can also be described as an annular flange, is attached to the top end of the container side wall by suitable means, and that ring or flange itself has a central circular aperture into which a pressed steel lid can be inserted to seal the can. The lid is thus able to form a releasable seal between itself and the annular flange. To make the seal, the lid simply has to be pushed into place. To remove the lid a tool, such as a screwdriver, can be inserted under the lip of the lid, and to pivot on the edge of the container body forming the seal between the container side wall and the annular flange. The tool can then be rotated to lever off the lid. Problems with this known configuration are that with repeated use the lid may become more difficult to seal properly in the container body. The incorporation of the annular flange, attached to the metal side walls and defining the aperture or mouth which is sealed by the lid, represents increased complexity compared with the metal pail arrangements in which the pail mouth is defined by a rim simply formed by curling over an upper edge portion of the metal side wall. The material cut out to form the circular aperture in the ring or annular flange is wasted. Furthermore, the ring or flange inhibits a user from being able to completely empty the can; when the can is tilted to pour out the contents the ring or flange tends to retain some material inside it.

[0008] Other forms of containers incorporating a metal ring seamed to the body are known, the ring defining a mouth to be closed by a pressure closing system, such

as a lid adapted for press-fitting inside the mouth. In such systems, the lid closes the mouth/aperture in the ring; the lid does not close directly on the body side wall.

[0009] GB400,008 discloses another known resealable container system. The disclosed container system utilises a container having a metal side wall, an upper end portion of which is curled over to define an outwardly projecting container rim. Close to that rim, the side wall of the container is deformed to provide a radially extending ridge or rib. A lid is adapted to fit onto the container and form a releasable seal. The lid comprises a portion which curls around the container rim, and then an edge portion of the lid is curled over outwardly to form a rim. This rim is arranged such that when the lid is closed, the rim is close to the ridge on the container wall. Then, to open the container system a tool is inserted in the space between the side wall rib and the lid rim from below, and is levered, pivoting on the radially outermost part of the rib, and so pushing the container rim radially outwards. A problem with this system is that the container side wall can be damaged by the levering action used to disengage the lid. Furthermore, the ridge provided by a kink in the side wall of the container results in the container being susceptible to deformation when the lid is pressed down onto it from above. Under a compressive axial force, the kink is liable to bend further, and this can close the gap between the container rib and the lid rim, inhibiting use of a screwdriver to open the system. Furthermore, the provision of the kink or rib on the container side wall represents an increase in manufacturing complexity over a plain or straight-sided metal container. Also, the provision of the kink to define the container rib or ridge necessitates the use of a slightly increased amount of material to manufacture the container body compared with a straight-sided equivalent.

[0010] WO2011/066635 A1 discloses a closure arrangement for can. FR2 935 976 A1 discloses a polyvalent cap opening device.

[0011] US3410448A discloses a resealable container system having the features of the precharacterising portion of claim 1

Summary of the Invention

[0012] It is an aim of embodiments of the invention to provide a releasable container system for storing paint and other like materials, and to provide lids for such container systems, which overcome, at least partly, one or more of the problems and disadvantages associated with the prior art. Certain embodiments aim to provide a releasable container system for storing paint having relatively simple construction, which forms a good air-tight seal, and which can be repeatedly opened and closed, forming a good seal on each closure, without damaging or distorting the lid and/or container. Certain embodiments are therefore reusable over a long period of time, and can be re-filled a large number of times, for example.

[0013] According to a first aspect of the invention there

is provided a resealable container system for storing paint, the system comprising:

a container body having a closed base (which can also be described as a container bottom) and a metal side wall extending, in use, upwardly from the base to define with the base an interior volume for containing paint, the metal side wall having an upper edge portion outwardly curled over (i.e. with respect to a longitudinal axis of the container body, or equivalently with respect to the interior of the container body) to form a container rim (which thus extends radially outwards from a portion of the metal side wall immediately adjacent the edge portion) which defines a mouth of the container body;

a removable lid adapted to be pressed onto the container body to a closed position in which the lid seals said mouth, the lid comprising an inner portion and a metal outer portion surrounding the inner portion, the metal outer portion comprising a sealing portion adapted to engage with at least a portion of an upper surface of the container rim, when the lid is in the closed position to form a seal between the lid and container body, the seal extending around the container rim, an outer wall portion connected to the sealing portion and adapted to extend, when the lid is in the closed position, down past an outer edge of the container rim, and a lid edge portion, extending from (i.e. connected to) a lower end of the outer wall portion, wherein the sealing portion comprises a sealing surface adapted to form said seal with the upper surface of the container rim such that said seal extends over at least an upper outer quadrant of the container rim surface, said metal outer portion of the lid is formed from metal sheet and said sealing surface is a surface of said metal sheet, and said sealing surface is adapted to conform with said upper surface of the container rim,

the system being characterised in that the lid edge portion (25) is inwardly curled over to form a lid rim (which thus extends radially inwards), the lid rim being arranged to engage and grip (i.e. exert a gripping force on) a portion of a lower surface of the container rim when the lid is in the closed position to hold the lid in place, and in that the system further comprises an opening tool for separating the lid from the container body, the tool comprising a lever portion and a hook portion attached to the lever portion, the lever and hook portions being arranged such that the tool can be arranged in at least one opening position, with respect to the container body and closed lid, in which the hook portion hooks under and engages a portion of the lid rim and the lever portion pivots against at least one pivot point on an external surface of the lid outer portion, such that when an upper end of the lever portion is displaced radially inwards (with

respect to the longitudinal axis of the container body) to rotate the lever portion about the pivot point or points, the hook portion is displaced radially outwards, thereby displacing the engaged portion of the lid rim radially outwards to release its grip on the container rim and enable separation of the lid from the container.

[0014] It will be appreciated that the hook portion hooks under and engages the portion of the lid rim from a position radially outside the lid rim. In certain embodiments the lever portion or arm is arranged such that when in the opening position the arm pivots on an external surface of the lid outer portion and extends from that pivot point in a direction radially outwards to a position radially outside the lid rim. Then, the hook portion extends radially inwards from that position to hook under and engage the portion of the lid rim. In certain embodiments, the hook portion is arranged to engage, when the opening tool is in the opening position, a lower inner quadrant of the lid rim cross section.

[0015] It will be appreciated that, in general, levering of the lid rim using the opening tool in this way will distort/flex the outer wall portion and the connected sealing portion and so will also break the seal between the lid and container body. The levering of the lid in this way with the opening tool produces a slight flexing of the lid and its subsequent removal can be regarded as involving a limited peeling off action. However, advantageously, the limited flexing of the lid caused by the levering action and subsequent removal from the container does not permanently distort or damage the lid.

[0016] It will be appreciated that this system provides numerous advantages. For example, no special tools are required to reseal the lid onto the container body. Instead, to seal the lid on the container body it simply has to be pressed down so that the lid rim is first of all displaced slightly radially outwards as it is forced over the container rim and then the lid rim springs back, radially inwardly, to engage and grip a lower surface of the container rim after it has passed over the radially outermost points of the container rim. This fitting or sealing of the lid to the container body can easily be automated in a factory, simply requiring a downward force to be applied over the entire lid sealing portion, for example by pushing down on a plate covering the lid. Equally, the lid can easily be resealed on the container body by a subsequent user by pressing down on the entire lid sealing means simultaneously, or by pressing down on one point to clip the lid rim into place at that point, and then working around the lid circumference until the lid rim grips around the entire container rim.

[0017] Another advantage is that the lid can have no sharp edges. This helps avoid injury to a user, and also inhibits the formation of rust, in embodiments where the metal of the lid is a ferrous metal and the lid is painted or coated with some rust-inhibiting substance.

[0018] Advantageously, the lid can be removed from

the container body using the opening tool without permanently distorting or damaging the lid. This is achieved by using the opening tool which is adapted to pivot about an external surface of the lid outer portion itself. Generally, this external surface will be supported by the underlying container rim, and hence is rigid and resistant to distortion. This is in contrast to prior art techniques in which tools to lever off a lid were applied between an edge of the lid and a side wall of the container, resulting in distortion.

[0019] Advantageously, the receivable container system of this first aspect of the invention avoids the disadvantages associated with the prior art system incorporating a plurality of claws, and also avoids the disadvantages associated with the ring and latch type prior art. Furthermore, the container system of this first aspect of the present invention is able to employ relatively simple container bodies, having metal side walls with simple out turned upper edge portions forming container rims. Thus, the disadvantages associated with syrup cans and DIY paint cans with ring members attached to their side walls are avoided.

[0020] Furthermore, as the resealable container system enables the lid to be repeatedly sealed to the container, removed, and then resealed, it provides access to the container body, which may have relatively simple construction, and so avoids the need for a lid-within-lid structure.

[0021] In certain embodiments, the metal side wall is formed from sheet metal.

[0022] It will be appreciated that the metal side wall may be formed from a wide variety of materials. For example, the metal side wall may be formed from sheet steel, tin-plated steel, a non-ferrous metal, such as aluminium, or any other suitable rigid metal according to the intended use of the container system. It will also be appreciated that the metal side wall may be coated, painted, or otherwise covered with some other material, such as a non-metallic paint, for example. In embodiments where the container wall is formed from a ferrous material, a covering or coating may be applied to inhibit the formation of rust.

[0023] Furthermore, appropriate coverings or coatings may be applied to the metal side walls to prevent contamination of the contents, such as liquids, to be stored in the container by the wall material, or indeed to prevent any reaction between the stored material and the side walls.

[0024] It will be appreciated that although the resealable container system is suitable for storing paint, it is not limited to such applications. Embodiments of the invention may be used for storing other substances, such as other liquids, powders, solids, gels, etc.

[0025] It will be appreciated that in certain embodiments the base and metal side wall may be integral, for example formed from a single metal sheet. However, in alternative embodiments the base may comprise one or more additional components, such as a metal sheet at-

tached to the metal side wall by suitable means (by suitable rolling or folding techniques at the sheet and wall edge portions) to close the bottom of the container (i.e. provide a fluid-tight seal). It will also be appreciated that the metal side wall may be provided by a seamless metal tubular structure, or may incorporate one or more seams, such as an axial seam running from the base of the container body to the container rim, formed by folding/rolling etc.

[0026] In certain embodiments, the metal side wall is substantially cylindrical. However, it will be appreciated that alternative embodiments may comprise other shapes and sizes of container bodies, including, but not limited to: tapered cans; conical-shaped bodies; tulip-shaped bodies.

[0027] In certain embodiments, the metal side wall has a substantially circular cross section.

[0028] In certain embodiments, the metal side wall is substantially straight, having no circumferential ridges or kinks.

[0029] Advantageously, this assists in making the metal side wall resistant to distortion, such as kinking or buckling, when the lid is pressed onto the container body to seal the mouth. This is in contrast to certain prior art arrangements described above.

[0030] In certain embodiments, the upper edge portion is curled over through an angle of no less than 270°.

[0031] In certain embodiments, the upper edge portion is curled over such that its leading edge substantially meets the metal side wall.

[0032] Curling over the upper edge portion to these extents provides the advantage that the resultant container rim presented to a user is smooth, and the user is not exposed to any sharp edge. Furthermore, the leading edge may be tucked away, helping to inhibit the formation of rust. Additionally, the curled-over rim is substantially rigid. Additionally, curling over the upper edge portion to this extent enables the container rim to provide a curved upper surface which can be engaged by the sealing means on the container lid and also a curved lower surface which can be engaged and gripped by the lid rim. The curved upper surface of the container rim provides a guiding surface which can gradually force the lid rim radially outwards as the lid is pressed into the closed position.

[0033] In certain embodiments, the outwardly curled over upper edge portion forming the container rim is generally circular in cross section.

[0034] In certain embodiments, the container rim is annular, for example circular.

[0035] In certain embodiments, the lid inner portion and metal outer portion are formed from a single metal sheet.

