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(54) **Method of making a container body and a closure for the body.**

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Description

This invention relates to a method of making a container body and a closure for the body. More particularly but not exclusively the method may be used to make a container comprising a seamless tubular body closed at one end by a peelable lid and closed at the other end by a can end fixed to the body by a double seam.

EP-A-0442770 describes a container body comprising a seamless tubular body having an outwardly directed flange at the bottom to which is heat sealed a flat lid. The other end of the body has a margin, of diameter less than that of the rest of the body, to which is fixed a can end by means of double seam. The benefit of this design is that the heat seal of the lid to the flange is done in clean dry factory conditions so the seals are reliable. During packing of particulates in a liquid into the container there is a risk that splashes of particulate material onto the seal margin may spoil the required hermetic seal. However double seaming of a can end to a body is able to cope with this problem of splashed product. These containers require cutting of the lid, body material and can end from sheet material. When the lid, body blank and can end are round, about 20% of the sheet material is lost to shred which, although recycled, has little value. However containers as described in EP-A-0442770 provide commercially attractive shapes.

US Patent 3428010 describes a container body and lid made from a tall drawn and wall ironed body comprising a cylindrical body closed at one end by an end wall. In the method described a metal blank is drawn and wall ironed to make a body having a cylindrical side wall closed at one end by an end wall thicker than the side wall, and joined to the side wall by an annulus of arcuate cross section. The end wall is parted from the side wall to make a closure comprising the end wall, annulus and a margin of the side wall as a skirt. The mouth of the body is reduced to a diameter small enough for the closure skirt to slide over the exterior surface to make a tubular body with a "slip lid". In preferred embodiments the body margin is reduced in diameter and curled to achieve a safe edge. The other end of the body with lid is closed by a can end fixed to the body by a double seam.

One objective of this invention is to provide a method of making a seamless body and can end from a single drawn article such that the can body and end so made may be joined by a double seam. Another objective is to provide a method of making container bodies in which the body is round or rectilinear in outline but the can end is round.

Accordingly this invention provides a method of making a container body and a closure for the body by the steps of:-

a). Drawing a container body from sheet metal to comprise a side wall portion and an end wall portion closing one end of the side wall portion;

b). Parting the end wall portion from the side wall portion to create a seamless annular body;

c). Reducing the diameter of a margin around one end of the seamless annular body to form a neck to receive a closure made from the material of the end wall portion; and

d). Closing the other end of the annular body with a closure to complete the body in readiness for filling and closing by the closure made from the end wall material, said method being characterised by the steps of in step (a), drawing a can body in which the end wall portion comprises a channel portion having an outer wall connected to the side wall portion and an inner wall connecting with a concave central panel of the end wall;

in step (b), parting the end wall portion from the side wall portion by cutting along a line around the outer wall of the channel;

in step (c), forming the neck and an outwardly directed flange;

in step (d), fixing a closure disc to the said other end of the body by crimping or heat sealing, and in step (b) or (d), curling the periphery of the outer channel portion of said end wall portion to a shape to permit co-operation with the flange of the body to make a double seam.

The benefit arising from provision of the channel portion is that the channel portion may include a properly shaped seaming profile portion for a can end.

If desired the outer wall of the channel portion may be joined to the side wall portion by an outwardly extending annulus so that the preferred round can end may be joined to a round or other shaped body portion.

In one embodiment of the method, in step (b), the container body is supported on a mandrel having a substantially flat peripheral annular surface located inside the outer wall of the channel, and a external roll co-operates with the mandrel to progressively shear the outer wall to part the end wall portion from the side wall portion by relative rolling motion as between the roll body and mandrel.

During parting of the end wall portion from the side wall portion, the centre panel of the end wall portion may be clamped between the end face of the mandrel and a chuck axially aligned with the mandrel.

If desired the external roll may have a profile to curl the periphery of the end wall portion during parting of the end wall portion from the side wall portion.

In step (c) the margin around said one end of the body may be reduced in diameter by supporting the side wall on a mandrel having an annular groove and the margin of side wall material is progressively displaced into the annular groove by application of pressure to the exterior of the margin by relative rolling motion as between a roll and the margin of side wall material and groove to form a neck and flange.

The method permits manufacture a variety of shapes of container all having the benefits of satisfactory seaming and sealing to achieve an hermetic container using the proven techniques of heat sealing and double seaming.

Various embodiments will now be described by way of example and with reference to the accompanying drawings in which:

Figure 1 is a side view of a first embodiment of the container cut away to show a heat sealed lid and a double seamed can end;

Figure 2 is a plan view of the container shown in figure 1;

Figure 3 is an underplan view of the container shown in figure 1;

Figure 4 is a sectioned side view of the container body of figure 1 at an early stage of manufacture;

Figure 5 is a like view to figure 4 during rolling of a neck and flange.

Figure 6 is a sectioned side view of the container during filling of a product;

Figure 7 is cut away side view of the container with a can end fitted on the flange in readiness for double seaming;

Figure 8 is a side view of a second embodiment of the container sectioned on a diameter;

Figure 9 is a cut away perspective view of a third embodiment in the form of a bowl;

Figure 10 is a sectioned side view of apparatus for parting the end wall portion from the side wall portion; and

Figure 11 is a sectioned side view of apparatus for forming a neck and flange on the side wall portion.

In figure 1 the first embodiment of the container 1 comprises a seamless body 2 drawn from coated sheet metal or foil to comprise a peripheral curl 3 supported by an outwardly directed flange 4 at the top of the side wall portion 5 which tapers towards an inwardly directed annulus 6 which surrounds a cylindrical neck portion 7 closed by an end wall 8 which is attached to the neck portion 7 by a double seam 9. As shown the container has a lid 10 which is heat sealed at its peripherally to the outwardly directed flange 4. If desired, the side wall may have longitudinal flutes 11 to stiffen it against loads arising when filled containers are stacked.

Figure 2 shows that the container is substantially square with rounded corners. The lid 10 fits within the peripheral curl 3 and has a lug 12 at one corner which may by used to grip the lid during peeling of the lid from the flange.

