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(54) **Method for manufacturing a metal container**

(57) The invention relates to a method for manufacturing a metal container (1), the metal container (1) comprising a metal body part (2), a metal bottom part (3) and optionally a top part, wherein the method comprises the steps of

- providing a metal body part (2) with a closed circumferential wall (6),
- providing a metal bottom part (3) with a flanged edge (5), the outside of the flanged edge (5) corresponding to the inner side of the body part (2) at the location where the bottom part (3) is to be connected to the body part (2),
- placing the bottom part (3) within the body part (2) at

said location, and

- folding the outer end (7) of the body part (2) that extends beyond the flanged edge (5) of the bottom part (3) inward against the inside of the flanged edge (5) of the bottom part (3).

Furthermore, sealing means are provided to ensure a liquid- and airtight seal between body part and bottom part, which sealing means are comprised in a coating applied on the bottom part and which are activated by means of a heating treatment.

A metal container (1) manufactured by the method of the invention is also disclosed.

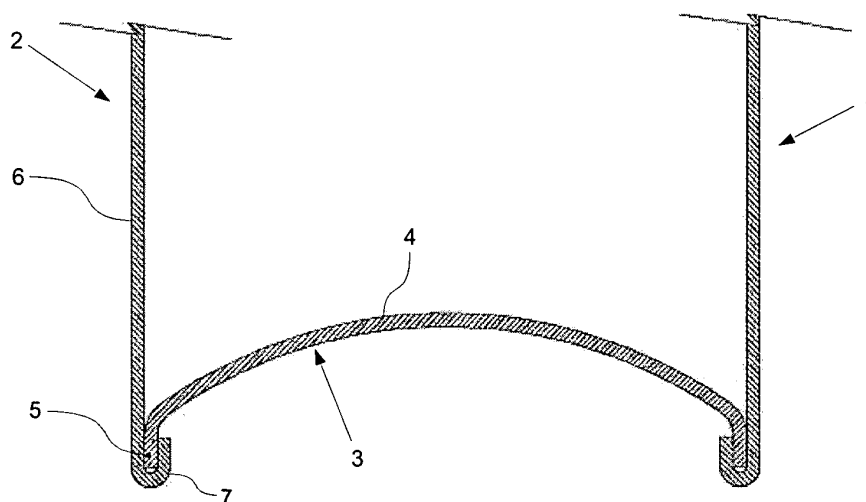


Fig. 1

Description

[0001] The invention relates to a method for manufacturing a metal container, the metal container comprising a metal body part with a closed circumferential wall, a metal bottom part and optionally a top part.

[0002] Such metal containers are known in different embodiments, that is with an open top, with a closed bottom and top, such as for example cans for the food industry, or closed at both ends with the top part provided with or consisting of a valve cap, such as a container for a pressurized medium, an aerosol.

[0003] The usual method to connect a separate bottom part or top part to a body part is by forming the edges of bottom part and body part or top part and body part into a double seam. The double seam method sets a number of demands to the properties, such as thickness and hardness, of the metal to be used with this method. For instance, seaming with one or both of the container parts being made out of very thin sheet metal of considerable hardness will be difficult or even impossible. Therefore, the material used for the double seam method will in most cases be a standard tin or chromium plated steel with properties which are most favourable for the method. These sheets may further be provided with a coating that serves as a barrier between the container and the content of the container and if also applied on the outside between the container and the environment.

[0004] Furthermore, prior to the seaming operation a sealing compound is applied to the bottom part and top part, if present, to ensure that the double seam will form a good closure of the container. The use of such a sealing compound brings extra costs, not only for the sealing compound itself, which are relatively costly, but also for the application thereof on the bottom part and top part, if present, which asks for an extra handling step.

[0005] It is an object of the invention to provide a method to manufacture a metal container in which in a simple and economic manner a bottom part and a top part, if present, are connected to a body part of a metal container.

[0006] It is another object of the invention to provide a method to manufacture a metal container which enables the use of different sheet metals for the bottom part and/or top part than the sheet metal used for the body part.