[0036] In certain embodiments, as with the metal side wall of the container body, the metal lid may be coated, painted, or otherwise covered with a material or substance to suit the particular application.

[0037] In embodiments of the invention the sealing portion comprises a sealing surface adapted to form said

seal with the upper surface of the container rim such that said seal extends over at least an upper outer quadrant of the container rim surface. Thus, an extensive seal is provided, without needing an insert, ring, or gasket in the lid. Furthermore, as the opening tool is rotated to open the lid, and the pivot point moves over the outer upper quadrant of the sealing means, the lid material is supported by the underlying container rim surface (outer, upper quadrant) so that the lid is not damaged. In certain embodiments, the seal may have even greater extent, extending over 180 degrees, for example, in embodiments employing sealing surfaces having semi-circular cross sections.

[0038] In embodiments of the invention the metal outer portion of the lid is formed from metal sheet and said sealing surface is a surface of said metal sheet (which may be a coated or painted surface in further embodiments).

[0039] In certain embodiments, the sealing portion has an inverted U shape.

[0040] In certain embodiments, the sealing portion has a substantially semicircular cross section.

[0041] The sealing surface of the lid and the sealing surface of the container rim are adapted to conform to one another. For example, the upper surface of the container rim may have a substantially semicircular cross section, and the downward facing inner surface of the sealing portion may be adapted to conform to the upper surface of the container rim. Thus, the sealing surface of the lid and the sealing surface of the container rim may, in cross section, have the same radius of curvature (at least when in the sealed, closed position). In certain embodiments, the radius of curvature of the lid sealing surface may be arranged so as to be slightly smaller than that of the container rim sealing surface when the lid is separated from the container, such that as the lid is applied to the container the sealing portion of the lid has to bend slightly and then grips the rim sealing surface as a result of its resilience.

[0042] Advantageously, this conformity enables an extensive seal to be formed between the sealing portion and the container rim, and furthermore results in the container rim supporting the sealing portion from below when the lid is in the closed position. The curved upper (i.e. outer) surface of the sealing means then provides a smooth curved surface on which the lever portion of the opening tool can pivot or rock when the tool is used to lever open the lid. The close support of the underlying container rim enables this operation to be performed without distorting the lid or container body.

[0043] In certain embodiments, the outer wall portion extends from an outer arm of the inverted U.

[0044] In certain embodiments, the outer wall portion is substantially cylindrical.

[0045] In certain embodiments, the outer wall portion extends substantially in a straight line from the sealing means to the lower end of the outer wall portion.

[0046] In certain embodiments, the lid edge portion is

curled over through an angle of at least 270°.

[0047] In certain embodiments, the lid edge portion is curled over such that its leading edge substantially meets an inner surface of the outer wall portion.

5 **[0048]** By curling over the lid edge portion to these extents, no sharp edges are presented to a user, and in certain embodiments oxidation/rusting can be inhibited. Furthermore, a smooth, curved surface of the lid rim is provided for engaging and gripping the container rim when the lid is in the closed position.

10 **[0049]** In certain embodiments, the lid edge portion curled over the form the lid rim has a substantially circular cross section.

[0050] In certain embodiments, the lid rim is annular, for example at least substantially circular.

[0051] In certain embodiments, the container rim and lid rim are both substantially circular, the inner radius of the lid rim being smaller than the outer radius of the container rim.

20 **[0052]** Thus, in order to press the lid into the closed position, the lid rim has to be deflected at least slightly radially outwards to fit over the widest part of the container rim and then spring back into position, to grip an underside of the container rim and hold the lid in place.

25 **[0053]** In certain embodiments, the container rim and lid rim are each substantially circular in cross section, and the engagement between the lid rim and container rim when the lid is in the closed position is such that a portion of an outer lower quadrant of the container rim is in contact with a portion of an inner upper quadrant of the lid rim.

30 **[0054]** As will be appreciated, the force exerted by the lid rim on the container rim when the lid is in the closed position has a radial component inwards and an axial component upwards.

35 **[0055]** In certain embodiments, the container rim and lid rim are each substantially circular in cross section. In certain such embodiments a ratio of the diameter (i.e. cross-sectional diameter) of the container rim to the lid rim is in the range 6.0:3.0 to 7.0:2.0, and optionally is substantially 6.5:2.5.

40 **[0056]** In certain embodiments in which the container and lid rims are substantially circular in cross section, the body rim cross sectional diameter is in the range 1mm to 9mm and the lid rim cross sectional diameter is in the range 1 mm to 9mm.

45 **[0057]** In certain embodiments, the lid further comprises at least one slot provided in the outer wall portion and arranged to enable a suitably sized tool, for example a screwdriver, to be inserted in the slot when the lid is in the closed position to lever a portion of the lid rim beneath the slot away from its gripping engagement with the container rim, whereby the lid can be levered off the container body without using the opening tool.

50 **[0058]** This feature of at least one slot is advantageous as, if the dedicated opening tool is lost or not available, the lid can still be removed. The slot typically provides access to a volume defined between the container rim,

lid rim, and lid outer wall portion. In certain embodiments a single slot is provided at a single location around the lid outer wall portion circumference to minimise disruption to the lid's integrity.

[0059] In certain embodiments, the lid further comprises a supporting wall extending down from an inner edge of the sealing portion and arranged to engage and support from inside an upper end portion of the metal side wall when the lid is in the closed position. However, in alternative embodiments a support wall may not be provided.

[0060] In certain embodiments, the sealing portion has an inverted U shape, and the supporting wall extends down from an inner arm of the U.

[0061] In certain embodiments, the support wall is substantially cylindrical.

[0062] In certain embodiments, the support wall is substantially frusto-conical.

[0063] In certain embodiments, the support wall extends downwardly from the sealing means for a distance D1, the outer wall portion extends downwardly from the sealing means for a distance D2. In certain embodiments D1 is greater than D2.

[0064] Thus, in certain embodiments the support wall may be substantially cylindrical, such that it forms an interference fit with an upper end portion or section of the metal side wall when the lid is fitted to the container in a closed position. Thus, the support wall can provide a supporting inner ring, supporting the upper end of the container and increasing the rigidity of the assembled structure. In certain embodiments, rather than the support wall being perfectly cylindrical, it may be frusto-conical, i.e. as the support wall extends downwardly from the sealing means it can also taper radially inwards. Thus, the lower surface of the support wall (on the underside of the lid) can provide a ramped surface for engaging an inner surface of the container rim as the lid is placed on it, thereby assisting in guiding the lid into the closed position as it is pressed down.

[0065] Advantageously, in certain embodiments the support wall extends down from the sealing means substantially lower than does the outer wall portion which carries the lid rim. Thus, the support wall and lid rim may be arranged such that as the lid is introduced to the container body the support wall engages an inner surface of the outer wall (or an inner portion of the container rim) and guides the lid into place before or at the same time as the lid rim engages an upper outer surface of the container rim. Thus, the support wall provides internal support to the container body (i.e. to the upper section of the side wall and/or to the container rib) while the lid is being pressed into the closed position, which requires the lid rim to be displaced radially outwards, and so at the same time results in the lid rim exerting a force radially inwards from the container rim.

[0066] In certain embodiments, the supporting wall is an outer wall of a channel formed in the lid, the channel comprising an inner wall, facing the support wall.

[0067] In certain embodiments, the external surface of the lid outer portion on which the lever portion pivots is an external surface of the sealing means.

[0068] In certain embodiments, said exterior surface of the sealing means has an inverted U shape.

[0069] In certain embodiments, said exterior surface is substantially semicircular in cross section.

[0070] In certain embodiments, said exterior surface comprises an outer half of the semicircular surface.

[0071] In certain embodiments, the lever portion comprises a substantially flat lever surface adapted to pivot against the pivot point or points, and the hook portion comprises a flat hook surface for engaging said portion of the lid rim.

[0072] In certain embodiments, the flat hook surface is arranged at an angle of $45 \pm 15^\circ$ to the lever flat surface.

[0073] In certain embodiments, the lid and container rim are substantially rotationally symmetric about an axis, such that said opening position can be anywhere around the circumference of the lid.

[0074] In certain embodiments, the lever portion comprises an aperture adapted to accommodate part of the lid outer portion when the opening tool is in the opening position, such that the lever portion pivots about two pivot points, one on each side of the aperture, when in the opening position.

[0075] In certain embodiments, the lever portion comprises a curved pivot surface adapted to rock on the external surface of the lid outer portion as the opening tool is used to remove the lid.

[0076] In certain embodiments, the opening tool comprises a second hook portion connected to an opposite end of the lever portion to the first hook portion, the system further comprising a container handle, pivotally connected to the container body, the second hook portion being adapted to hook over the handle when the opening tool is in the opening position and such that rotation of the handle operates the opening tool to displace the engaged portion of the lid rim radially outwards.

[0077] An advantage of certain embodiments of the invention is that the lid construction enables the lid to be made from thinner sheet metal than is required for lids of the prior art systems. Similarly, embodiments can utilise container bodies which have side walls incorporating no ridges or kinks (which may also be described as beads), which are therefore more resistant to deformation under axial compression, and which can also be made of thinner sheet metal material than containers for prior art systems.

[0078] In embodiments of the invention, the lid closes directly on the body rim, provided at the top of the side wall, so eliminating the metal ring of certain prior art systems, requiring one less component, and hence being more environmentally friendly.

Brief Description of the Drawings

[0079] Embodiments of the present invention will now

be described with reference to the accompanying drawings, of which:

Fig. 1 is a drawing of a prior art container system in the process of being opened;

Fig. 2 is a drawing of a prior art container system with claws bent outwards to permit removal of the lid from the container;

Fig. 3 is a drawing, partly in cross section, of a container body and lid of a resealable container system embodying the invention;

Fig. 4 is an enlarged cross section of part of the container body of Fig. 3;

Fig. 5 is a cross section of a lid of a container system embodying the invention, the lid being for attachment to the container body shown in Fig. 3;

Fig. 6 is an enlarged cross section of part of the lid shown in Fig. 5;

Fig. 7 is a plan view of the lid of Figs. 5 and 6 embodying the invention;

Fig. 8 is a drawing of part of a container system incorporating the container body of Fig. 3 and the lid of Fig. 5, illustrating the lid in the closed position and an opening tool in an opening position;

Figs. 9a, b, and c are perspective, side, and front views respectively of an opening tool of a resealable container system embodying the invention;

Figs. 10a, b, and c are perspective, front, and side views respectively of another opening tool for a resealable container system embodying the invention;

Figs. 11a, b and c are perspective, side, and front views respectively of another opening tool for a container system embodying the invention;

Fig. 12 is a drawing of a resealable container system embodying the invention, showing the lid being pressed onto the container body to form the releasable seal; and

Fig. 13 is a drawing of part of a container system embodying the invention, illustrating a slot or aperture provided in the lid outer wall portion.