Figure 3 shows that the end wall 8 is round and provided with concentric beads around a flat central panel so that the beads may flex during thermal processing of the container and its contents. If however thermal processing is done under balanced pressure, a flat centre panel may be used.

Figure 4 shows a drawn tray component from which the container 1 of figure 1 is made. In Figure 4 the drawn component has the peripheral curl 3, the outwardly directed flange 4, the flared side wall 5, inwardly directed annulus 6, and central panel portion 8A of the same profile as the centre panel of end wall 8 as shown in Figure 1. However, as shown in Figure 4, the inwardly directed annulus 6 is connected to the central panel portion 8A by a channel portion 14. The channel portion comprises an inner wall 13 upstanding from the periphery of the central panel 8A, an annulus 14a of arcuate cross section extending radially outwards from the inner wall, and an outer wall 15 descending from the arcuate annulus to the substantially flat annulus 6.

Figure 5 shows the component of Figure 4 during reforming of the outer wall 15 of the channel portion. The container side wall portion 5 is supported by a mandrel 16 while a plug 17 supports the inner wall 13 and top surface of the channel 14 while a work roll 21 is progressively applied to the outer wall of the channel so that relative rolling motion as between the roll and container body generates the neck portion 7 and an outwardly extending flange portion best seen in Figure 6. As the neck 7 and flange 18 are nearly complete a cutting disc 21A is moved inwards to sever the annulus 14 from the flange 18. Preferably, the centre of the end wall 8A is clamped between a sprung piston in the mandrel 16 and the plug 17 during rolling and cutting of the outer wall 15.

Figure 6, the container body 2, has been closed at one end by a lid 10 heat sealed peripherally to the outwardly directed flange 4. The lid material may be cardboard coated with a thermoplastic material to heat seal with a coating on the interior surface of the body 2. Preferably, the lid material is a metal foil, such as aluminium, coated with a suitable thermoplastic to achieve a peelable seal but also able to survive thermal processing. Heat sealing the lid to the flange before filling the container, avoids risk of contamination of the heat seal, so reliable peelable seals may be made.

Figure 6 shows the closed body 2 during filling with a product 19 from a nozzle 20. Any splashes

of product landing on the flange are bridged during a conventional double seaming process.

Returning to Figure 5, it will be seen that the centre panel 8A, inner wall 13, and arcuate annulus 14 provide sufficient material to make an end wall 8 like a conventional can end. The arcuate annulus 14 is severed from the flange 18 to release the end wall material. It may be necessary to reshape the end wall material a suitable peripheral curl to permit double seaming to the flange. The filled container is then closed by the end wall as shown in Figure 7 by a double seam 9 as shown in Fig.1.

An advantage of using a round can end or end wall component is that the double seam can be formed at high speeds to achieve a production line speed of about 800 cans per minute as is used in food packing factories.

If thin metal or foil is used to make the body it is preferable that there is a radius of about 0,508 mm (0.020") between the flange 18 and neck 7 and the flange width is about 1.524 mm (0.060") so that the double seam is of small dimensions and can be seamed with low axial loads of 22,68 Kg (50lbs) or less.

Figure 8 shows a second embodiment of the invention in which a round seamless body 22 has a peripheral curl 23 and flange 24 supported in a taller side wall 25 which tapers toward an inclined annulus 26 or shoulder which supports a neck 27 and flange joined to an end wall 28 by a double seam 29. Some products adhere to any crevice in a container so the end wall 28 in Figure 8 has a domed centre panel 30 to blend with the profile of the inclined annulus 26 so there is less risk of product sticking in the container when emptied.

The container shown in Figure 6 may be made by the steps described with reference to Figures 4, 5 and 7. However, the end wall may alternatively be an ordinary can end applied to one end of a necked in seamless can body.

In Figure 9 the third embodiment is a bowl 32 having a lid 33 peripherally heat sealed to flange 34 and a base wall 35 fixed by a double seam 36 as already descried with reference to the first and second embodiments. The base wall 35 may be embossed with a design in low relief to impose the design on a product such as jelly which can be turned out of the container for serving. A spatular 37 or spoon may be located in the recess defined by the peripheral curl. Alternatively, the spatular may be located in the end wall within the compass of the double seam.

If desired, the arcuate annulus 14 of the end wall may be crimped onto a curled flange and heated to fuse the coatings of end wall and flange together to achieve a hermetic seal. Heat may be applied by a noncontacting means such as an induction coil. Whilst the containers have been described with reference to processed foods, they may also be used for aseptically packed foods or dry goods.

Figures 10 and 11 show respectively, apparatus for parting the end wall portion from the side wall portion, and apparatus forming of a neck of reduced diameter and flange on the side wall portion.

As shown in Figure 10 the parting apparatus comprises a rotatable mandrel 41, a pad 42 which is rotatable and moveable towards and away from the mandrel, and a freely rotating cutter roll 43 supported on an arm 44 for movement in a radial direction towards and away from the mandrel 41.

In Figure 10 the container component 45 has a cylindrical side wall 46 closed at one end by an end wall portion 47 comprising a concave central panel 48 surrounded by a flat annulus 49 which is surrounded by a convex annular channel portion 50 the outer wall of which connects directly with the cylindrical side wall.

As shown in Figure 10 the flat annulus 49, of the end wall portion, is pressed onto a stepped annulus 51 of the mandrel so that the channel portion 50 is accurately aligned with the cutter roll 43 and a peripheral portion 511 of annulus 50 is at the correct height for the parting line. While the pad 42, mandrel 41 and component 45 rotate the cutter roll is moved radially towards the mandrel to part the end wall portion from the side wall portion.

In the embodiment shown in Figure 10 the cutter roll has a curved profile 522 above its cutting edge 52 so that, as the cutting edge of the roll co-operates with the peripheral edge of the mandrel to shear the outer wall of the channel the end wall material is peripherally formed to an inwardly directed curl suitable for double seaming. However, in an alternative method a simple cutting tool may be used to and the peripheral edge of the end wall portion may be curled by conventional apparatus for curling can ends.