[0007] It is another object of the invention to provide a method to manufacture a metal container wherein a coating on bottom part or top part is used as sealing means.

[0008] It is still another object of the invention to provide a metal container manufactured according to the method and capable of holding a pressurized medium.

[0009] According to a first aspect of the invention one or more of the objects are achieved by means of a method comprising at least the following steps:

- providing a metal body part with a closed circumferential wall,
- providing a metal bottom part with a flanged edge,

the outside of the flanged edge corresponding to the inner side of the body part at the location where the bottom part is to be connected to the body part,

- placing the bottom part within the body part at said location, and
- folding the outer end of the body part that extends beyond the flanged edge of the bottom part inward against the inside of the flanged edge of the bottom part.

[0010] With this method the bottom part is bent to a final shape with a flanged edge in only one step, which is done prior to inserting the bottom part into the body part at the final position. Thereafter, the body part is folded in a simple operation without having to bend the bottom part at the same time as is done in the double seam method. With these simple bending and folding operations it is possible to use other sheet metals than is necessary with the double seam method, without the risk of flange cracks. Furthermore, it is possible to use different sheet metals for body and bottom and/or top part. For instance, a thinner sheet metal of greater hardness may be used for the bottom part.

[0011] By folding the outer end of the body part against the inside of the flanged edge the bottom part is clamped securely against the body part. However, in order to also have a liquid and air tight connection between bottom part and body part it is further provided that at least the outer side of the flanged edge of the bottom part is provided with sealing means. According to the invention the bottom part is made out of a sheet metal provided at least at one side with a coating, the coating consisting of or comprising sealing means or provided with a coating that is suitable to be used as sealing means. Very good experimental results have been achieved by using a steel sheet that is commercially available from CORUS under the trademark "Protact". This steel sheet is provided at one or at both sides with a single or multi-layered polymer coating preferably comprising polyethylene terephthalate, polypropylene or a mixture of polypropylene and nylon. A coating from other material than that of said polymer coatings can also be used, such as for instance a lacquer, however, such coatings do not have the advantages of thickness and flexibility of said polymer coatings.

[0012] In order to form a liquid and air tight connection a heating treatment is required to have the coating act as a sealing means. There are a number of possibilities to perform such a heating treatment, but preferably this is done by induction heating because this is an easy and fast manner to do so.

[0013] By using such a sheet metal with a coating suitable to be used as a sealing means, it is no longer necessary to use said special sealing compound. This not only means saving out the costs for such a relatively expensive compound but also the steps of applying the sealing compound and the following curing of the compound before the bottom part can be applied to the body part.

[0014] With the method according to the invention the outer end of the body part that extends beyond the flanged edge of the bottom part may be folded such that the largest part of the inner side of said outer end of the body part butts against the inner surface of the flanged edge of the bottom part. With a bottom part that is provided at only the side that is facing the inside of the container and the inside wall of the body part a very good seal can be formed by induction heating as described. By providing a coating at both sides the seal is further improved, but this is not really necessary, if the length of the flanged edge of the bottom part is long enough.

[0015] However, a bottom part provided on both sides with a coating suitable to be used as sealing means gives the possibility for another advantageous way to fold the outer end of the body part. Accordingly, the outer end of the body part that extends beyond the flanged edge of the bottom part is curled inward such that the edge between outer and inner side of said outer end of the body part butt against the inner side of the flanged edge of the bottom part. Herewith, the edge of the body part, along which the sheet is cut and for that reason is not provided with a protective layer of for instance tin, chromium and/or organic coating, butts against the coating of the bottom part. With the heating treatment to form a seal between the bottom part and body part, also a seal between the inside of the flanged edge of the bottom plate and said edge of the body part is formed, protecting the edge and therewith preventing it from corrosion.

[0016] The method according to the invention can be applied to manufacture a container that is open at the top and in principle also to manufacture a container closed at both sides with the same bottom and top part, although the last embodiment will be a bit more complicated to manufacture. However, the method seems best to be used to manufacture a container with different bottom and top parts, such as for example a container with a bottom part as described and a top part consisting of a top part provided with a valve cap or only a valve cap, as used for aerosols.