Detailed Description of Embodiments of the Invention

[0080] Referring now to Fig. 3, this shows a container, which may also be referred to as a container body 1 or

pail, and a lid 2 of a resealable container system embodying the invention. The container body 1 has a generally cylindrical metal side wall 12, which may, in certain embodiments be slightly tapered along some or all of its length, and may therefore be partly frusto-conical, and a closed base 11. In this embodiment the base 11 is formed from a single, generally circular piece of sheet metal, having its edges bent around the lower or bottom rim of the metal side wall 12 to form a seal or sealing rib 121. The attachment between the container base 11 and side wall 12 can be achieved using a variety of known techniques to provide a container body which is able to store liquids, such as paint. It will be appreciated that in alternative embodiments, the closed base of the container may take alternative forms. For example, in certain embodiments the side walls 12 and base 11 are both formed from sheet metal materials, but in alternative embodiments the base 11 may be formed from a different material. In certain embodiments the base 11 may be provided by a separate component, attached to the side wall 12. However, in alternative embodiments the side wall 12 and base 11 may be integral, for example formed by stamping out or pressing a single sheet of material. In certain embodiments the base 11 may be formed from a different material to the metal side wall 12. The side wall 12 and base 11 may be painted, coated, or otherwise provided with a suitable covering to inhibit rusting, reaction between the stored contents and the container, or contamination of the contents by the container. The metal side wall extends, when the container body is resting on the base, upwardly from the base to define, together with the base, an interior volume V for containing paint. The metal side wall 12 has an upper edge portion 13 which has been outwardly curled over (i.e. with respect to a longitudinal axis A of the container body, to form a container rim 14). This rim 14 defines a mouth M of the container body. The rim 14 thus extends radially outwards from the portion of the metal side wall 12 immediately adjacent the edge portion 13. In this example, the upper edge portion 13 has been curled over to an extent such that its leading edge 15 substantially meets an inner surface of the curled over rim 14. Thus, the outer edge portion 13 has been curled over through an angle in excess of 270°, and the resultant container rim 14 is substantially circular in cross section. Fig. 4 shows the container rim in more detail, and the rim 14 has an outer surface which can be divided into an inner upper quadrant Q1, an outer upper quadrant Q2, an outer lower quadrant Q3, and an inner lower quadrant Q4. In this example, the upper quadrants Q1 and Q2 together form a sealing surface 141 of the container rim, which seals against the correspondingly shaped sealing surface of the lid. This sealing surface of the container rim is substantially semi-circular in cross section, and extends, uninterrupted, around the mouth of the container. Thus, the seal formed between the lid and container is substantially semi-torroidal. In this example, the diameter of the semi-circular sealing surface of the container rim is 6.5mm. In other words, the

radius of curvature of the curl-over to form the container rim upper sealing surface is 3.25mm.

[0081] The container body 1 also includes a pair of metal housings 18 attached to and extending radially outwards from the metal side wall 12, these housings being adapted to receive the bent ends of a metal handle 16, in this example formed from metal rod or bar. These housings are diametrically opposed from the container body 1. The housings 18 are arranged such that the handle 16 can be rotated about the axis R through the centres of the housings 18 so that it can adopt a position in which the handle grip 17 is positioned directly above the centre of the container for lifting it. When the handle is released, it will typically adopt a position in which the grip 17 rests against a side of the metal wall 12. Referring again to Fig. 4, the sheet metal material used to form the metal side wall 12 in this example has a thickness in the range 0.05mm to 0.40mm. The generally circular cross section of the container rim 14 has a diameter of 6.5mm. It will be appreciated that different embodiments may employ different diameter rims. For example, smaller diameter cans may employ smaller diameter rims. The container rim 14 as a whole is circular in this example, providing an annular rim defining the mouth M. In this example, the internal diameter of the container rim (and hence of the mouth M) is 285mm, and the external diameter of the container rim 14 (i.e. the diameter of its widest point) is 298mm. Again, alternative embodiments may of course comprise container bodies and lids of different sizes and shapes. Certain embodiments comprise container bodies having external diameters ranging from 45mm to 400mm, for example.

[0082] Referring now to Figs. 5, 6 and 7, these show a lid (i.e. the lid of fig. 3) of a container system embodying the invention for releasable attachment to the container body 1 of Figs. 3 and 4. The lid 2 comprises an inner portion 21, which in this example is dished downwards, and an outer portion 22 surrounding the inner portion. The lid in this example is formed from a single piece of sheet metal, such that the inner and outer portions are integral parts of the single metal component. It will be appreciated that, although the lid is described as being metal, it may have a coating, covering, or the like applied to one or more of its surfaces to inhibit rust formation, reaction with contents, or corrosion of the dead material, for example. The lid outer portion 22 comprises a sealing portion 23 which is adapted to engage with an upper surface (i.e. the corresponding sealing surface) of the container rim 14. The sealing means 23 in this example has an inverted U shape, and is substantially semi-circular in cross section. This cross section is adapted to conform with the substantially semi-circular upper surface of the container rim 14. Thus, in this example the radius of curvature of the inner (i.e. lower) sealing surface 231 of the lid sealing portion 23 is 3.25mm. The lid sealing surface is substantially semicircular in cross section, extends, uninterrupted, around the lid, and overall is substantially semi-torroidal. The close, interference fit, between the

lower (sealing) surface of the sealing means 23 and the upper, external (sealing) surface of the container rim 14 provides a seal between the lid and container when the lid is in the closed position. The lid also comprises an outer wall portion 24 which extends in a straight line, directly downwards in this example, from the outer arm of the inverted U-shaped sealing means 23. In this example the outer wall portion is substantially cylindrical overall, and extends, uninterrupted, around the perimeter of the lid. The lid also comprises a lid edge portion 25 which is a continuation of the outer wall portion 24 and which has been inwardly curled over to form a lid rim 26. Thus, this lid rim 26 extends radially inwards from the outer wall portion 24. The arrangement is such that when the sealing means 23 abuts the container rim, the outer wall portion 24 extends down past the container rim such that the lid rim engages and grips a portion of a lower surface of the container rim (i.e. when the lid is in the closed position). The force exerted on the container rim by the lid rim holds the lid in place. In this example the lid edge portion 25 has been curled over through an angle in excess of 270°, to an extent such that a leading edge 27 of the lid edge portion substantially meets an inner surface of the outer wall portion 24. The lid rim is generally circular in cross section. The external surface of the lid rim 26 can therefore be described as generally comprising four quadrants, a lower outer quadrant LQ1, a lower inner quadrant LQ2, an upper inner quadrant LQ3, and an upper outer quadrant LQ4. When the lid is in the closed position, quadrant LQ3 of the lid rim is in contact with, and exerts a force on quadrant Q3 of the container rim. This exerted force has components in the radially inward direction and the axially upwards direction. The lid rim in this example has an overall circular, i.e. annular, shape. The outer diameter of the lid rim, which is the same as the outer diameter of the outer wall portion 24, is 299.5mm. The diameter of the circular cross section of the lid rim 26 is 2.5mm in this example, though the internal diameter of the lid rim as a whole is 294.5mm. Thus, the external diameter of the container rim is greater than the internal diameter of the lid rim. Thus, when the lid is first placed on the container, before pressing it down to adopt the closed position, the lid rim firstly engages the upper surface of the container rim. In particular, quadrant LQ2 of the lid rim engages quadrant Q2 of the container rim. Then, as the lid is pressed down, the container rim is displaced radially outwards, bending the outer wall portion 24 such that the lid rim can pass over the widest part of the container rim. As the lid is pushed further down, the lid rim then springs back towards its normal position, gripping underneath the container rim and holding the lid in place with the sealing means 23 forming a seal against the upper surface of the container rim.

[0083] Looking at Fig. 6, it will be seen that in this example the lid 2, in addition to having the generally cylindrical outer wall portion 24, also comprises an inner, or supporting wall 28 which extends downwardly from an inner arm of the inverted U-shaped sealing means 23. In

this example the supporting wall 28 is substantially straight in cross section, but is angled slightly inwards such that the inner surface of the support wall 28 is generally frusto-conical. The support wall 28 extends further down from the sealing means 23 than does the outer wall portion 24. The support wall 28 provides support to the inner surface of the side wall 12 of the container as the lid is being pushed into the closed position, and when the lid is in the closed position. As the support wall 28 is angled, it provides a guiding surface for guiding the lid into the correct position as it is pushed into the closed position. As the support wall 28 is longer than the outer wall portion 24 in the axial direction, when the lid is first placed in the container the support wall engages and supports an inner surface of the side wall 12 (just inside its mouth) before or at the same time as the lid rim is required to be deflected radially outwards to fit over the widest part of the container rim. The support wall 28 is advantageous in that it lends rigidity to the assembly of the container and lid in the closed position, helping to prevent distortion of the container rim and lid when the opening tool is used to detach the lid. In this example, the support wall 28 is an outer wall of a groove 201 provided in the lid 2. An inner wall 29 of the groove faces the support wall 28, and a base of the groove is defined by a flat annular wall portion 30.

[0084] The lid, formed from thin tinplate in this example, also comprises a plurality of strengthening features 200. These features 200, each provided by distorting the sheet tinplate used to form the lid, provide additional rigidity.

[0085] Referring now to Fig. 8, this is a schematic representation of part of a resealable container system embodying the invention. The figure shows the lid 2 in the closed position on the container body, with the sealing portion 23 forming a seal with the upper surface of the container rim, the lid rim 25 engaging and gripping a lower surface of the container rim (exerting a gripping force generally radially inwards and axially upwards), and the supporting wall 28 of the lid abutting and supporting a portion of the container side wall 12 internally. Although a small gap is shown between the lid sealing surface 231 and container rim sealing surface 141 (which comprises the upper quadrants Q1 and Q2), it will be appreciated that this is for illustrative purposes only, and in practice, when the lid is in the sealing position, the gripping action of the lid rim pulls the sealing surface 231 into direct contact with sealing surface 141, with no gap between them, forming a semi-torroidal seal which extends around the mouth of the container. Thus, an extensive, airtight seal is formed, without the need for any gasket, sealing ring, or other insert inside the sealing portion 23 of the lid. In certain embodiments, one or both of the sealing surfaces 231, 141 may be the surface of a covering or coating (e.g. paint) applied to the metal surface. The cross section of the sealing portion 23 of the lid is continuously curved, having no straight portion, as is the correspondingly-shaped upper portion of the container rim which

provides the container sealing surface 141. It will be appreciated that the contact between the supporting wall 28 and side wall 12 will generally be an annular portion (a ring) of the side wall material, generally at its upper end. Also shown in the figure is an opening tool 3 which comprises a lever portion 31 and a hook portion 32. In this example, the lever portion 31 is in the form of a generally straight arm or bar having a substantially flat surface 33 for resting against and pivoting on an external surface of the lid. In this example the lever surface 33 is adapted to engage and pivot about a pivot point P on the outer surface of the lid sealing means. In the figure, the opening tool is in the opening position, and the initial pivot point P is on the upper, outer quadrant of the curved sealing means exterior surface. It will be appreciated that, as the lever is rotated about this pivot point, the position of the pivot point P will change slightly, as the lever rolls around the curved outer surface of the lid sealing means. In particular, the pivot point P will move upwards, and radially inwards over the lid sealing portion's outer surface, but no distortion of the lid sealing portion will occur because the sealing portion, for this entire range of pivot point positions, is supported by the underlying surface 141 of the container rim. In this example the generally straight lever portion 31 is adapted so that, in the opening position, it extends from its upper end both downwards and in a radially outwards direction, so that the lever portion 31 extends radially outside the radial extremity of the lid, and downwards past a lower extremity of the lid rim. The hook portion 32 is attached to the nominal lower end of the lever portion 31, and extends from that lower end such that a hook surface 34 (which in this example is substantially flat) extends upwardly and radially inwards so as to hook under and engage a portion of the lid rim surface. In this example, the opening tool is adapted such that the hook surface 34 engages the lower, inner quadrant of the lid rim surface. To open the lid, the upper end of the lever 31 is moved radially inwards, such that the lever 31 pivots about pivot point P, and the lower end of the lever 31 is displaced radially outwards, such that the hook surface 34 pushes the lid rim 25 radially outwards to disengage it from its grip on the container rim 13. The outer wall portion 24 bends to a small extent as this action is performed, and the sealing portion 23 which extends from the outer wall portion 24 is also elastically deformed, thereby breaking the seal between it and the container rim 13. In this example the angle between the substantially flat hook surface 34 and substantially flat lever surface 33 is labelled as x. In this example x is approximately 45° but in alternative embodiments x may take alternative values, such as values falling within the range 30 to 60°.