As shown in Figure 11 the apparatus for forming a neck and flange from the side wall material comprises a rotatable mandrel 55, a rotatable plug 56 axialy aligned with the mandrel, and a forming roll 57 supported for rotation on an arm 58 movable to bring the roll to co-operate with the plug and mandrel.

The mandrel 55 comprises a cylindrical body having a first diameter portion 59 joined by an annular ledge 60 to second portion 61 of smaller diameter to fit inside the side wall portion 62.

The rotatable plug 56 has a shaft supported in bearings (not shown) and head comprising a peripheral flange 63 of diameter greater than the side wall portion 62, an annular surface 64 to fit inside the side wall portion to support the free edge of the side wall portion, and a cylindrical plug portion 65

which extends into nesting relationship with a recess 66 in the end surface of the mandrel to centre the plug in the mandrel.

The plug portion 65 of the plug and annular end surface 67 of the mandrel define a groove into which the initially cylindrical side wall material is forced as the roll 57 is moved to progressively push the mandrel plug and side wall rotate, as can be seen by comparing the unformed sidewall at the right of the drawing with the necked and flanged metal at the left of the drawing.

If desired the bottom flange may be formed on a drawn or wall ironed can body by means of the plug and mandrel ledge 60.

Once the can end and container body have been formed a heat sealed lid may be fitted to the lower flange or alternatively some other conveniently openable closure may be used.

A curled profile as already described with reference to Figures 1 to 9 may alternatively be drawn as shown by the embodiments of Figures 1 to 9 with a flange made in the press tool and subsequently curled before parting of the end wall portion from the side wall portion.

Claims

1. A method of making a container body (2) and a closure (8) for the body by the steps of:-

   a). Drawing a container body (2) from sheet metal to comprise a side wall portion (5) and an end wall portion (8) closing one end of the side wall portion;

   b). Parting the end wall portion (8) from the side wall portion (5) to create a seamless annular body;

   c). Reducing the diameter of a margin around one end of the seamless annular body to form a neck (7) to receive a closure made from the material of the end wall portion (8); and

   d). Closing the other end of the annular body with a closure (10) to complete the body in readiness for filling and closing by the closure made from the end wall material;

   said method being characterised by the steps of:

   in step (a), drawing a can body in which the end wall portion comprises a channel portion (14) having an outer wall (15) connected to the side wall portion (5) and an inner wall (13) connecting with a concave central panel (8a) of the end wall;

   in step (b), parting the end wall portion (8) from the side wall portion by cutting along a line around the outer wall (15) of the channel;

   in step (c), forming the neck (7) and an outwardly directed flange (18);

   in step (d), fixing a closure disc (10) to the said other end of the body by crimping or heat sealing; and in step (b) or (d), curling the periphery of the outer channel portion (15) of said end wall portion to a shape to permit co-operation with the flange (18) of the body to make a double seam.

2. A method according to claim 1 characterised in that the outer wall (15) of the channel portion is joined to the side wall (5) by an outwardly extending annulus (6).

3. A method according to claim 1 or claim 2 characterised in that in step (b), the container body is supported on a mandrel (41) having a substantially flat peripheral annular surface located inside the outer wall of the channel, and a external roll (43) co-operates with the mandrel to progressively shear the outer wall to part the end wall portion from the side wall portion by relative rolling motion as between the roll, body and mandrel.

4. A method according to claim 3 characterised in that during parting of the end wall portion from the side wall portion, the centre panel of the end wall portion is clamped between the end face of the mandrel (41) and a pad (42) axially aligned with the mandrel.

5. A method according to claim 3 or claim 4 characterised in that the external roll (43) has a profile (522) to curl the periphery of the end wall portion during parting of the end wall portion from the side wall portion.

6. A method according to any preceding claim characterised in that in step c), the margin around said one end of the body is reduced in diameter by supporting the side wall on a mandrel (55, 56) having an annular groove and the margin of side wall material is progressively displaced into the annular groove by application of pressure to the exterior of the margin by relative rolling motion as between a roll (57) and the margin of side wall material and groove.

Patentansprüche

1. Verfahren zur Herstellung eines Behälters (2) und eines Deckels (8) für den Behälter mit den folgenden Schritten:

   a) es wird ein Behälter (2) aus einem Metallblech gezogen, um einen Seitenwandabschnitt (5) und einen Stirnwandabschnitt (8)

herzustellen, der ein Ende des Seitenwandabschnitts abschließt;
b) es wird der Stirnwandabschnitt (8) von dem Seitenwandabschnitt (5) abgetrennt, um einen nahtlosen Ringkörper zu erzeugen;
c) es wird der Durchmesser eines Randes an einem Ende des nahtlosen Ringkörpers vermindert, um einen Hals (7) zu schaffen, der einen Deckel aus dem Material des Stirnwandabschnitts (8) aufnimmt; und
d) es wird das andere Ende des Ringkörpers mit einem Deckel (10) verschlossen, um den Behälter zu vervollständigen und zur Füllung und zum Abschließen durch einen Deckel bereit zu machen, der aus dem Stirnwandmaterial hergestellt ist,
wobei das Verfahren gekennzeichnet ist durch die folgenden Schritte:

- während des Schrittes (a) wird ein Büchsenkörper gezogen, bei dem der Stirnwandabschnitt einen kanalförmigen Abschnitt (14) besitzt, dessen Außenwand (15) mit dem Seitenwandabschnitt (5) verbunden ist, während eine Innenwand (13) des kanalförmigen Abschnitts mit einer konkaven zentralen Platte (8a) der Stirnwand verbunden ist;
- während des Schrittes (b) wird der Stirnwandabschnitt (8) von dem Seitenwandabschnitt getrennt, indem ein Schnitt längs einer Linie über die Außenwand (15) des kanalförmigen Abschnitts durchgeführt wird;
- während des Schrittes (c) werden der Hals (7) und ein nach außen gerichteter Flansch (18) geformt;
- während des Schrittes (d) wird eine Dekkelscheibe (10) auf dem anderen Ende des Behälters durch Krimpen oder Wärmeversiegelung fixiert; und
- während des Schrittes (b) oder (d) wird der Umfang des äußeren Kanalabschnitts (15) des Stirnwandabschnitts auf eine Form aufgerollt, die ein Zusammenwirken mit dem Flansch (18) des Behälters zwecks Herstellung eines Doppelfalzes möglich macht.

