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(54) Bowl with flexible bottom

(57) Sheet metal container (1) comprising a bottom (2) and an upstanding peripheral wall (3),

wherein the bottom comprises a convex, outside directed flexible part (6), which is flexible between the convex rest position and a concave position.

The flexible bottom part can compensate for expansion of the air inside the container due to for example heating by returning to its convex rest position.

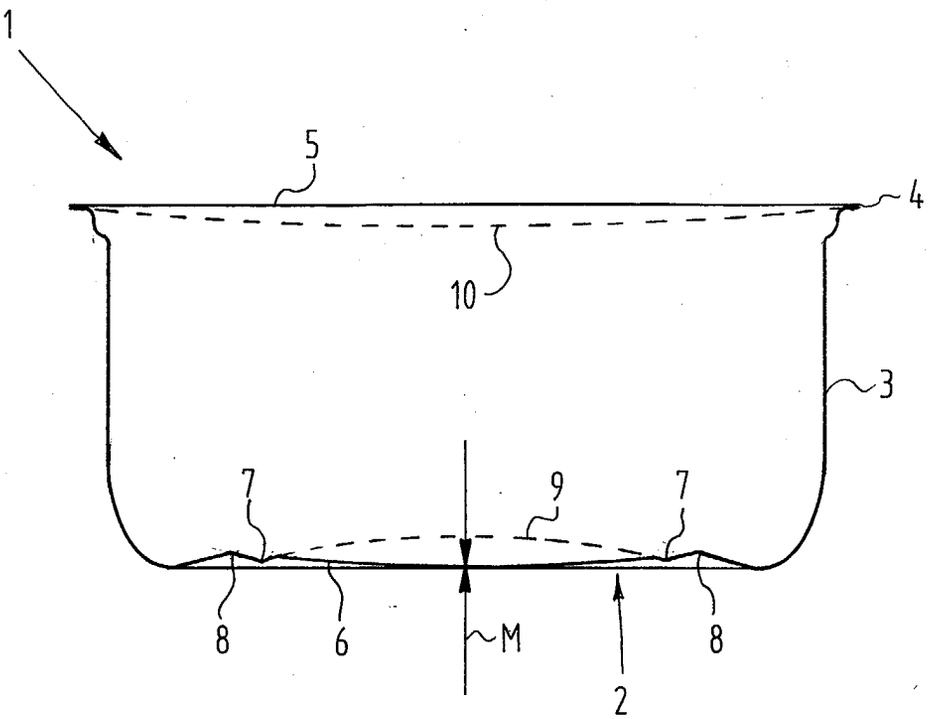

FIG. 1

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Description

[0001] The invention relates to a sheet metal container comprising a bottom and an upstanding peripheral wall. Such containers are known in all kinds of sorts and are used for a number of applications. Especially with such containers for use in storing food stuff, the container has to fulfil a number of requirements.

[0002] When such sheet metal containers are used for storing food stuff it is common to close the mouth opening defined by the peripheral wall with a foil seal. It is however possible to close such sheet metal containers in a different way. However, especially with foil seals a number of difficulties can arise. First of all, out of an esthetic aspect it is desired that the foil seal is at any time tight and shows a flat surface without wrinkles. However food stuff is generally put into the container at temperatures below ambient temperature. After arranging the foil seal onto the container, the container will warm up to ambient temperature. This increase in temperature could result in expansion of the food stuff and air in the container, such that the foil seal becomes wrinkled.

[0003] Another requirement of an above-mentioned container with a foil seal is that the foil seal is arranged airtight onto the mouth opening, defined by the peripheral wall. If the foil seal is not airtight the container has to be rejected as waste. It is however difficult to measure this especially as sheet metal containers are relatively rigid and it is difficult to reliably detect whether the foil seal is airtight or not.

[0004] It is therefore an object of the invention to provide a sheet metal container according to the preamble which resolves the above-mentioned disadvantages.

[0005] This object is achieved by a sheet metal container which is characterized in that the bottom comprises a convex, outside directed flexible part, which is flexible between the convex rest position and a concave position. A sheet metal container is provided with the foil lid, is filled and sealed such a way that the final internal pressure is lower than the ambient pressure. So after the foil seal is arranged the ambient pressure will press the foil seal inwards providing a seal with a flat unwrinkled surface. Also due to the pressure difference between the outside and the inside of the container the flexible bottom part will be urged to the concave position. When the temperature of the food stuff inside the container is raised and food stuff expands, the flexible bottom part will compensate for this expansion by returning to its convex rest position. This will keep the foil lid straight and unwrinkled.