[0086] In Fig. 8, it will be appreciated that both the lid sealing surface 231 and container sealing surface 141 have substantially semi-circular cross sections, having substantially the same diameters, such that the seal formed between them extends for an angle of substantially 180 degrees around a point in the centre of the curled-over container rim 14. In certain other embodi-

ments, however, the sealing surface may have a different extent. For example, the sealing surface of the lid may be adapted to engage just the outer, upper quadrant Q2 of the container rim, such that the seal then extends over an angle of substantially 90 degrees. However, in such embodiments the container rim 14 still supports the lever over its full range of pivot points, and lid damage or permanent distortion is prevented. In yet further embodiments, the sealing surface may extend over an angle of between 90 and 180 degrees.

[0087] Referring now to Fig. 9, this shows another opening tool for use with container systems embodying the invention. Dimensions of the tool are shown in millimetres (as are dimensions of other features of the container systems embodying the invention in other figures). Again, the tool has a lever portion 31 providing a flat lever surface 33. The lever portion and hook portion 32 are formed from a single piece of sheet metal. An edge portion of the piece of sheet metal has been bent over to form the hook portion 32, having a flat hook surface 34. As will be appreciated from Fig. 9, the hook portion has a width much greater than the thickness of the sheet metal thickness. In this example, the width of the hook portion is 21mm, and the thickness of the metal material used to form the tool is 1.5mm. Thus, the hook surface 34 can engage an extended portion of the container rim, helping to enable removal of the lid without permanently distorting or damaging it. The tool 3 also comprises a loop of material 35, passing through an aperture provided in the lever portion 31, this lever 35 enabling the tool to be attached to another entity for safe-keeping.

[0088] Referring now to Fig. 10, this shows another opening tool 3 for use in container systems embodying the invention. Again the tool comprises a lever portion 31 and hook portion 32 formed from a single piece of sheet metal. Additionally, the tool 3 comprises a handle portion 310 attached to an end of the lever portion 31 opposite the end to which the hook portion 32 is attached. The lever portion 31 also comprises an aperture 301 which, when the tool is in the opening position, is able to receive and accommodate a portion of the container lid outer portion such that the lever portion 31 pivots on two portions 33a and 33b of its flat lever surface, those portions 33a and 33b being located on either side of the central aperture 301. Again the hook portion 32 has an extended width, and provides a substantially flat hook surface 34 for hooking under and engaging the lid rim. The provision of the central aperture 301 such that the lever pivots about two portions of its lever surface (and hence on two pivot points on the outer surface of the lid) therefore halves the force applied to each pivot point on the lid for a given opening force being applied to the lid rim and so helps avoid damaging the lid or container in the process of lid removal. In this example the inner surface of the lever 31 defining the aperture 301 is adapted such that the tool can also be used for an additional purpose, in this example the opening of bottles with a crown top.

[0089] Referring now to Fig. 11, this shows another opening tool for use with a container system embodying the invention. This tool 3 comprises a lever portion 31 which has a curved lever surface 33 for rocking on the curved exterior surface of the lid sealing means when the tool is being used to open the lid. A hook portion 32 is provided at a first end of the lever portion 31, and has an inclined hook surface 34 for hooking under and engaging the lid rim to open the lid. A second hook portion 36 is provided at the opposite end of the lever means 31, this second hook portion having a surface 361 which in cross section is part-circular. This second hook portion is adapted to hook onto the container handle 17, with the surface 361 engaging the exterior, generally circular in cross section surface of the handle 17. This tool 3 is adapted to fit onto the lid in an opening position in which the arm or lever 31 pivots about its curved surface 33, whilst at the same time the hook surface 34 engages the lid rim as the second hook portion 36 is hooked onto the handle.

[0090] To open the lid the handle is then pulled generally upwards, the handle portion 17 thus following a circular path. The attached opening tool 3 (attached by means of its second hook portion 36 hooking over the handle) is therefore both rotated and pulled upwards, to release the grip of the lid on the container and break the seal at the appropriate part around the container rim.

[0091] Referring now to Fig. 12, this is a photograph showing the closing of a container system embodying the invention. The lid is being manually pressed down at two positions around its circumference onto the container to clip the lid into place. The points at which pressure is applied can thus be moved around the circumference of the lid until it is fully in the closed position. Thus, the lid can be resealed on the container time after time, and without needing special tools or additional equipment.

[0092] Referring now to Fig. 13, this is a photograph of part of a container system embodying the invention. The photograph shows the container lid in the closed position, and the generally cylindrical outer wall portion 24 can be seen extending around, and covering from view, the container rim. An aperture, which can also be described as a slot, hole, or slit, 240, is provided in the outer wall portion 24. This aperture 240 is arranged so as to communicate with a volume enclosed between the container rim, lid rim, and inner surface of the outer wall portion 24. The aperture is dimensioned to permit insertion of a suitably sized tool, such as the tip of a screwdriver, into this space to permit use of the screwdriver to lever open the lid if the dedicated opening tool is not available. It is preferable to use the dedicated opening tool of the invention, incorporating the lever and hook, as this enables opening of the lid without damaging the lid or container, but a screwdriver can be used in conjunction with the aperture 240 if the dedicated opening tool has been lost. It will be appreciated that the outer wall portion 24 is uninterrupted, except for the slot 240. Unlike certain prior art systems, there are no separate

tabs or claws. The substantially uninterrupted wall portion, together with the uninterrupted lid rim, and uninterrupted sealing portion 23, forms a strong perimeter portion of the lid, which can exert a strong gripping force on the container rim and hence a good seal. In certain embodiments it is at least very difficult for a person to remove the lid without using a tool; in practice, the dedicated opening tool may be necessary to open the system. This is in contrast to certain prior art systems in which the lid is adapted to enable removal without use of tools.

[0093] It will be appreciated that embodiments of the present invention provide a number of advantages over the prior art, including the following. The container system embodying the invention is easy to open, and furthermore can be opened without permanently distorting or damaging the lid or container. The lid is re-closable onto the container and is able to form a seal on the container time after time. The container system is safer for consumer usage as no potentially sharp cut edges are presented to the user. The container system of the invention provides better prevention of oxidation. The container system can be filled on conventional filling lines without requiring substantial investment to adapt those filling lines. Lids embodying the invention can be used with existing container designs. The resealable lid and container system is suitable for use with mixing machines as the lid can be opened to allow addition of colour and mixing, and can then be used to easily re-seal the container. A lid within lid structure is therefore not required. The lids embodying the invention are easy to remove; an opening tool can be used to lever off the lid at just one circumferential position, and then the lid can pop off. Lids embodying the invention can easily be closed onto containers to seal those containers, by manual application of force at one or more positions around the circumference, working those positions around, or by simultaneous pressing down on the entire circumference of the lid sealing portion, with a flat plate or suitably dimensioned ring having a flat pressing surface, in an automated filling and closing line, for example.

[0094] Throughout the description and claims of this specification, the words "comprise" and "contain" and variations of the words, for example "comprising" and "comprises", means "including but not limited to", and is not intended to (and does not) exclude other moieties, additives, components, integers or steps.

[0095] Throughout the description and claims of this specification, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality as well as singularity, unless the context requires otherwise.

[0096] Features, integers, characteristics, compounds, chemical moieties or groups described in conjunction with a particular aspect, embodiment or example of the invention are to be understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith.

[0097] It will be also be appreciated that, throughout the description and claims of this specification, language in the general form of "X for Y" (where Y is some action, activity or step and X is some means for carrying out that action, activity or step) encompasses means X adapted or arranged specifically, but not exclusively, to do Y.

Claims

1. A resealable container system for storing paint, the system comprising:

a container body (1) having a closed base (11) and a metal side wall (12) extending, in use, upwards from the base to define with the base an interior volume for containing paint, the metal side wall having an upper edge portion (13) outwardsly curled over to form a container rim (14) which defines a mouth of the container body; and

a removable lid (2) adapted to be pressed onto the container body to a closed position in which the lid seals said mouth, the lid comprising an inner portion (21) and a metal outer portion (23) surrounding the inner portion, the metal outer portion comprising a sealing portion (23) adapted to engage with at least a portion of an upper surface (141) of the container rim, when the lid is in the closed position to form a seal between the lid and container body, the seal extending around the container rim, an outer wall portion (24) connected to the sealing portion and adapted to extend, when the lid is in the closed position, down past an outer edge of the container rim, and a lid edge portion (25), extending from a lower end of the outer wall portion, wherein the sealing portion comprises a sealing surface (231) adapted to form said seal with the upper surface (141) of the container rim such that said seal extends over at least an upper outer quadrant of the container rim surface, said metal outer portion of the lid is formed from metal sheet and said sealing surface is a surface of said metal sheet, and said sealing surface (231) is adapted to conform with said upper surface (141) of the container rim,

the resealable container system being **characterised in that** the lid edge portion (25) is inwardsly curled over to form a lid rim (26), the lid rim being arranged to engage and grip a portion of a lower surface of the container rim when the lid is in the closed position to hold the lid in place, and **in that** the system further comprises an opening tool (3) for separating the lid from the container body, the tool (3) comprising a lever portion (31) and a hook portion (32) attached to the lever portion, the lever and hook portions

- being arranged such that the tool can be arranged in at least one opening position, with respect to the container body and closed lid, in which the hook portion hooks under and engages a portion of the lid rim and the lever portion pivots against at least one pivot point on an external surface of the lid outer portion, such that when an upper end of the lever portion is displaced radially inwards to rotate the lever portion about the pivot point or points, the hook portion is displaced radially outwards, thereby displacing the engaged portion of the lid rim radially outwards to release its grip on the container rim and enable separation of the lid from the container.
2. A system in accordance with claim 1 wherein the upper edge portion (13) is curled over such that its leading edge substantially meets the metal side wall, and/or wherein the outwardly curled over upper edge portion forming the container rim is generally circular in cross section.
 3. A system in accordance with any preceding claim, wherein said sealing surface (231) is a coated or painted surface of said metal sheet.
 4. A system in accordance with any preceding claim wherein the sealing portion (23) has an inverted U shape, and/or wherein the sealing portion has a substantially semicircular cross section.
 5. A system in accordance with claim 4, wherein the upper surface (141) of the container rim has a substantially semicircular cross section, and the downward facing inner surface (231) of the sealing portion is adapted to conform to the upper surface of the container rim.
 6. A system in accordance with any preceding claim, wherein the outer wall portion (24) is substantially cylindrical.
 7. A system in accordance with any preceding claim, wherein the lid (2) further comprises at least one slot (240) provided in the outer wall portion (24) and arranged to enable a suitably sized tool, for example a screwdriver, to be inserted in the slot when the lid is in the closed position to lever a portion of the lid rim beneath the slot away from its gripping engagement with the container rim, whereby the lid can be levered off the container body without using the opening tool.
 8. A system in accordance with any preceding claim, wherein the lid (2) further comprises a substantially frusto-conical supporting wall (28) extending down from an inner edge of the sealing portion (23) and arranged to engage and support from inside an upper end portion of the metal side wall when the lid is in the closed position.
 9. A system in accordance with any preceding claim, wherein said external surface of the lid outer portion on which the lever portion pivots is an exterior surface of the sealing portion (23).
 10. A system in accordance with claim 9, wherein said exterior surface is substantially arcuate in cross section, for example semicircular.
 11. A system in accordance with any preceding claim, wherein the lever portion (31) comprises a substantially flat lever surface (33) adapted to pivot against the pivot point or points, and the hook portion comprises a flat hook surface (34) for engaging said portion of the lid rim.
 12. A system in accordance with any preceding claim, wherein the lid (2) and container rim (14) are rotationally symmetric about an axis, such that said opening position can be anywhere around the circumference of the lid.
 13. A system in accordance with any preceding claim, wherein the lever portion (31) comprises an aperture (301) adapted to accommodate part of the lid outer portion (22) when the opening tool is in the opening position, such that the lever portion pivots about two pivot points, one on each side of the aperture, when in the opening position, and/or wherein the lever portion (31) comprises a curved pivot surface (33) adapted to rock on the external surface of the lid outer portion as the opening tool is used to remove the lid, and/or wherein the opening tool (3) comprises a second hook portion (36) connected to an opposite end of the lever portion to the first hook portion, the system further comprising a container handle (16), pivotally connected to the container body (1), the second hook portion being adapted to hook over the handle when the opening tool is in the opening position and such that rotation of the handle operates the opening tool to displace the engaged portion of the lid rim radially outwards.