2. Verfahren nach Anspruch 1,
dadurch gekennzeichnet, daß die Außenwand (15) des kanalförmigen Abschnitts mit der Seitenwand (5) über einen nach außen verlaufenden Ring (6) verbunden ist.

3. Verfahren nach Anspruch 1 oder 2,
dadurch gekennzeichnet, daß während des Schrittes (b) der Behälterkörper von einem Dorn (41) getragen wird, der eine im wesentlichen flache ringförmige Umfangsoberfläche aufweist, die innerhalb der Außenwand des kanalförmigen Abschnitts liegt, und der eine äußere Rolle (43) trägt, die mit dem Dorn zusammenwirkt, um progressiv die Außenwand abzuscheren, um den Stirnwandabschnitt von dem Seitenwandabschnitt durch eine relative Rollbewegung zwischen der Rolle, dem Körper und dem Dorn abzutrennen.

4. Verfahren nach Anspruch 3,
dadurch gekennzeichnet, daß während der Abtrennung des Stirnwandabschnitts von dem Seitenwandabschnitt die zentrale Platte des Stirnwandabschnitts zwischen der Stirnfläche des Dorns (41) und einem Puffer (42) eingeklemmt wird, der axial auf den Dorn ausgerichtet ist.

5. Verfahren nach den Ansprüchen 3 oder 4,
dadurch gekennzeichnet, daß die äußere Rolle (43) ein solches Profil (522) aufweist, daß der Umfang des Stirnwandabschnitts während des Abtrennens des Stirnwandabschnitts von dem Seitenwandabschnitt aufgerollt wird.

6. Verfahren nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, daß während des Schrittes (c) der Rand rings um das eine Ende des Behälters im Durchmesser dadurch vermindert wird, daß die Seitenwand auf einem Dorn (55, 56) abgestützt wird, der eine Ringnut besitzt, wobei der Rand des Seitenwandmaterials progressiv in die Ringnut eingedrückt wird, indem ein Druck auf die Außenseite des Randes durch eine relative Rollbewegung zwischen einer Rolle (57) und dem Rand des Seitenwandmaterials und der Nut ausgeübt wird.

Revendications

1. Procédé de fabrication d'un corps de récipient (2) et d'une fermeture (8) pour le corps par les phases consistant à :
(a) Emboutir un corps de récipient (2) dans un métal en feuille pour qu'il comprenne une portion de paroi latérale (5) et une portion de paroi d'extrémité (8) fermant une extrémité de la portion de paroi latérale;
(b) Séparer la portion de paroi d'extrémité (8) de la portion de paroi latérale (5) pour créer un corps annulaire sans soudure;
(c) Réduire le diamètre d'une bordure autour d'une extrémité du corps annulaire sans soudure pour former un rétrécissement

(7) destiné à recevoir une fermeture faite du matériau de la portion de paroi d'extrémité (8); et

(d) Fermer l'autre extrémité du corps annulaire avec une fermeture (10) pour achever le corps de manière qu'il soit prêt à être rempli et fermé par la fermeture faite du matériau de la paroi d'extrémité;

ledit procédé étant caractérisé par les opérations consistant à

à la phase (a), emboutir un corps de boîte métallique dans lequel la portion de paroi d'extrémité comprend une gorge (14) comportant une paroi externe (15) reliée à la portion de paroi latérale (5) et une paroi interne (13) se raccordant à un pan central concave (8a) de la paroi d'extrémité;

à la phase (b), séparer la portion de paroi d'extrémité (8) de la portion de paroi latérale par découpe le long d'une ligne autour de la paroi externe (15) de la gorge;

à la phase (c), former le rétrécissement (7) et un rebord dirigé vers l'extérieur (18);

à la phase (d), fixer un disque de fermeture (10) à ladite autre extrémité du corps par sertissage ou thermoscellage; et à la phase (b) ou (d), rouler la périphérie de la paroi externe (15) de la gorge de ladite portion de paroi d'extrémité en une forme permettant une coopération avec le rebord (18) du corps afin de réaliser un double pli.

2. Procédé selon la revendication 1, caractérisé en ce que la paroi externe (15) de la gorge est raccordée à la portion de paroi latérale (5) par un anneau s'étendant vers l'extérieur (6)

3. Procédé selon la revendication 1 ou 2, caractérisé en ce que, à la phase (b), le corps de récipient est supporté sur un mandrin (41) comportant une surface annulaire périphérique sensiblement plate située à l'intérieur de la paroi externe de la gorge, et un rouleau externe (43) coopère avec le mandrin pour cisailler progressivement la paroi externe afin de séparer la portion de paroi d'extrémité de la portion de paroi latérale par un mouvement de laminage relatif entre le corps du rouleau et le mandrin.

4. Procédé selon la revendication 3, caractérisé en ce que lors de la séparation de la portion de paroi d'extrémité de la portion de paroi latérale, le pan central de la portion de paroi d'extrémité est serré entre la face d'extrémité du mandrin (41) et un tampon (42) aligné axialement avec le mandrin.

5. Procédé selon la revendication 3 ou 4, caractérisé en ce que le rouleau externe (43) a un profil (522) pour rouler la périphérie de la portion de paroi d'extrémité durant la séparation de la portion de paroi d'extrémité de la portion de paroi latérale.

6. Procédé selon l'une quelconque des revendications précédentes, caractérisé en ce que, à la phase (c), la bordure autour de ladite extrémité du corps a son diamètre réduit en supportant la paroi latérale sur un mandrin (55, 56) comportant une gorge annulaire et la bordure du matériau de la paroi latérale est progressivement déplacée dans la gorge annulaire par application de pression sur l'extérieur de la bordure par un mouvement de laminage relatif entre un rouleau (57) et la bordure du matériau de la paroi latérale et la gorge.

