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(54) Truncated cone metal container and method for manufacturing the same.

(57) A '3-piece' truncated cone shaped container (1) is described, which is made of welded sheet metal and has absolutely smooth internal surface, so that the container can be easily cleaned.

The container is easy to stack, and has a ring shaped upper lip (6) that is concave (7) in the centre.

A method for manufacturing above container is also described.

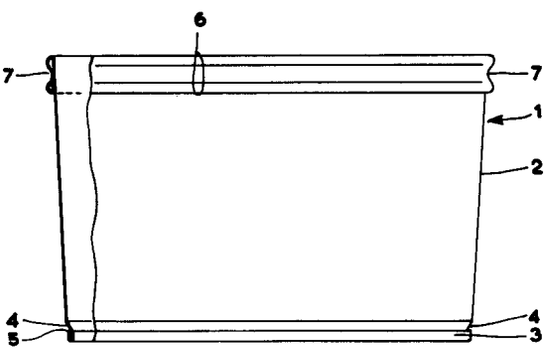

fig. 1

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Background to the Invention

The invention consists of a '3-piece' truncated cone shaped container which is made of welded sheet metal and has absolutely smooth internal surface, so that the container can be easily cleaned and its contents completely removed.

The container is easy to stack, and has ring shaped upper lip that is concave in the centre.

A method for manufacturing the above container is also described.

Previous Methods

Metal containers, with lids, are often used to contain, pack, and transport a large number of very different products in a wide range of technical fields. Purely as an example, we mention here food products (ice-cream, confectionary, dressings, and sauces, etc.), agricultural products and their derivates (fruit, vegetables, juices, sauces, and concentrates, etc.), chemical products (all types of ink, putty, paints, dyes, and solvents, etc.), and so forth.

Cylindrical or truncated cone shaped containers stiffened by grooves or reinforcing ribs on their side walls are both well known and widely used, however the reinforcing ribs can create serious problems both from an economic and ecological point of view. If containers can be completely cleaned, the product, often expensive, packed in them can be completely consumed, thus making the containers themselves easier to recover and recycle, and avoiding (or at least helping to avoid) containers with not inconsiderable quantities of the products packed in them (often hazardous and polluting) being dumped in the environment.

In order to meet the aforementioned requirements, it would be advantageous to use, at least for more expensive and/or potentially polluting products, containers with totally smooth interiors, in other words without any grooves or ribbing in which hard to remove deposits of the material packed in them can form. The interior of completely smooth containers is easier to clean with brushes and/or jets of water or solvent, for example.

The smooth containers (preferably truncated cone shaped ones) available on the market are made by drawing a normally pre-painted and/or pre-printed metal sheet and folding the edge into a lip in one or more rolling stages. The truncated cone shape makes the sheet metal drawing process easier and makes it possible to stack the containers, thus saving space; the external lip allows, amongst other things, to handle the containers easily, to attach the lid well, and to easily separate two containers that have been stacked one inside the other.

There are however numerous disadvantages to these drawn containers (known as '2-piece' containers as they consist of a drawn body and of a lid), including the fact that:

- The thickness of the sides is not uniform, they are thickest at the base and progressively thinner towards the upper lip;
- The drawing process is slow and expensive, and requires several stages of stamping before the desired depth is gradually reached.

Each of these stages requires the use of a machine, often very bulky, that is capable of developing the considerable power necessary for drawing, and the molds (mold and counter-mold) are costly because they must be made of special materials and are subject to considerable and rapid wear;

- It is difficult to print lettering and artwork on the side wall. It is in fact extremely difficult to lithograph the truncated cone shaped side wall of the finished product and achieve a satisfactory result. As an alternative, it is perfectly possible to lithograph onto the sheet metal whilst it is still flat, but lettering and artwork are inevitably distorted (often of unacceptable amount) when the container is drawn;
- Containers are often required that have a special internal protective coating, which is difficult to apply to a truncated cone shaped finished product, and if the coating is applied to the flat sheet, it is inevitably damaged when the sheet is drawn, as cracks form, the coating is lifted from the support, etc.