Patentansprüche

1. Wiederverschließbares Behältersystem zum Lagern von Farbe, wobei das System Folgendes umfasst:

einen Behälterkörper (1) mit einem geschlossenen Boden (11) und einer Metallseitenwand

(12), die sich beim Gebrauch vom Boden nach oben erstreckt, um mit dem Boden ein Innenvolumen zur Aufnahme von Farbe zu definieren, wobei die Metallseitenwand einen oberen Randabschnitt (13) aufweist, der nach außen gekräuselt ist, um einen Behälterrand (14) zu bilden, der eine Mündung des Behälterkörpers definiert; und

einen entfernbaren Deckel (2), so ausgelegt, dass er auf den Behälterkörper in eine geschlossene Position gedrückt werden kann, in der der Deckel die genannte Mündung verschließt, wobei der Deckel Folgendes aufweist: einen Innenabschnitt (21) und einen den Innenabschnitt umgebenden metallischen Außenabschnitt (23), wobei der metallische Außenabschnitt einen Dichtungsabschnitt (23) zum Eingreifen in wenigstens einen Abschnitt einer Oberseite (141) des Behälterrandes aufweist, wenn der Deckel in der geschlossenen Position ist, um eine Dichtung zwischen dem Deckel und dem Behälterrand zu bilden, wobei die Dichtung um den Behälterrand herum verläuft, einen Außenwandabschnitt (24), der mit dem Dichtungsabschnitt verbunden und so ausgelegt ist, dass er, wenn der Deckel in der geschlossenen Position ist, nach unten an einem äußeren Rand des Behälterrandes vorbei verläuft, und einen Deckelrandabschnitt (25), der sich von einem unteren Ende des Außenwandabschnitts erstreckt, wobei der Dichtungsabschnitt eine Dichtungsfläche (231) aufweist, die zum Bilden der genannten Dichtung mit der Oberseite (141) des Behälterrandes ausgelegt ist, so dass die genannte Dichtung über wenigstens einen oberen äußeren Quadranten der Behälterrandfläche verläuft, der genannte metallische Außenabschnitt des Deckels aus Metallblech gebildet ist und die genannte Dichtungsfläche eine Fläche des genannten Metallblechs ist und die genannte Dichtungsfläche (231) so ausgelegt ist, dass sie sich der Form der genannten Oberseite (141) des Behälterrandes anpasst, wobei das wiederverschließbare Behältersystem **dadurch gekennzeichnet ist, dass** der Deckelrandabschnitt (25) nach innen gekräuselt ist, um einen Deckelrand (26) zu bilden, wobei der Deckelrand so ausgelegt ist, dass er in einen Abschnitt einer Unterseite des Behälterrandes eingreift und ihn ergreift, wenn der Deckel in der geschlossenen Position ist, um den Deckel festzuhalten, und dadurch, dass das System ferner ein Öffnungswerkzeug (3) zum Trennen des Deckels vom Behälterkörper umfasst, wobei das Werkzeug (3) einen Hebelabschnitt (31) und einen an dem Hebelabschnitt angebrachten Hakenabschnitt (32) umfasst, wobei der Hebel und der Hakenabschnitt so ausgelegt sind, dass

das Werkzeug in wenigstens einer Öffnungsposition mit Bezug auf den Behälterkörper und den geschlossenen Deckel angeordnet werden kann, in der der Hakenabschnitt unter einen Abschnitt des Deckelrandes einhakt und darin eingreift und der Hebelabschnitt um wenigstens einen Drehpunkt auf einer Außenfläche des Deckelaußenabschnitts dreht, so dass, wenn ein oberes Ende des Hebelabschnitts radial nach innen verschoben wird, um den Hebelabschnitt um den/die Drehpunkt(e) zu drehen, der Hakenabschnitt radial nach außen verschoben wird, um dadurch den im Eingriff gehaltenen Abschnitt des Deckelrandes radial nach außen zu verschieben, um seinen Griff am Behälterrand zu lösen und ein Trennen des Deckels vom Behälter zu ermöglichen.

2. System nach Anspruch 1, wobei der obere Randabschnitt (13) gekräuselt ist, so dass sein vorderer Rand im Wesentlichen auf die Metallseitenwand trifft, und/oder wobei der nach außen gekräuselte obere Randabschnitt, der den Behälterrand bildet, einen allgemein kreisförmigen Querschnitt hat.
3. System nach einem vorherigen Anspruch, wobei die genannte Dichtungsfläche (231) eine beschichtete oder lackierte Oberfläche des genannten Metallblechs ist.
4. System nach einem vorherigen Anspruch, wobei der Dichtungsabschnitt (23) die Form eines umgekehrten U hat, und/oder wobei der Dichtungsabschnitt einen allgemein halbkreisförmigen Querschnitt hat.
5. System nach Anspruch 4, wobei die Oberseite (141) des Behälterrandes einen im Wesentlichen halbkreisförmigen Querschnitt hat und die nach unten weisende Innenfläche (231) des Dichtungsabschnitts so ausgelegt ist, dass sie der Form der Oberseite des Behälterrandes entspricht.
6. System nach einem vorherigen Anspruch, wobei der Außenwandabschnitt (24) im Wesentlichen zylindrisch ist.
7. System nach einem vorherigen Anspruch, wobei der Deckel (2) ferner wenigstens einen Schlitz (240) aufweist, der im Außenwandabschnitt (24) vorgesehen und so ausgelegt ist, dass er das Einführen eines Werkzeugs einer geeigneten Größe, z.B. eines Schraubendrehers, in den Schlitz ermöglicht, wenn der Deckel in der geschlossenen Position ist, um einen Abschnitt des Deckelrandes unterhalb des Schlitzes von seinem Eingriff am Behälterrand weg zu hebeln, so dass der Deckel ohne Benutzen des

Öffnungswerkzeugs vom Behälterkörper weg geholt werden kann.

8. System nach einem vorherigen Anspruch, wobei der Deckel (2) ferner eine im Wesentlichen kegelstumpfförmige Tragwand (28) aufweist, die sich von einem inneren Rand des Dichtungsabschnitts (23) erstreckt und so ausgelegt ist, dass sie von innen in einen oberen Endabschnitt der Metallseitenwand eingreift und ihn trägt, wenn der Deckel in der geschlossenen Position ist. 10
9. System nach einem vorherigen Anspruch, wobei die genannte Außenfläche des Außenabschnitts des Deckels, auf dem der Hebelabschnitt dreht, eine Außenfläche des Dichtungsabschnitts (23) ist. 15
10. System nach Anspruch 9, wobei die genannte Außenfläche einen im Wesentlichen bogenförmigen, zum Beispiel halbkreisförmigen Querschnitt hat. 20
11. System nach einem vorherigen Anspruch, wobei der Hebelabschnitt (31) eine im Wesentlichen flache Hebelfläche (33) umfasst, die so ausgelegt ist, dass sie an dem/den Drehpunkt(en) dreht, und der Hakenabschnitt eine flache Hakenfläche (34) zum Eingreifen in den genannten Abschnitt des Deckelrandes umfasst. 25
12. System nach einem vorherigen Anspruch, wobei der Deckel (2) und der Behälterrand (14) rotationssymmetrisch um eine Achse sind, so dass die genannte Öffnungsposition an jeder Stelle am Umfang des Deckels sein kann. 30
13. System nach einem vorherigen Anspruch, wobei der Hebelabschnitt (31) ein Loch (301) aufweist, das so ausgelegt ist, dass es einen Teil des Deckelaußenabschnitts (22) aufnimmt, wenn das Öffnungswerkzeug in der Öffnungsposition ist, so dass der Hebelabschnitt um zwei Drehpunkte dreht, einer auf jeder Seite des Lochs, wenn er in der Öffnungsposition ist, und/oder 35
wobei der Hebelabschnitt (31) eine gekrümmte Drehfläche (33) zum Wippen auf der Außenfläche des Deckelaußenabschnitts umfasst, wenn das Öffnungswerkzeug zum Entfernen des Deckels benutzt wird, und/oder 40
wobei das Öffnungswerkzeug (3) einen zweiten Hakenabschnitt (36) umfasst, der mit einem gegenüberliegenden Ende des Hebelabschnitts zu dem ersten Hakenabschnitt verbunden ist, wobei das System ferner einen Behältergriff (16) umfasst, der drehbar mit dem Behälterkörper (1) verbunden ist, wobei der zweite Hakenabschnitt zum Einhängen über den Griff ausgelegt ist, wenn das Öffnungswerkzeug in der Öffnungsposition ist, und so, dass eine Rotation des Griffes das Öffnungswerkzeug betätigt, um den 45
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im Eingriff befindlichen Abschnitt des Deckelrandes radial nach außen zu verschieben.

5 Revendications

1. Système de récipient refermable destiné au stockage de la peinture, le système comprenant :

un corps de récipient (1) présentant une base fermée (11) et une paroi métallique latérale (12) partant, durant l'utilisation, depuis la base vers le haut pour définir avec la base un volume intérieur destiné à renfermer la peinture, la paroi métallique latérale comportant une partie de bord supérieure (13) enroulée vers l'extérieur pour former un rebord de récipient (14) qui définit une embouchure du corps de récipient ; et un couvercle amovible (2) adapté pour être pressé sur le corps de récipient en une position fermée dans laquelle le couvercle scelle ladite embouchure, le couvercle comprenant une partie interne (21) et une partie métallique externe (23) qui entoure la partie interne, la partie métallique externe comprenant une partie de scellage (23) adaptée pour s'enclencher avec au moins une partie d'une surface supérieure (141) du rebord de récipient, quand le couvercle est dans la position fermée pour former un joint étanche entre le couvercle et le corps de récipient, le joint étanche s'étendant autour du rebord de récipient, une partie de paroi externe (24) raccordée à la partie de scellage et adaptée pour s'étendre, quand le couvercle est dans la position fermée, vers le bas au-delà d'un bord externe du rebord de récipient, et une partie de bord de couvercle (25), s'étendant depuis une extrémité inférieure de la partie de paroi externe, dans lequel la partie de scellage comprend une surface de scellage (231) adaptée pour former ledit joint étanche avec la surface supérieure (141) du rebord de récipient de telle sorte que ledit joint étanche s'étende par-dessus au moins un quartier supérieur externe de la surface du rebord de récipient, ladite partie métallique externe du couvercle est formée en feuille de métal et ladite surface de scellage est une surface de ladite feuille de métal, et ladite surface de scellage (231) est adaptée pour épouser ladite surface supérieure (141) du rebord de récipient, le système de récipient refermable étant **caractérisé en ce que** la partie de bord de couvercle (25) est enroulée vers l'intérieur pour former un rebord de couvercle (26), le rebord de couvercle étant agencé pour s'enclencher avec, et serrer, une partie d'une surface inférieure du rebord de couvercle quand le couvercle est dans la position fermée pour maintenir le couvercle en place,