Fig. 1

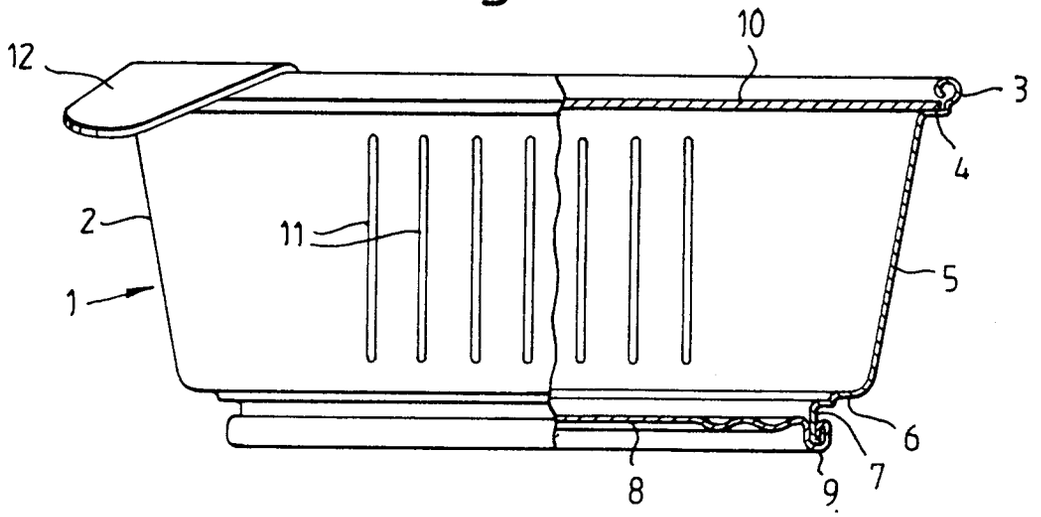

Fig. 2

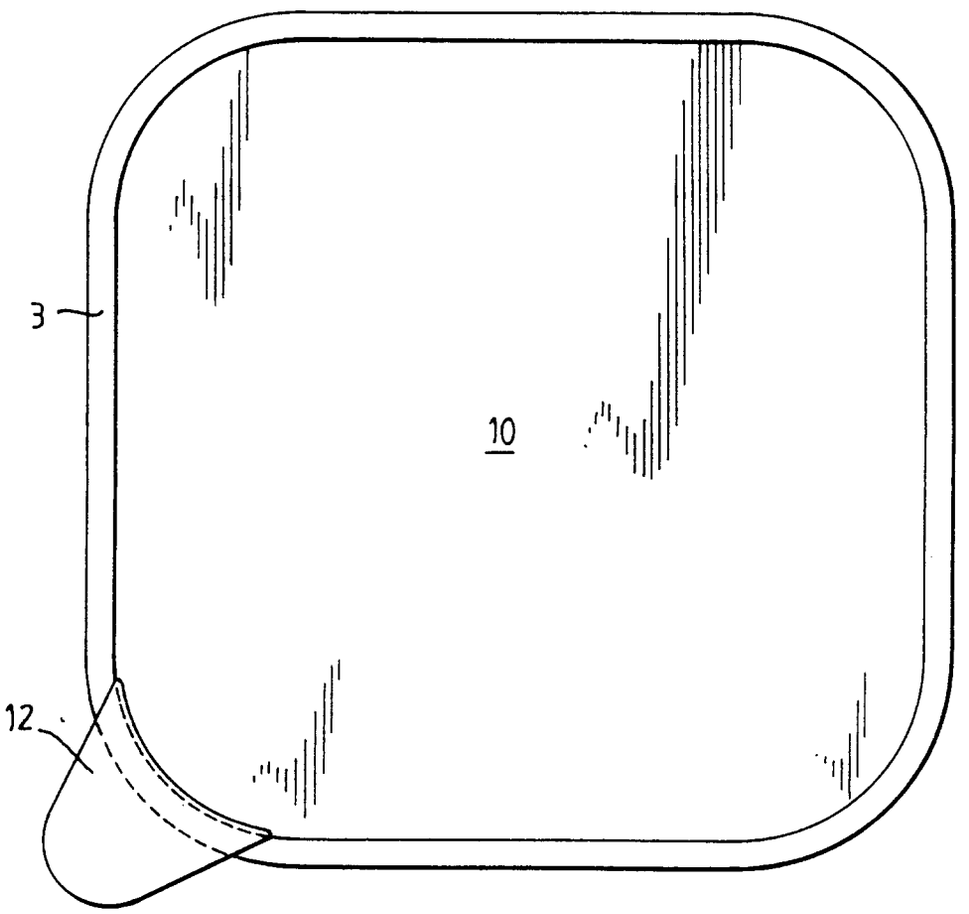

Fig. 3