[0017] If the method is used to manufacture aerosols, the bottom part is preferably formed into a dome shape, the dome pointing in a direction opposite to the direction in which the flanged edge of the bottom part points. With such a shape the transition from dome into the flanged edge can also be formed more easily than from a for instance flat bottom.

[0018] Furthermore, if the container is manufactured to be used as an aerosol the method provides in either a top part with a valve cap or that the body part of the container is provided with a top opening suitable to directly receive a valve cap. The latter will mean in most cases that the top opening has to be made smaller than the bottom opening.

[0019] The invention will be further described on hand of the examples given in the drawing, wherein:

Fig. 1 shows schematically part of a cross-section of

an embodiment of a container with the outer end of the body part folded flat against the flanged edge of the bottom part,

Fig.2 shows schematically part of a cross-section of an embodiment with the outer end of the body part curled against the inner side of the flanged edge of the bottom part, and

Fig.3 shows in cross-section as well as in perspective a part of an embodiment of a container with the outer end of the body part folded flat against the flanged edge of the bottom part.

[0020] The embodiment of the container 1 as shown in Fig. 1 and also in Fig. 3 comprises a body part 2 and a bottom part 3. The body part 2 has a closed circumferential wall 6. In the most simple shape such a wall 6 is of circular cross-section and with a constant diameter along the length of the body. However, other shapes, such as tapered shapes and/or shapes of non-circular cross-section are also possible. The bottom part 3 is formed with a dome shape 4 pointing in upward direction and is further provided with a flanged edge 5. The outer size and shape of flanged edge 5 of bottom part 3 corresponds to the size and shape of body part 2 at the inside at the location where the bottom part 3 is to be connected to the body part 2.

[0021] After placing the bottom part 3 at the right location in the body part 2, that is at a certain distance above the lower edge of body part 2, the outer end 7 of body part 2 that extends below the flanged edge 5 of bottom part 3 is folded such that the largest part of the inner side of said outer end 7 of body part 2 butts against the inner side of the flanged edge 5 of bottom part 3. By folding the outer end 7 in this way bottom part 3 is clamped securely against body part 2.

[0022] The bottom part 3 is provided at one or both sides with a coating that comprises a sealing means or that may be used as a sealing means. The bottom part that was experimented with is made from a steel sheet commercially available under the trade name "Protact", which is provided at one or both sides with a coating of polyethylene terephthalate, polypropylene or a mixture of polypropylene and nylon. To activate the sealing means a heating treatment is necessary, which heating treatment is preferably an induction heating treatment. After this heating treatment the sealing means not only provide a liquid tight and air tight seal but it also improves the mechanical connection between the bottom and body parts 2, 3.

[0023] In the embodiment shown in Fig.2 the outer end of the body part 2 is curled inward in such a way that the edge 8 of body part 2 butts against the inner side of the flanged edge 5 of bottom part 3 and therewith against the coating comprising a sealing means. After induction heating the edge 8 will be securely embedded in the sealing means therewith preventing any corrosion of edge 8 of body part 2.

[0024] With this embodiment sealing of the container

1 is mainly achieved by the sealing means acting on the outer side of the flanged edge 5 of bottom part 3 and the inner side of the circumferential wall 6 of body part 2, which however is sufficient. For this embodiment it is essential that bottom part 3 is provided on both sides with the coating containing sealing means.

Claims

1. Method for manufacturing a metal container, the metal container comprising a metal body part with a closed circumferential wall, a metal bottom part and optionally a top part, wherein the method at least comprises the following steps:

- providing a metal body part with a closed circumferential wall,
- providing a metal bottom part with a flanged edge, the outside of the flanged edge corresponding to the inner side of the body part at the location where the bottom part is to be connected to the body part,
- placing the bottom part within the body part at said location, and
- folding the outer end of the body part that extends beyond the flanged edge of the bottom part inward against the inside of the flanged edge of the bottom part.