- et en ce que le système comprend en outre un outil d'ouverture (3) pour séparer le couvercle d'avec le corps de récipient, l'outil (3) comprenant une partie de levier (31) et une partie de crochet (32) fixée à la partie de levier, les parties de levier et de crochet étant agencées de telle sorte que l'outil puisse être agencé dans au moins une position d'ouverture, relativement au corps de récipient et au couvercle fermé, dans lequel la partie de crochet s'accroche sous une partie du rebord de couvercle et s'enclenche avec celle-ci et la partie de levier pivote contre au moins un point pivot sur une surface externe de la partie externe de couvercle, de telle sorte que quand une extrémité supérieure de la partie de levier est déplacée radialement vers l'intérieur pour faire tourner la partie de levier autour du ou des points pivot, la partie de crochet soit déplacée radialement vers l'extérieur, déplaçant ainsi la partie enclenchée du rebord de couvercle radialement vers l'extérieur pour relâcher son serrage sur le rebord de couvercle et permettre la séparation du couvercle d'avec le récipient.
2. Système selon la revendication 1 dans lequel la partie de bord supérieure (13) est enroulée de telle sorte que son bord d'attaque rencontre sensiblement la paroi latérale métallique, et/ou dans lequel la partie de bord supérieure enroulée vers l'extérieur formant le rebord de récipient présente une coupe transversale généralement circulaire.
 3. Système selon l'une quelconque des revendications précédentes, dans lequel ladite surface de scellage (231) est une surface enduite ou peinte de ladite feuille de métal.
 4. Système selon l'une quelconque des revendications précédentes, dans lequel la partie de scellage (23) a une forme de U inversé, et/ou dans lequel la partie de scellage a une coupe transversale sensiblement semi-circulaire.
 5. Système selon la revendication 4, dans lequel la surface supérieure (141) du rebord de récipient a une coupe transversale sensiblement semi-circulaire, et la surface interne tournée vers le bas (231) de la partie de scellage est adaptée pour épouser la surface supérieure du rebord de récipient.
 6. Système selon l'une quelconque des revendications précédentes, dans lequel la partie de paroi externe (24) est sensiblement cylindrique.
 7. Système selon l'une quelconque des revendications précédentes, dans lequel le couvercle (2) comprend en outre au moins une fente (240) formée dans la partie de paroi externe (24) et agencée pour permettre l'insertion dans la fente d'un outil de taille convenable, par exemple un tournevis, quand le couvercle est dans la position fermée afin de soulever une partie du rebord de couvercle se trouvant en dessous de la fente et la dissocier de son enclenchement de serrage avec le rebord de récipient, permettant ainsi de soulever le couvercle et de le retirer du corps de récipient sans utiliser l'outil d'ouverture.
 8. Système selon l'une quelconque des revendications précédentes, dans lequel le couvercle (2) comprend en outre une paroi de support sensiblement tronconique (28) partant vers le bas depuis un bord interne de la partie de scellage (23) et agencée pour s'enclencher avec une partie d'extrémité supérieure de la paroi latérale métallique, et supporter depuis l'intérieur celle-ci, quand le couvercle est dans la position fermée.
 9. Système selon l'une quelconque des revendications précédentes, dans lequel ladite surface externe de la partie externe de couvercle sur laquelle pivote la partie de levier est une surface extérieure de la partie de scellage (23).
 10. Système selon la revendication 9, dans lequel ladite surface extérieure a une coupe transversale sensiblement arquée, par exemple semi-circulaire.
 11. Système selon l'une quelconque des revendications précédentes, dans lequel la partie de levier (31) comprend une surface de levier sensiblement plate (33) adaptée pour pivoter contre le ou les points pivot, et la partie de crochet comprend une surface de crochet plate (34) destinée à s'enclencher avec ladite partie du rebord de couvercle.
 12. Système selon l'une quelconque des revendications précédentes, dans lequel le couvercle (2) et le rebord de récipient (14) sont symétriques en rotation autour d'un axe, de telle sorte que ladite position d'ouverture puisse se trouver n'importe où autour de la circonférence du couvercle.
 13. Système selon l'une quelconque des revendications précédentes, dans lequel la partie de levier (31) comprend une ouverture (301) adaptée pour recevoir une partie de la partie externe de couvercle (22) quand l'outil d'ouverture est dans la position d'ouverture, de telle sorte que, dans la position d'ouverture, la partie de levier pivote autour de deux points pivot, un de chaque côté de l'ouverture, et/ou dans lequel la partie de levier (31) comprend une surface pivot courbe (33) adaptée pour se balancer sur la surface externe de la partie externe de couvercle quand l'outil d'ouverture est utilisé pour retirer

le couvercle, et/ou

dans lequel l'outil d'ouverture (3) comprend une seconde partie de crochet (36) raccordée à une extrémité opposée de la partie de levier par rapport à la première partie de crochet, le système comprenant en outre une poignée de récipient (16), connectée de façon pivotante au corps de récipient (1), la seconde partie de crochet étant adaptée pour s'accrocher par-dessus la poignée quand l'outil d'ouverture est dans la position d'ouverture et de telle sorte que la rotation de la poignée actionne l'outil d'ouverture pour déplacer la partie enclenchée du rebord de couvercle radialement vers l'extérieur.

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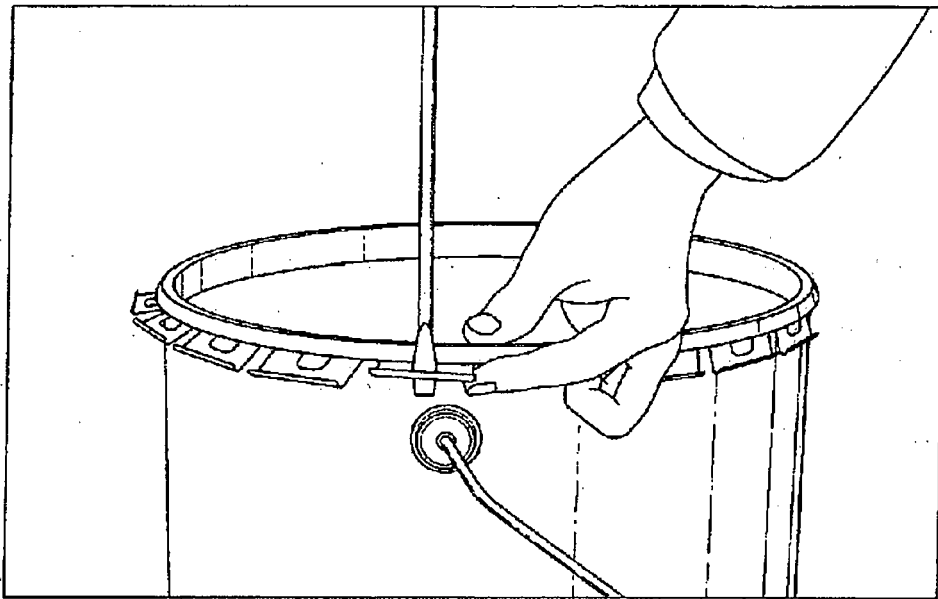