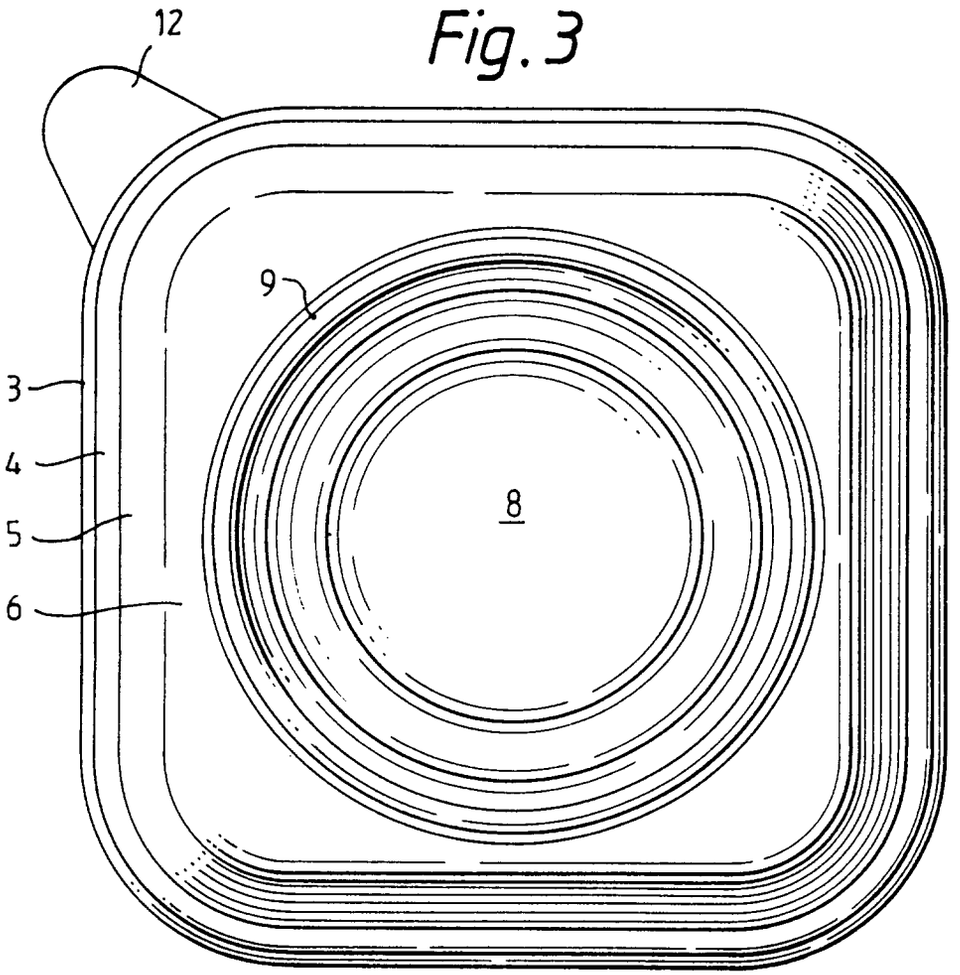

Fig. 4

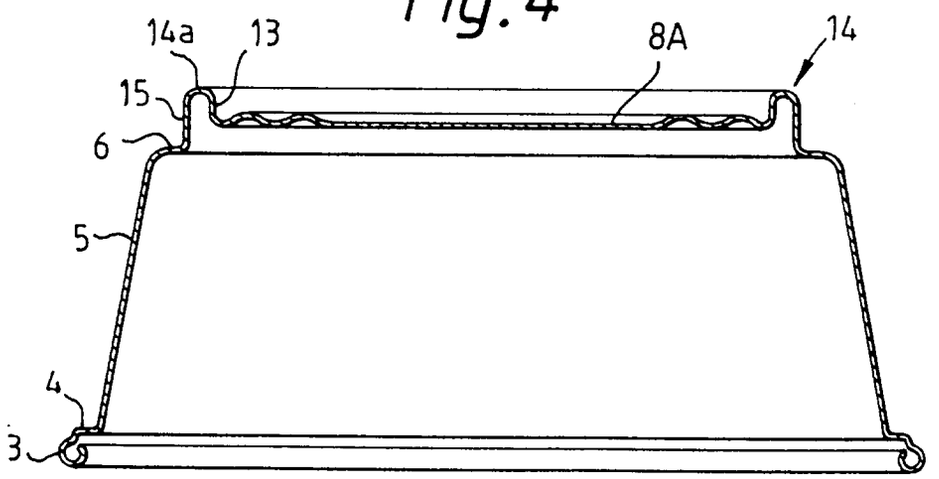

Fig. 5

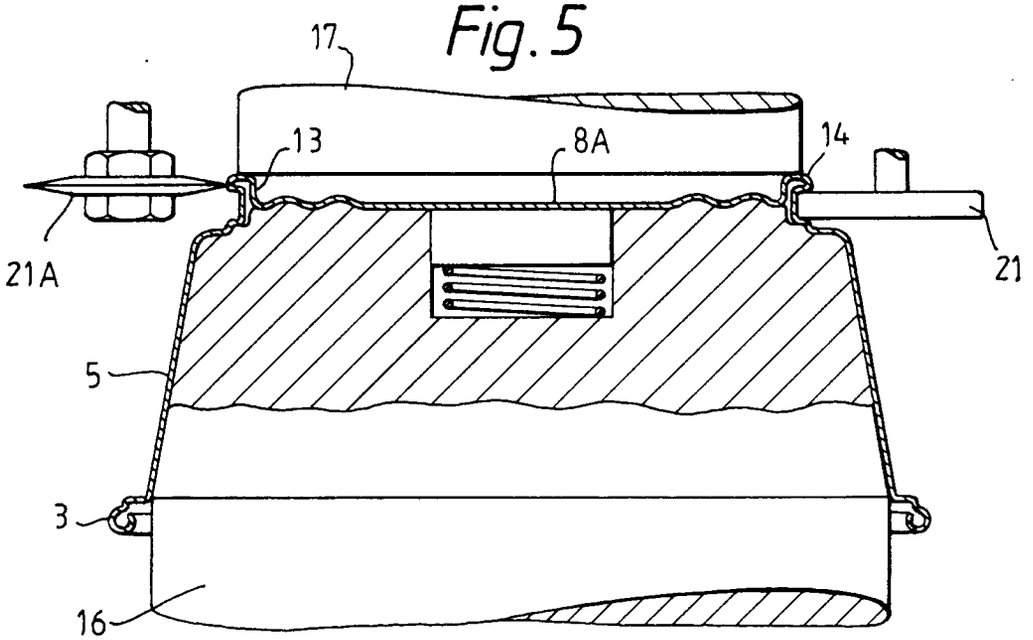