2. Method according to claim 1, wherein the outer end of the body part that extends beyond the flanged edge of the bottom part is folded such that the largest part of the inner side of said outer end of the body part butts against the inner surface of the flanged edge of the bottom part.

3. Method according to claim 1, wherein the outer end of the body part that extends beyond the flanged edge of the bottom part is folded inward such that the edge between outer and inner side of said outer end of the body part butts against the inner side of the flanged edge of the bottom part.

4. Method according to any one of claims 1-3, wherein at least the outer side of the flanged edge of the bottom part is provided with sealing means.

5. Method according to any one of claims 1-4, wherein the bottom part is made out of a sheet provided at least at one side with a coating, the coating consisting of or comprising sealing means or provided with a coating that is suitable to be used as sealing means.

6. Method according to claim 5, wherein the bottom part is made out of a steel sheet with at least at one side a coating comprising polyethylene terephthalate,

polypropylene or a mixture of polypropylene and nylon.

7. Method according to any one of claims 4-6, wherein the sealing means are activated by means of a heating treatment.

8. Method according to claim 7, wherein the heating treatment consist of induction heating.

9. Method according to any one of claims 1-8, wherein the bottom part is formed into a dome shape, the dome pointing in a direction opposite to the direction in which the flanged edge of the bottom part points.

10. Method according to any one of claims 1-9, wherein the container is provided with a top part such as a top part provided with a valve as used for aerosols.

11. Method according to any one of claims 1-10, wherein the body part of the container is provided with a top opening suitable to receive a valve cap.

12. Metal container manufactured according to any one of claims 1-11 and provided with a top part, wherein the container is manufactured to hold a pressurized medium.