As an alternative to '2-piece' truncated cone shaped containers, '3-piece' (lid, side wall, and base) truncated cone shaped containers are also well known and widely available on the market, and do not suffer from the above mentioned disadvantages, as:

- The side wall is obtained by forming (in an 'coning' machine, well known to one skilled in the art) a cylindrical body obtained from a flat sheet by cutting, rolling, and welding. This production process is much faster and cheaper than drawing, and does not require the use of expensive and bulky special machinery and molds;
- The sheet metal used is far less thick than that required to produce a drawn container of the same size;
- Wall thicknesses are uniform over the entire side wall, and can be the same thickness as the base and lid, which are manufactured separately;
- The flat metal sheet can easily be lithographed and/or coated with a protective coat-

ing. The process by which the side wall is formed does not damage coatings or distort lithographed artwork.

All truncated cone shaped '3-piece' welded sheet metal containers available on the market do, however, have internal reinforcing ridges, and smooth truncated cone shaped '3-piece' welded sheet metal containers are not available on the market. The present invention remedies this deficiency and combines the advantages of '2-piece' containers and '3-piece' containers of the known type.

We wish to specifically draw attention to the fact that in the present description, the term 'metal sheet' is used to signify any type of tinned or chromed strip, or even more generally, any type of thin metal sheet that is protected and is suitable for manufacturing the above described containers.

Summary of the Invention

The object of the present invention is a '3-piece' container made of welded sheet metal and including a truncated cone shaped side wall, lid, and base fixed to the side wall by a folded seam, this container being characterized in that the internal surface of the side wall is smooth, in that the upper edge of the side wall has a ring shaped lip that is concave in the centre, and in that the folded seam attaching the base to the side wall is inside the truncated cone shape of the side wall.

A particularly advantageous method for manufacturing the above mentioned container is a further object of the present invention.

List of Figures

The invention is described with reference to a non-limiting embodiment, that is shown in the attached figures, wherein:

- Figure 1 shows a container according to the invention, without its cover and partly cross-sectioned;
- Figure 2 schematically shows the main steps of the method for producing a container according to the invention;
- Figure 3 shows a sequence of some steps of the working of the side wall according to the invention;
- Figure 4 shows an enlarged detail of the upper edge of the side wall;
- Figure 5 schematically shows the exterior side of a 'coning' machine modified according to the invention and with a narrowed area.

Detailed Description

Figure 1 is a partly cross-sectioned view of a container (1) according to the invention - in the attached figures, the lid is always omitted in order to make the drawings easier to understand.

The truncated cone shaped smooth side wall (2) is visible in figure 1, to which the base (3) is attached by a folded seam. As can be seen, the lower part of the side wall (2) has a narrower area (4) deep enough for the folded seam area (5) attaching the base (3) to the side wall (2) to be within the truncated cone shape of the side wall (2).

The upper edge of the side wall (2) is folded over, preferably by pressure-forming, to form a ring shaped lip (6) with a central concave area (7), as can be seen clearly from the cross-section on the left of figure 1 and the cross-section shown in figure 4. A simple and efficient method of producing a container according to the invention, including the ring-shaped lip (6) with the particular cross-section shown in figures 1 and 4, is described with reference to the other figures.

The ring shaped edge (6) enables the lid to be attached and removed from the container more easily, and to separate two containers that have been stacked one inside the other to reduce storage space. In a preferred embodiment of the invention, the dimensions of the ring shaped lip (6) are such that the lower part of the ring shaped lip (6) of a container (1) makes contact with the upper part of the ring shaped lip (6) of a second container (1) that has been stacked inside the first.

Figure 2 schematically shows the main steps of the production process that is an object of the present invention.

The two edges of the side wall (2), obtained (step A) by rolling and then welding a piece of sheet metal, are worked, as will be fully described with reference to figure 3, to produce the fold area (10) and edge (13) (step B). The side wall is then formed using a machine known to one skilled in the art as a 'coning' machine so that it becomes truncated cone shaped (step C), and the container is then completed by folding the seam that attaches the base (3) to the side wall (2) (step D).

Figure 3 shows a sequence of four steps of the process used to pass from step A to step B of figure 2.