Fig. 6

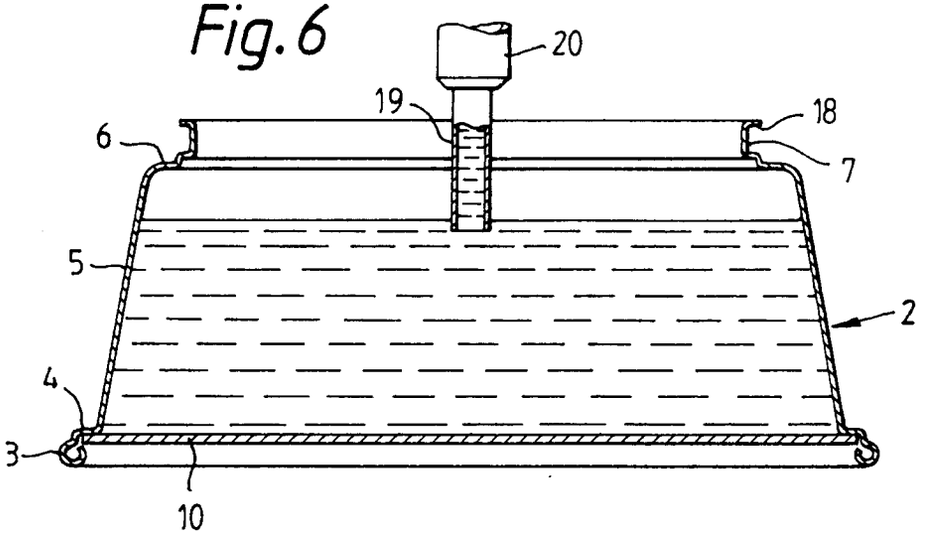

Fig. 7

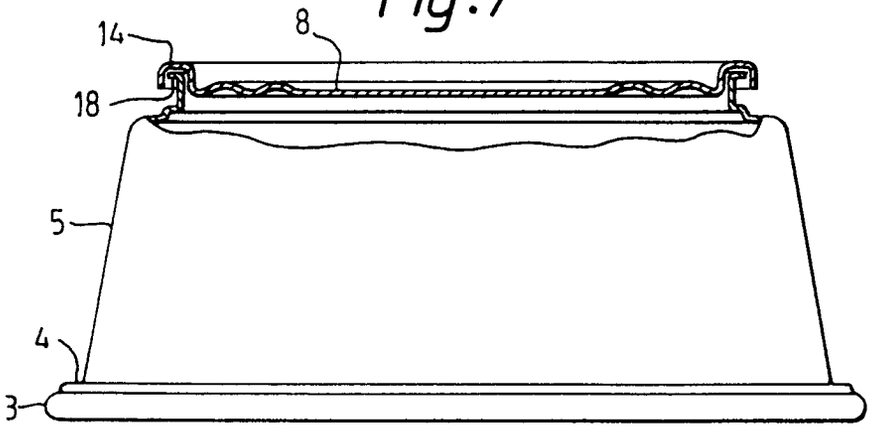

Fig. 8

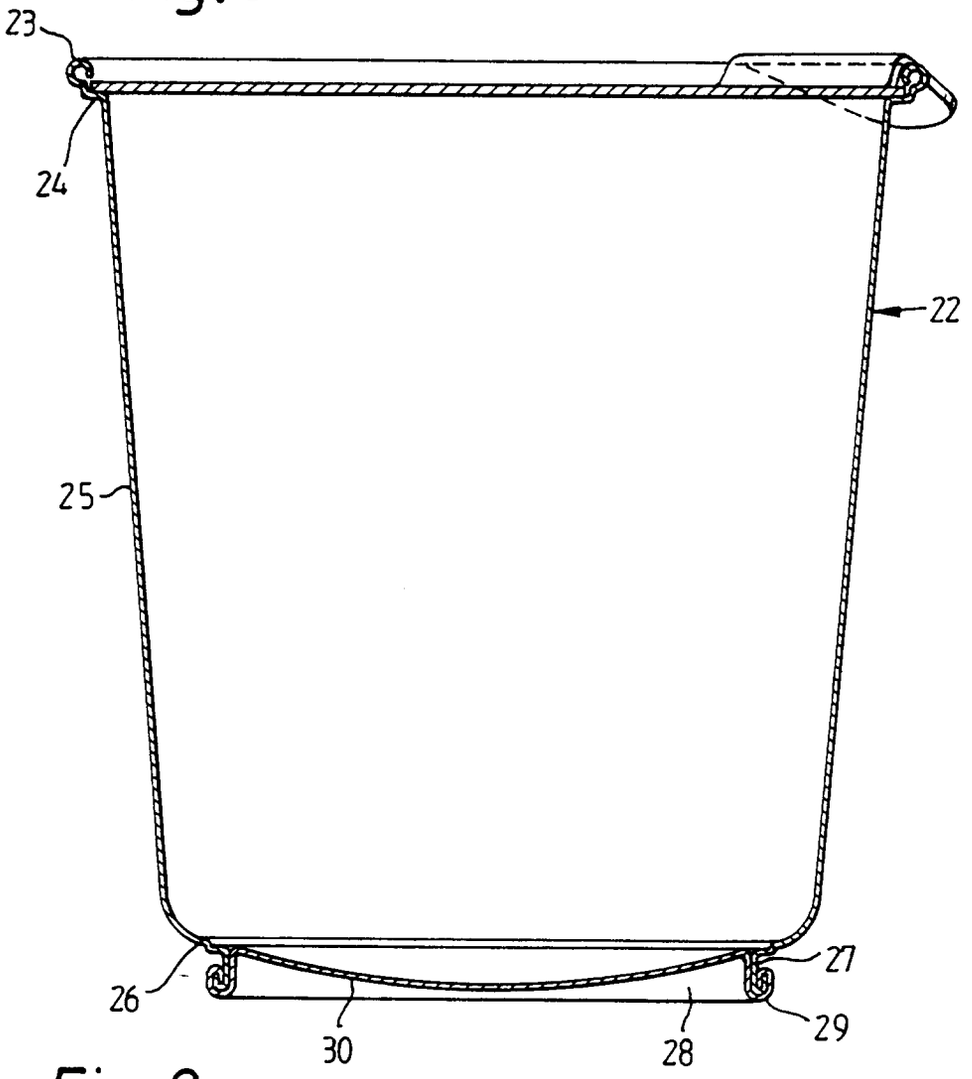