FIG. 1

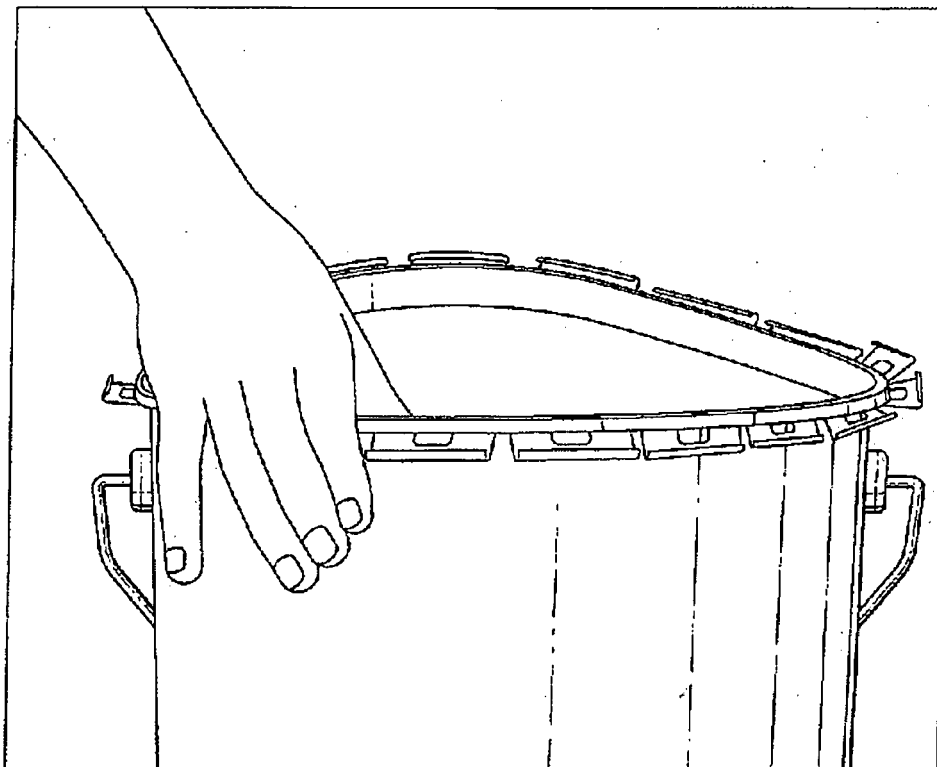


FIG. 2

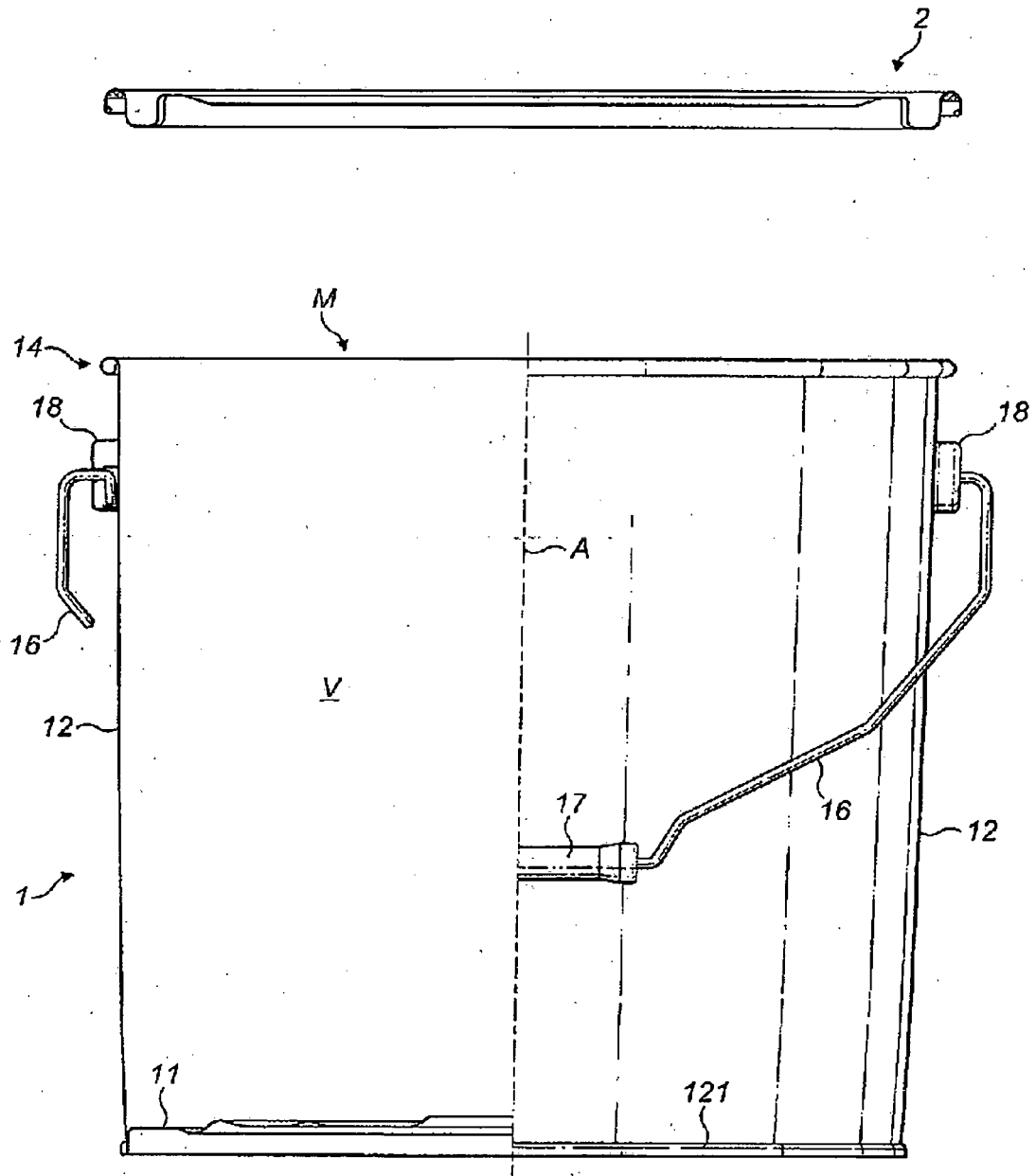


FIG. 3

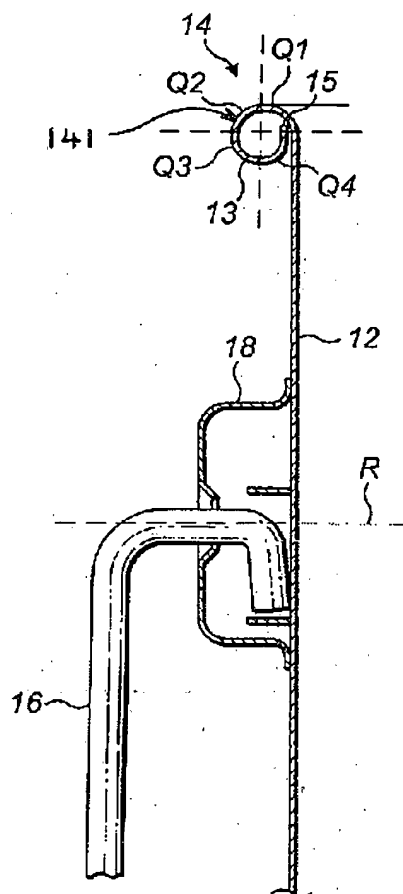


FIG. 4

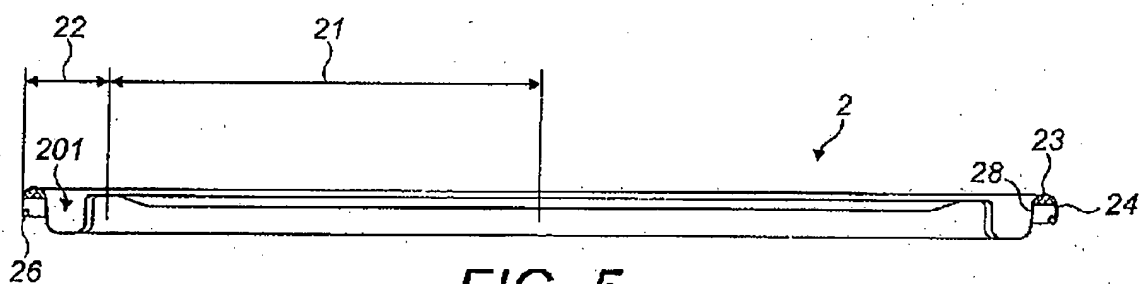


FIG. 5

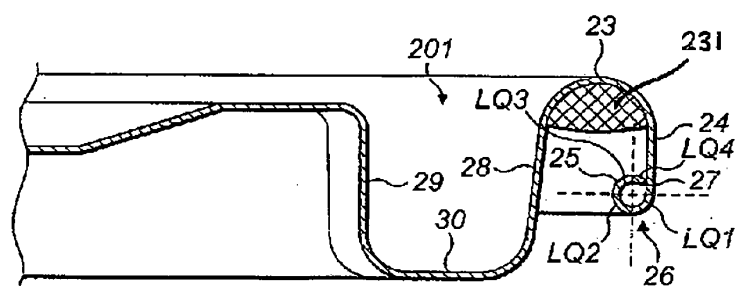


FIG. 6

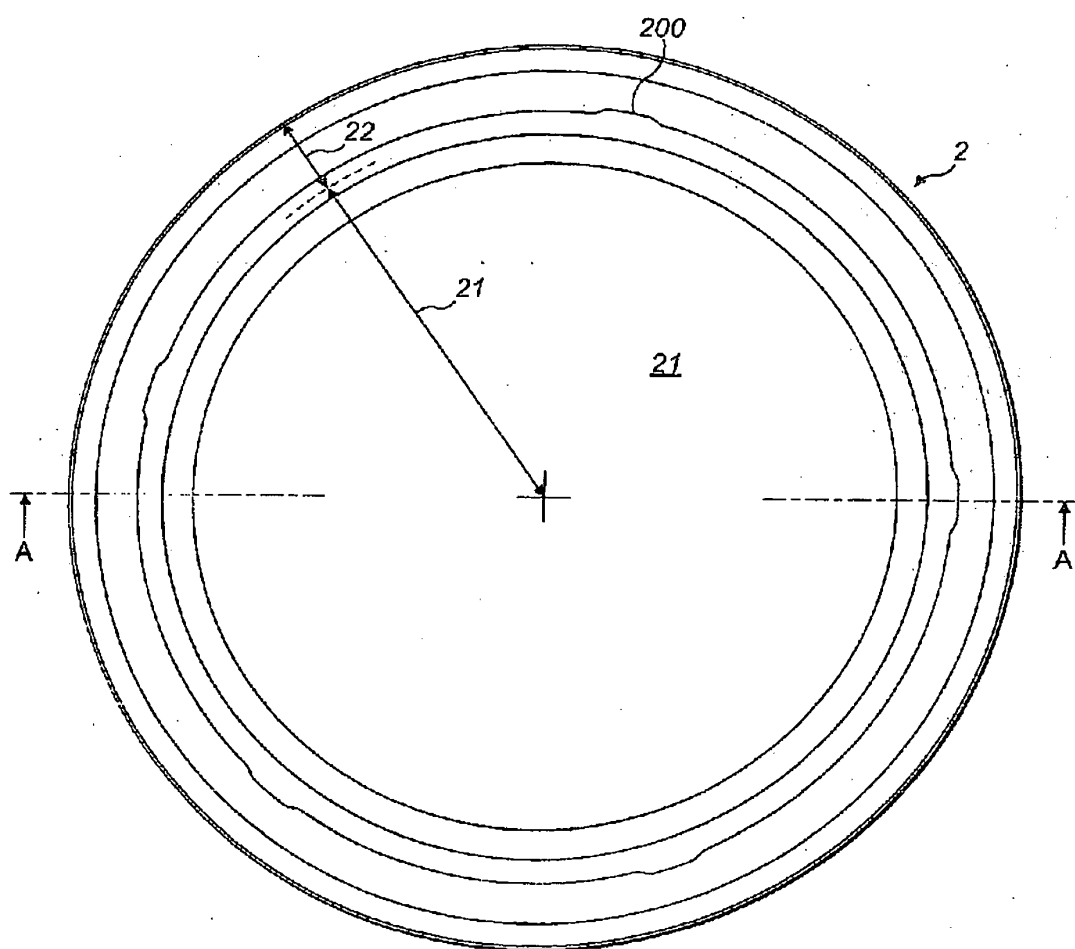


FIG. 7

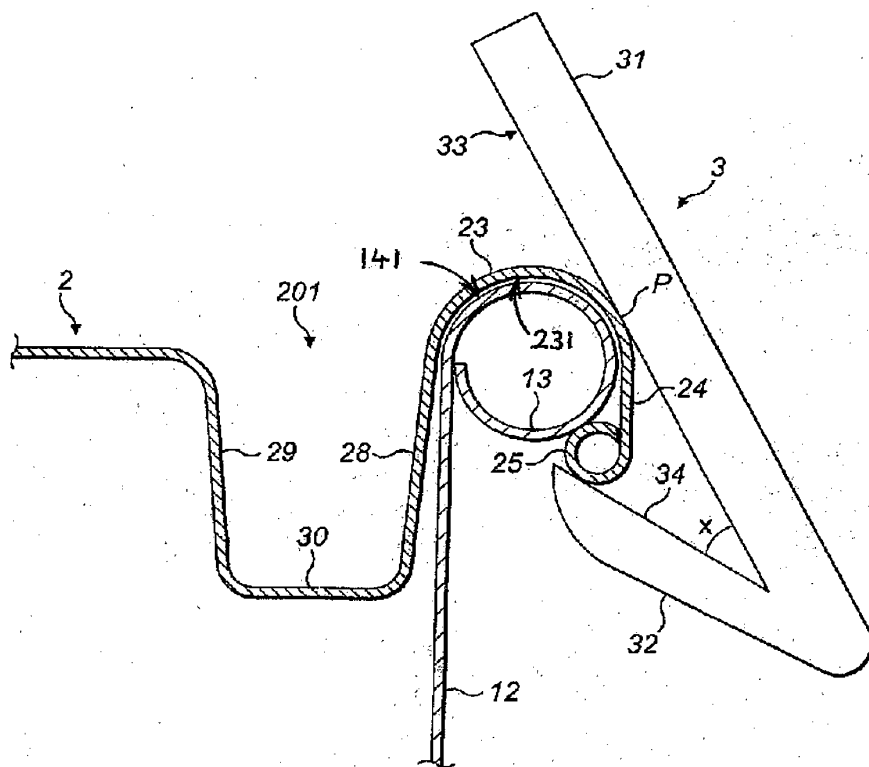


FIG. 8

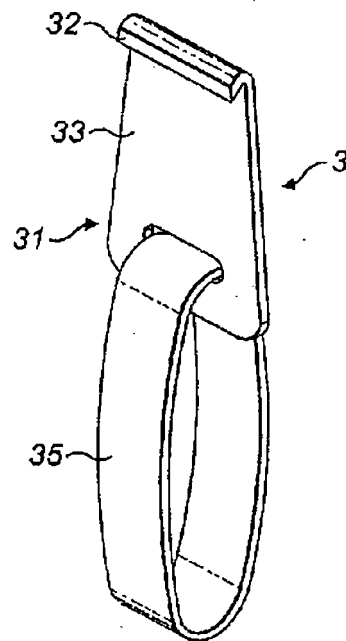


FIG. 9(A)

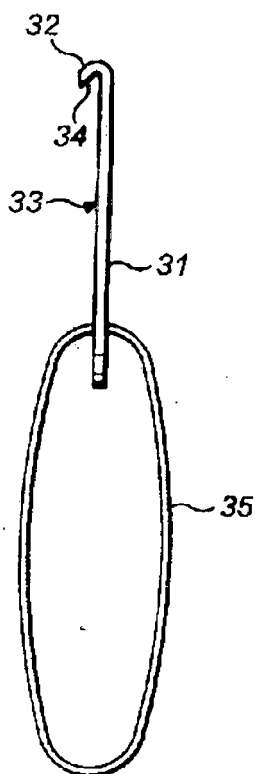


FIG. 9(B)