The folded seam area (10) of the lower edge (11) of the side wall (2) is shaped by a first die (16) and prepared for being attached to the base (3) by a folded seam, and the upper edge (12) of the side wall (2) is shaped by a second die (17) to form a lip (13) consisting of a closed circular shaped loop (14).

In known production processes, this circular shaped looped lip is formed at the end of the production process and, in any case, once the container has assumed its final truncated cone

shape: this enables the dimensions of the lip to be controlled with sufficient accuracy to ensure that the lid seals hermetically.

A characterizing feature of the production process according to the invention is the fact that the circular shaped closed loop lip (14) is produced whilst the side wall (2) is still cylindrical in shape, and is then further shaped by pressure exerted by the second die (17) until it forms an elongated shaped closed loop lip (15).

In a preferred embodiment of the invention, the two dies (16 and 17) consist of two suitably grooved discs that act simultaneoulsly at both edges (11 and 12) of the side wall (2) along the entire circumference of the side wall. Once the circular shaped loop (14) has been produced, the second die (17) effects a second stroke of a length comparable with the larger axis of the elongated shaped loop (15).

A further characterizing feature of the production process according to the invention is the fact that the tensions that are created in the lip (13) when it is subjected to stretching during the 'coning' step, cause the permanent deforming of the central area of the lip (13) (which is less rigid than the external folded areas of the lip), and the concave area (7) is thus spontaneaously formed and does not require the use of molds, tools, or further production steps.

Figure 5 is a cross-section of a detail of a 'coning' machine (18) modified according to the invention. The part of the 'coning machine' (18) with the narrowest diameter has a narrowed section (19) that is used during the 'coning' steps to create a narrower part (4) of the side wall (2) deep enough that once the seam folding stage following the 'coning' step has been completed, the folded seam (5) attaching the base (3) to the side wall (2) is within the truncated cone shape of the side wall (2).

Within the scope of the invention, a skilled man may make any number of improvements or modifications to the above described container and to its production method that arise through normal experience and the natural evolution of the relevant art.

Claims

1. '3-piece' container made of welded sheet metal and including a truncated cone shaped side wall, a lid, and a base attached to the side wall by a folded seam, the container being characterized in fact that the internal surface of the side wall (2) is smooth, in that the upper edge (12) of the aforementioned side wall (2) is folded to produce a ring shaped lip (6) with a concave central area (7), and in that the folded seam area (5) attaching the base (3) to the side wall (2) is within the truncated cone shape of the side wall (2).

2. Container as in Claim 1 apt to be stored by stacking lidless containers one inside the other, characterized in that the lower part of the ring shaped lip (6) of a container (1) makes contact with the upper part of the ring shaped lip (6) of a second container (1) that has been stacked inside the first container.

3. Method for the production of a '3-piece' container made of welded sheet metal and including a truncated cone shaped side wall with a smooth interior, a lid, and a base attached to the side wall by a folded seam, this method including the following steps:
   - Forming the aforementioned side wall (2) by cutting a section of metal sheet, rolling this section of metal sheet, and then welding its ends together;
   - Forming the first edge (11) of the aforementioned side wall (2) so as to be apt to be attached to the aforementioned base (3) by a folded seam;
   - Forming the aforementioned side wall (2) by a 'coning' machine;
   - Forming the second edge (12) of the aforementioned side wall (2) to obtain a lip (13) with a circular closed loop (14) cross-section;
   - Folding the seam that attaches the aforementioned base (3) to the aforementioned formed part (10) of the first edge (11) of the aforementioned side wall (2);

   and characterized in that:
   - the second edge (12) of the aforementioned side wall (2) is further pressure formed to obtain an elongated closed loop shaped lip (15);
   - the aforementioned elongated closed loop shaped lip (15) is produced before forming the aforementioned side wall (2) in the aforementioned 'coning' machine (18);
   - Forming the aforementioned side wall (2) in the 'coning' machine (18) causes the central area of the aforementioned elongated closed loop shaped lip (15) to bend inwards forming the aforementioned concave area (7).