[0006] The flexible bottom part also provides for a way to detect whether the foil seal is airtight or not and/or loss of vacuum. When the foil seal is not airtight, the flexible bottom part will try to compensate for the lack of pressure difference between the inside and the outside container and will move towards the convex rest position. When the foil seal is leaking, the flexible bottom part will get to its rest position. Now by measuring the relative position of the flexible bottom part it is possible to detect whether the foil seal is airtight or not. A third possible advantage of the sheet metal container according to the invention is that when opening the foil seal, the flexible bottom part will suddenly move back to its convex rest position providing an audible sound, which is an indication to the user of the container that the contents of the container is still fresh.

[0007] In an embodiment of the sheet metal container according to the invention, the flexible part is flexible around a center line. This enhances the popping sound when opening the foil seal or other closure of the sheet metal container.

[0008] In a preferred embodiment of the invention the container comprises a first groove enclosing the flexible part. This groove provides for extra flexibility of the flexible part resulting in an increased deflection of the bottom part which improves detection of the relative position of the flexible bottom part.

[0009] Preferably the first groove is directed inwardly (towards the interior of the container), as this provides the best flexibility, especially when the first groove is bordering the flexible part.

[0010] In yet another preferred embodiment the sheet metal container according to the invention comprises a second groove enclosing the first groove and directed opposite of the first groove. This further improves the flexibility of the flexible part.

[0011] In an embodiment of the invention the bottom is circular. With a circular bottom the tension in the flexible bottom part is distributed evenly providing for a more linear displacement and better detectability of the position of the bottom part.

[0012] In yet another embodiment of the invention the upstanding wall defines a mouth opening, which mouth opening is sealed by a foil lid. Preferably the inside pressure is decreased, such that the flexible bottom flexes towards the concave position.

[0013] These and other advantages and features of the invention will be elucidated in conjunction with the accompanying drawings.

Figure 1 shows a cross sectional view of a first embodiment of a sheet metal container according to the invention.

Figure 2 shows a cross sectional view of a second embodiment of a sheet metal container according to the invention.

[0014] Figure 1 shows a cross sectional view of a sheet metal container 1 according to the invention. This sheet metal container 1 has a bottom 2 and a peripheral wall 3 extending upwardly.

[0015] The upper edge 4 of the peripheral wall 3 defines a mouth opening for the sheet metal container 1. On the edge 4 a foil lid 5 is sealed.

[0016] The bottom 2 comprises a flexible bottom part

6, which is bordered by an inward directed first groove 7 and a outward directed groove 8. The flexible bottom part 6 is convex.

[0017] Food stuff is introduced into the container 1 at a pressure lower than the ambient or atmospheric pressure. Under these conditions the foil lid 5 is sealed onto the edge 4. When the container 1 is then brought into the ambient pressure the flexible bottom part will flex inwardly to a concave position, which is designated by 9. The foil lid 5 will also become a bit concave and is designated by 10.

[0018] Now when the contents of the container 1 warms up and expands the flexible bottom part 6 will, due to the elastic properties of the metal of the container 1 flex back towards the position as designated by 6. This will keep the pressure inside the container 1 lower than the ambient pressure, such that the foil lid 5 will remain without wrinkles.

[0019] Figure 2 shows a second embodiment 15 of a container according to the invention. This container 15 has a bottom 16 and a peripheral wall 17 with an edge 18. A foil lid 19 is arranged onto the edge 18. The bottom 16 has a flexible bottom part 20, which is bordered by an annular portion 21. This annular portion is bordered by an inwards directed groove 22 and an outward directed groove 23. When the pressure inside the container 15 is below ambient pressure, the flexible bottom part will flex to its concave position designated with 24 and the foil lid will bent inwards to the position 25 as shown in figure 2.

[0020] After a container 1, 15 according to figures 1 respectively figures 2 is filled with a substance and sealed by the foil lid 5, 19 it is possible to detect whether the container is airtight or not. By measuring at the position M the distance of the flexible part 6, 20 in relation to the bottom 2, 16 of the container it is possible to detect whether there is a pressure lower than the ambient pressure inside the container or not. When the flexible bottom part is at the position designated by 9 respective 24, it is clear that the container 1, 15 is airtight. However, if the bottom part is at the position shown as 6, 20 there is apparently a leak and the container can be rejected.

[0021] It is noted that in the alternative the container according to the invention is provided with a closure with easy open end.

Claims

1. Sheet metal container comprising a bottom and an upstanding peripheral wall,
   characterized in that
   the bottom comprises a convex, outside directed flexible part, which is flexible between the convex rest position and a concave position.