Fig. 9

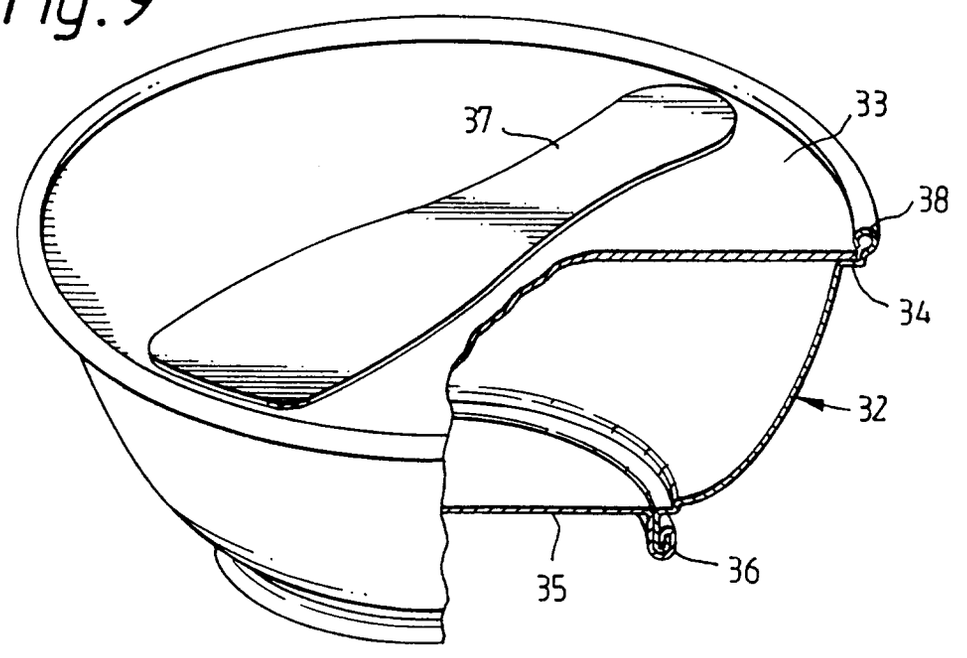

Fig.10

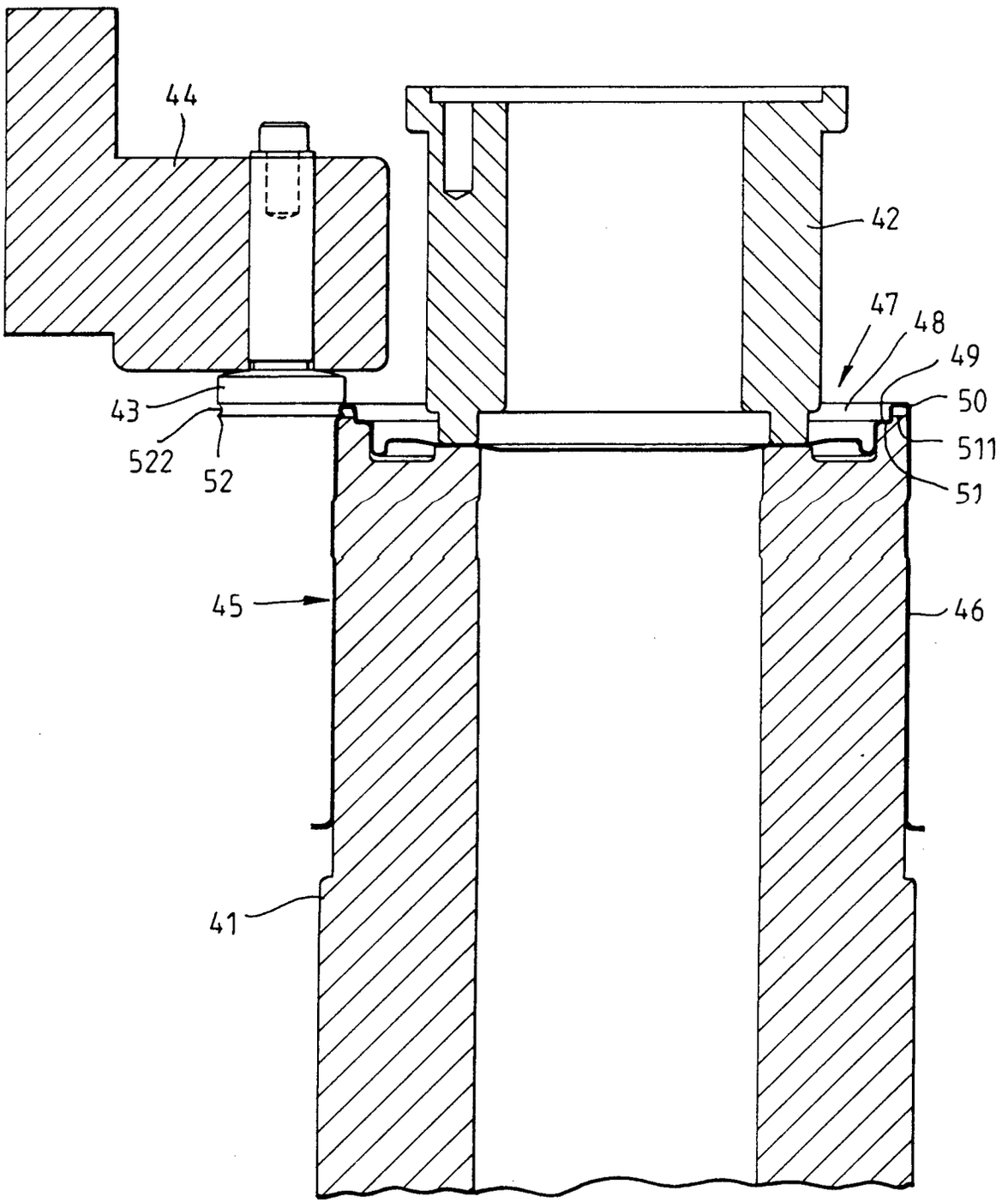

Fig.11