4. Method as in Claim 3, characterized in that the aforementioned first and second edges (11 and 12) of the aforementioned side wall (2) are simultaneously formed by pressing dies, and in that the aforementioned circular closed loop

shaped lip (13) obtained by die pressure on the second edge (12) of the aforementioned side wall (2) becomes elongated in shape because of a further pressure of the corresponding die (17).

5. Method as in Claim 4, characterized in that once the circular closed loop shaped lip (14) has been formed on the aforementioned second edge (12) of the aforementioned side wall (2), the aforementioned die (17) makes a further stroke whose length is equal to the length of the larger axis of the aforementioned elongated shaped loop (15).

6. Method as in Claim 3, characterized in that the narrow part of the aforementioned 'coning' machine (18) has a narrower section (19) designed to create, during the 'coning' process, a narrower section (4) in the lower part of the aforementioned side wall (2) of a depth such that the aforementioned folded seam (5) attaching the aforementioned base (3) to the side wall (2) is within the truncated cone shape of the aforementioned side wall (2).

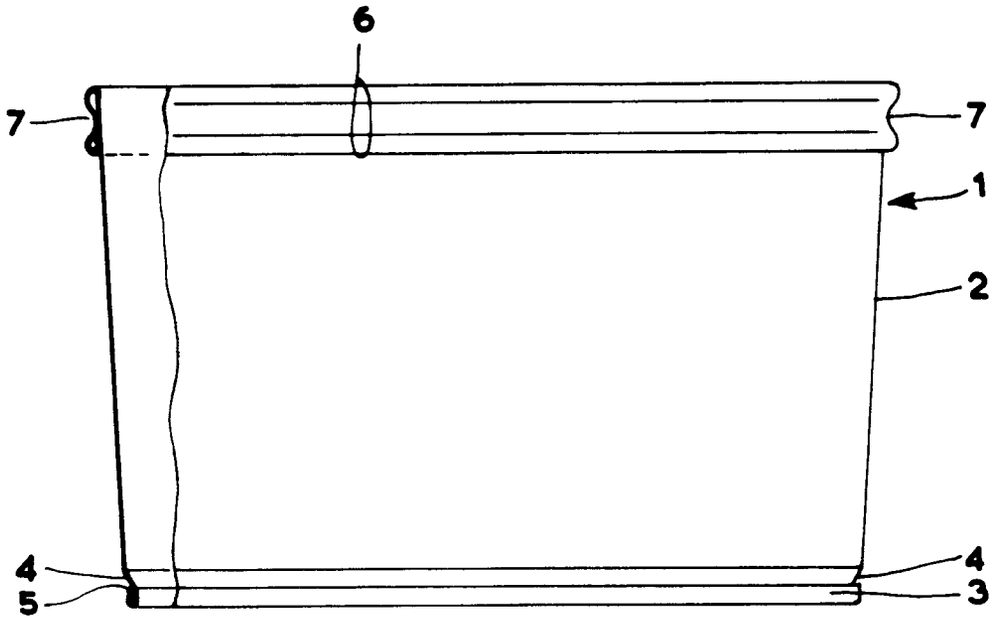

fig. 1

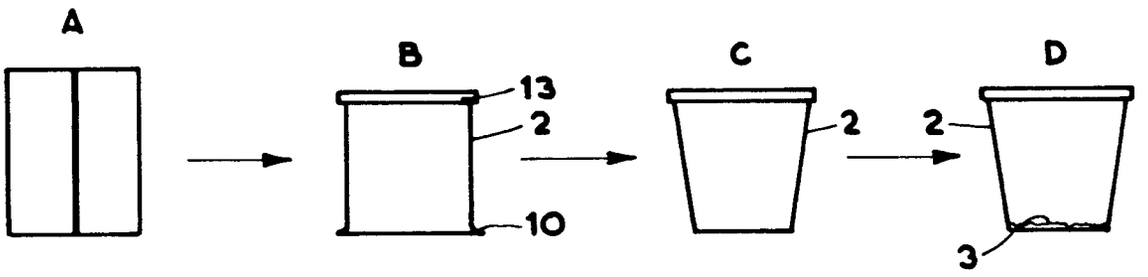

fig. 2

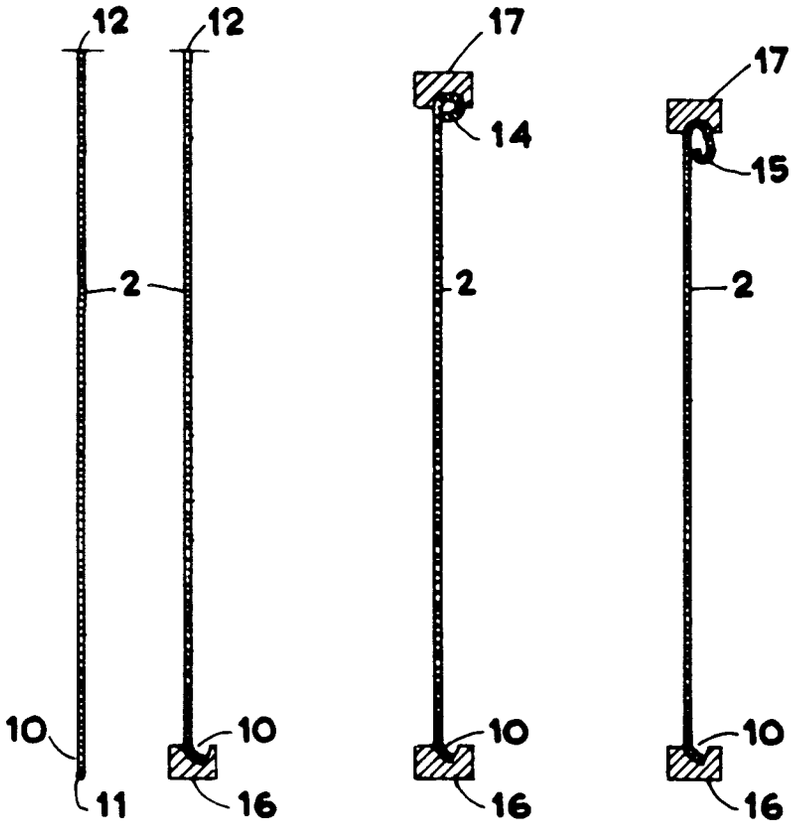

fig. 3

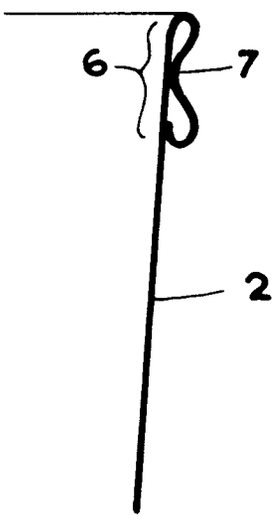

fig. 4

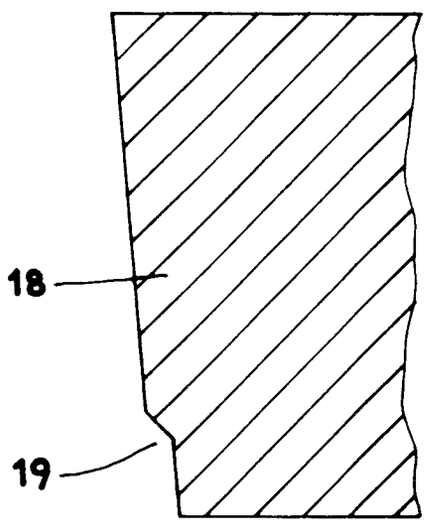

fig. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 11 1868

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	DE-A-3 041 001 (W. BENDER) * page 10, line 6 - page 11, line 3; figures *	1-3	B65D6/02 B21D51/26
A	DE-B-2 819 490 (K.HUBER VERPACKUNGWERKE) * column 2, line 32 - line 68; figures *	1-3	
A	DE-A-3 422 040 (E.HENZ-ECKHARD) * abstract; figures *	1,3-5	
A	US-A-2 214 422 (A.L.KRONQUEST) * figures *	1	
A	FR-A-2 343 655 (BMW-VOGEL AG.) * figure 1 *	1,2,3,6	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B65D
B21D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	06 NOVEMBER 1992	AMEDEO ZANGHI'

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