2. Sheet metal container according to claim 1, wherein the flexible part is flexible around a center line.

3. Sheet metal container according to claim 1 or 2, comprising a first groove enclosing the flexible part.

4. Sheet metal container according to claim 3, wherein the first groove is directed inwards.

5. Sheet metal container according to claim 3 or 4, wherein the first groove is bordering the flexible part.

6. Sheet metal container according to one of the claims 3 - 5, comprising a second groove enclosing the first groove and directed opposite of the first groove.

7. Sheet metal container according to any of the preceding claims, wherein the bottom is circular.

8. Sheet metal container according to any of the preceding claims, wherein the upstanding wall defines a mouth opening, wherein the mouth opening is sealed by a foil lid.

9. Sheet metal container according to claim 8, wherein the inside pressure is decreased, such that the flexible bottom flexes towards the concave position.

10. Sheet metal container according to any claims 1-9, provided with a closure with easy open end.

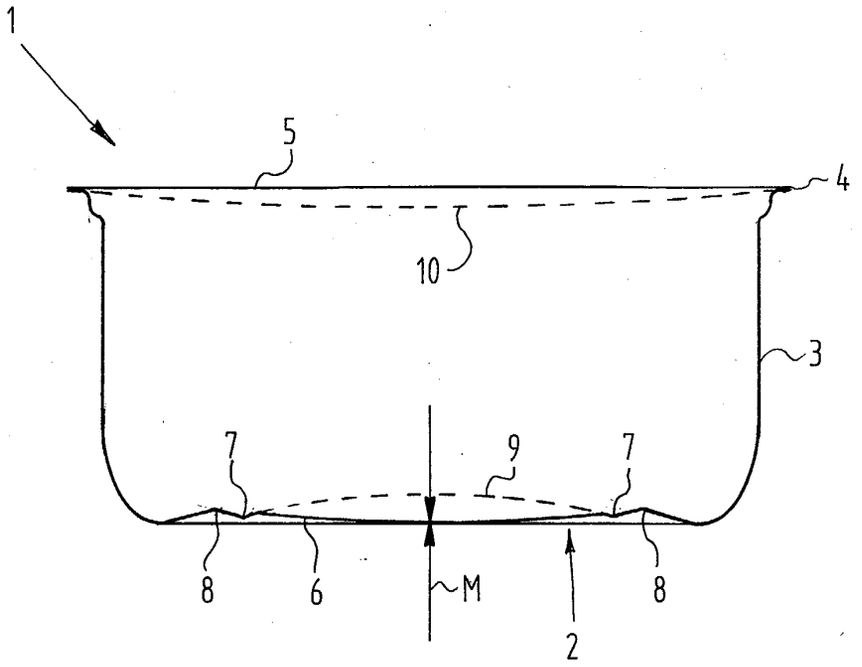

FIG. 1

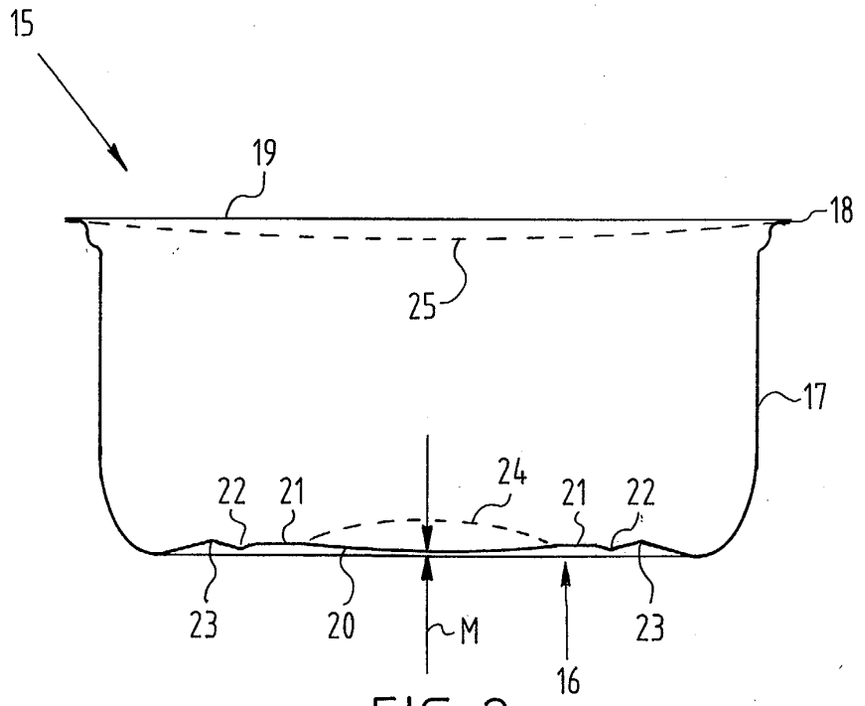

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	10 May 2004	Reichhardt, O

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