13. Metal container according to claim 12, wherein the top part consists of a valve cap.

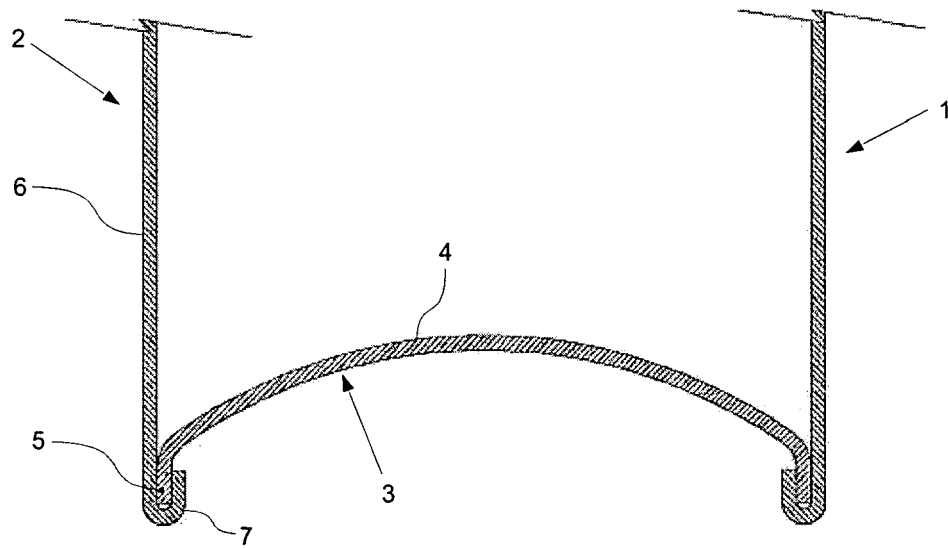


Fig. 1

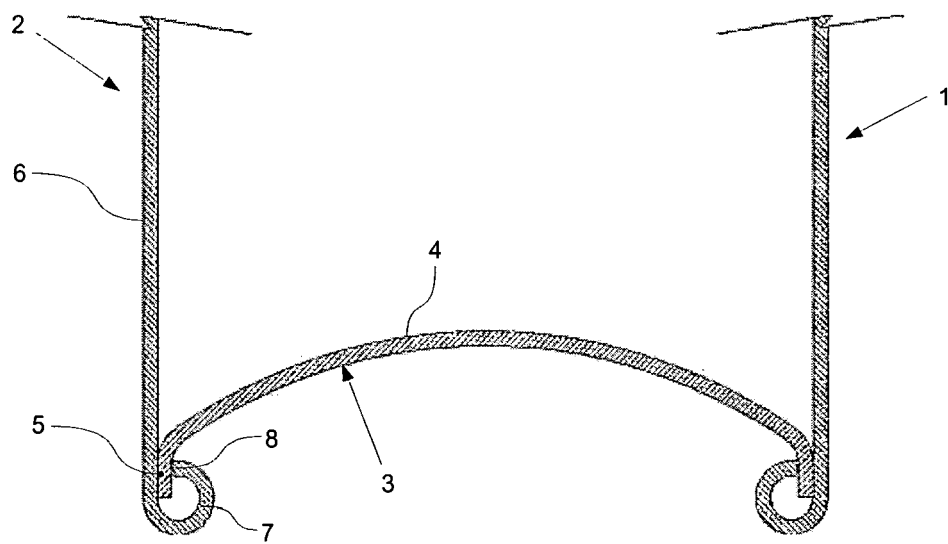


Fig. 2

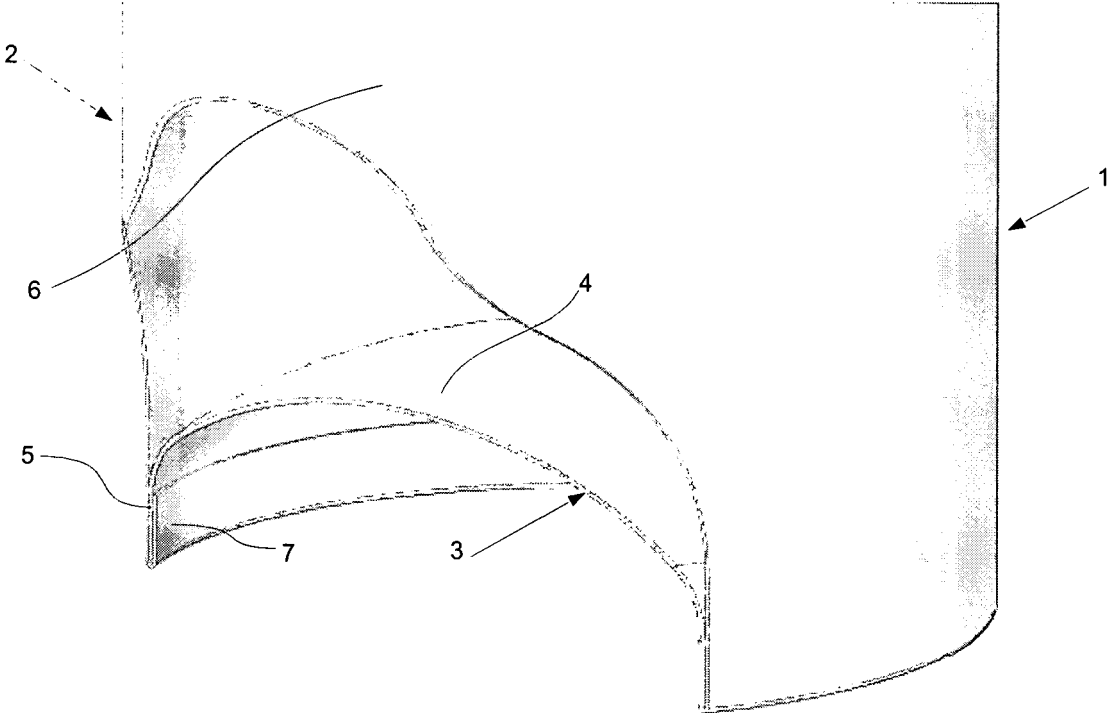


Fig. 3



European Patent
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EUROPEAN SEARCH REPORT

Application Number
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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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