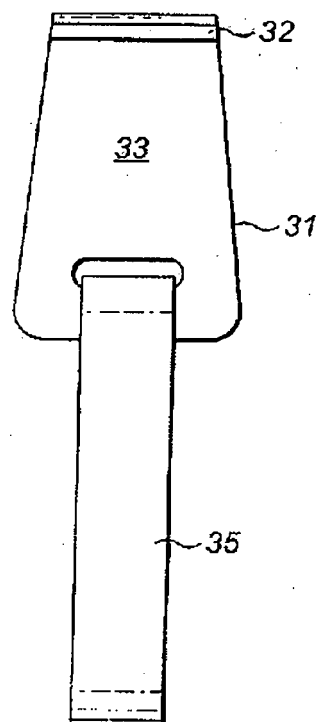
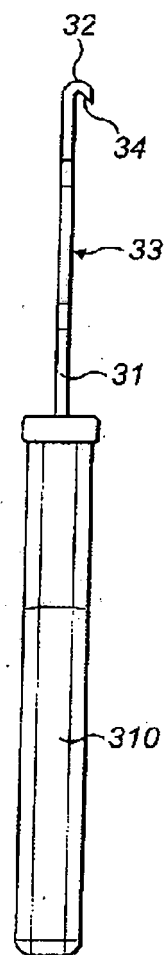
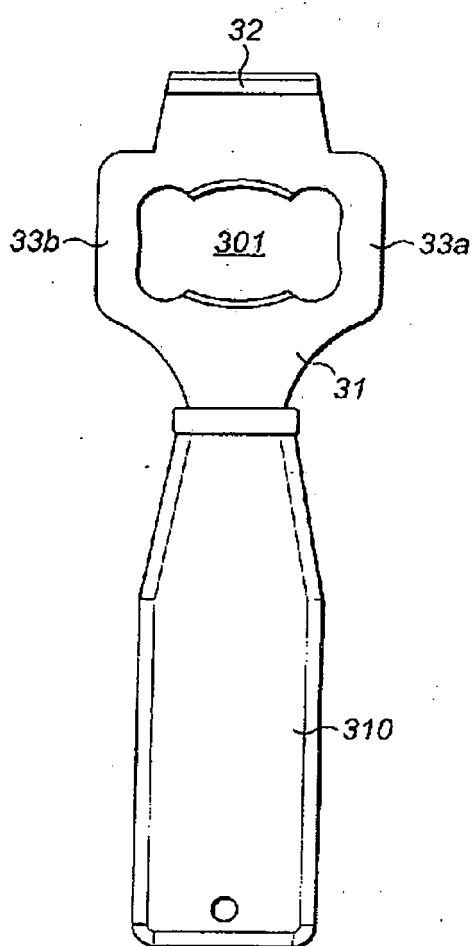
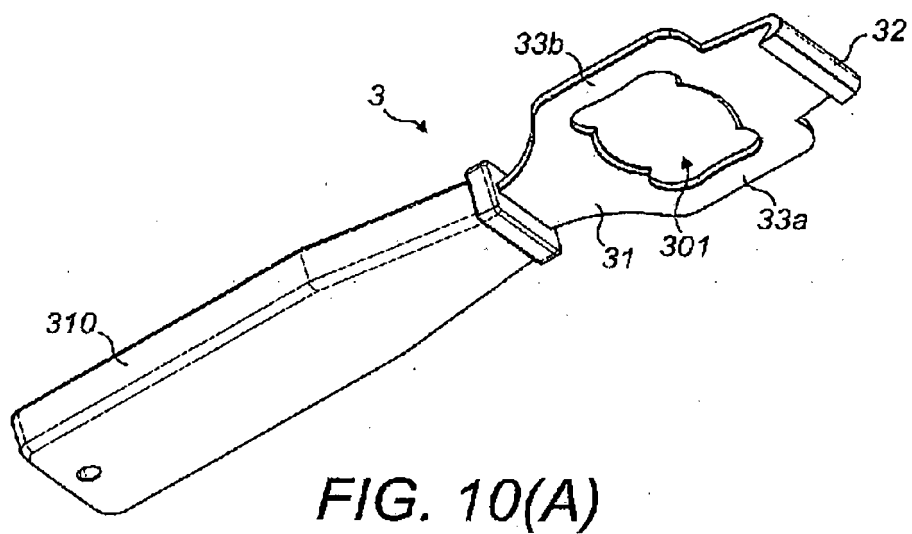


FIG. 9(C)



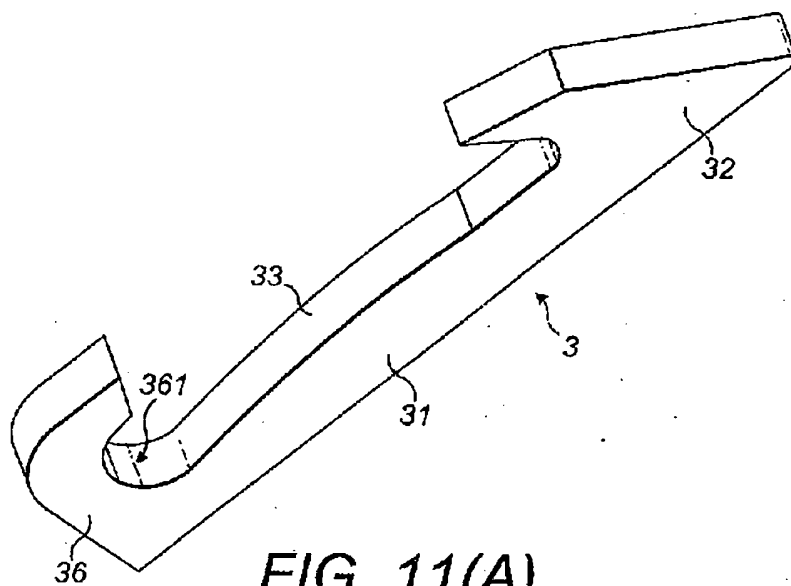


FIG. 11(A)

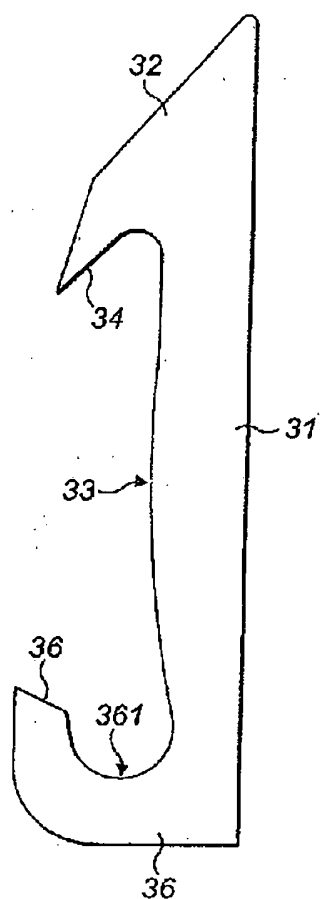


FIG. 11(B)

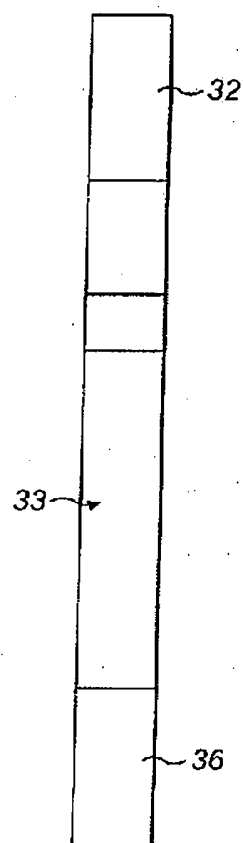


FIG. 11(C)

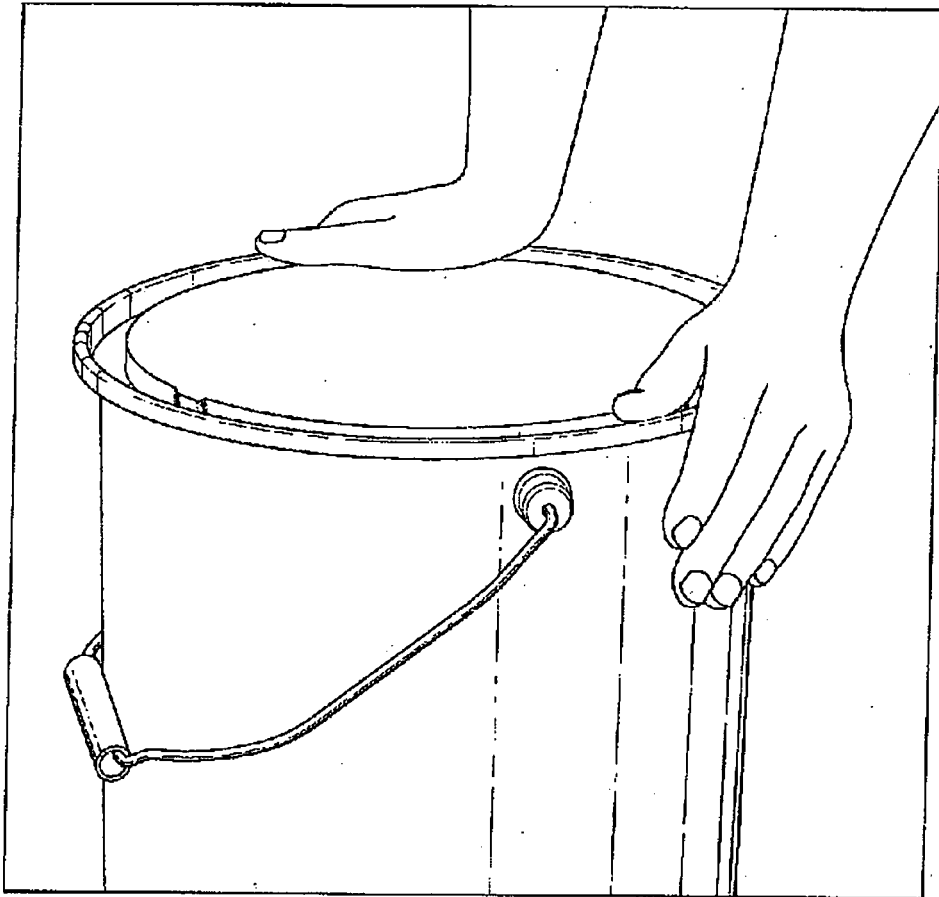


FIG. 12

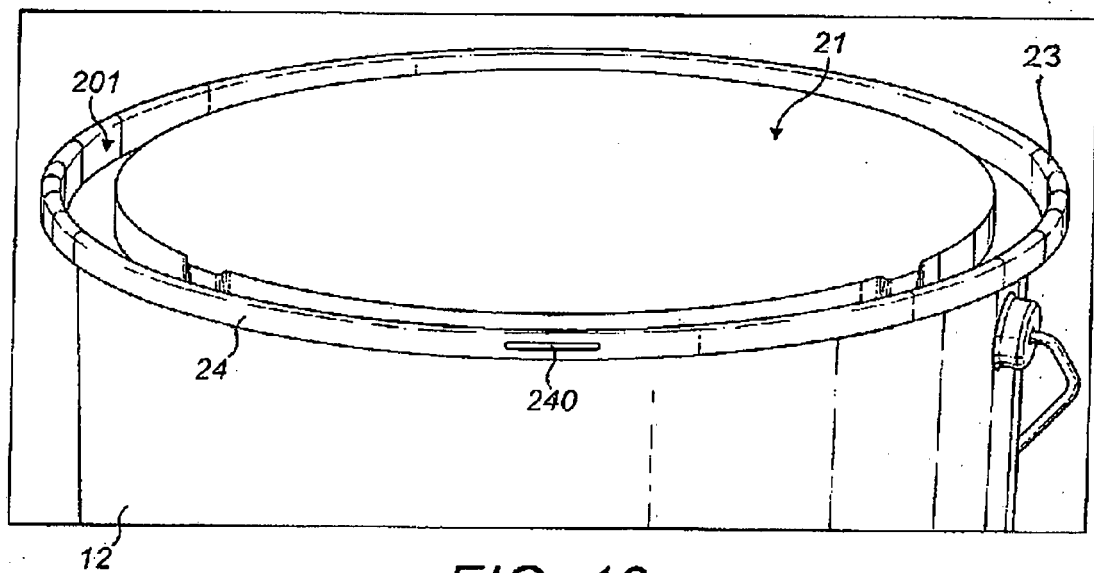


FIG. 13

REFERENCES CITED IN THE DESCRIPTION

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