

[54] METAL CONTAINER WITH ROLLED RIM
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[51] Int. Cl. B21d 41/04
[58] Field of Search 113/120 R, 120 H, 120 AA;
72/348; 220/74

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Primary Examiner—Richard J. Herbst

[57] **ABSTRACT**

This invention relates to the production of an elongated rolled rim on a metal container in which, in a first operation, the rim of the container blank, which has previously been leveled off, is rolled over by a tool which is displaced parallel to the axis of the container and the end of the operating travel of which is determined by its distance from the plane of the outside face of the bottom of the container, and in a second operation, the rolled-over portion is pushed downwardly by a second tool whose operational engagement surface is different from the first tool and whose operating travel is also limited by its distance from the plane of the outside face of the bottom of the container, the difference between the two distances determining the height of the rolled rim of the container.

1 Claim, 7 Drawing Figures

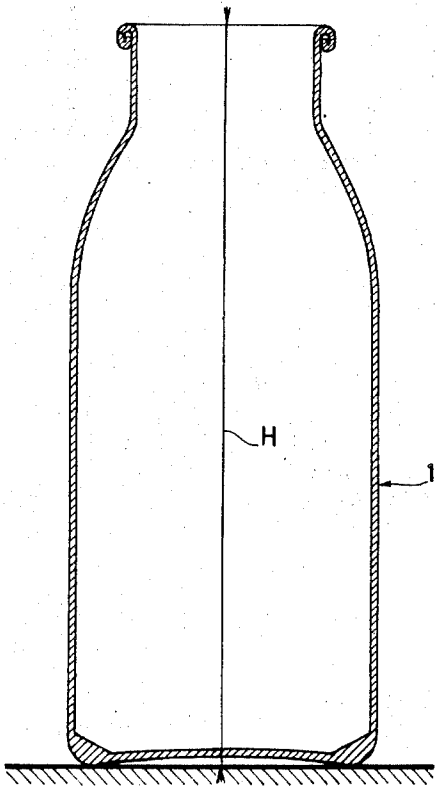


Fig. 1

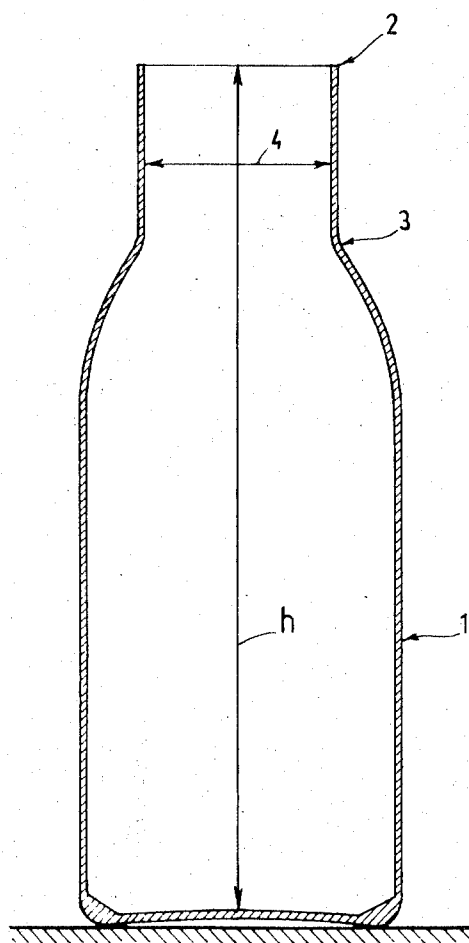


Fig. 2

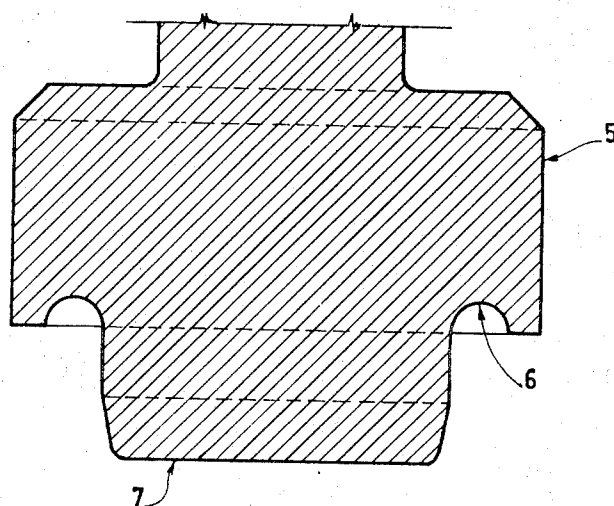
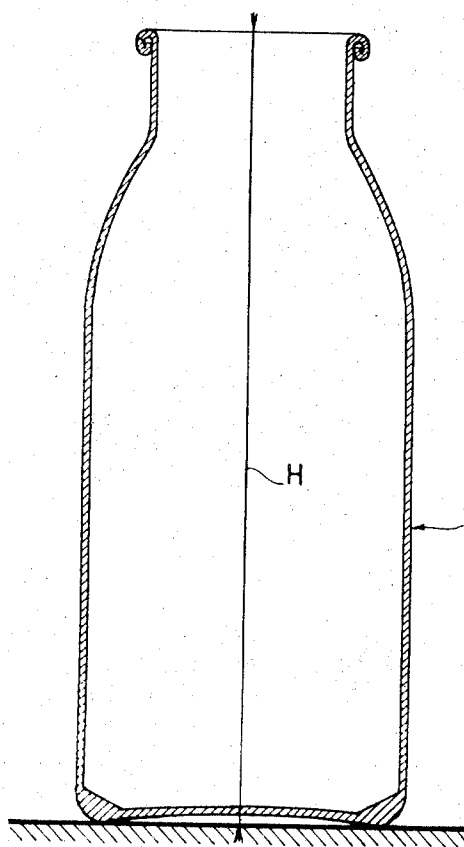


Fig. 3



SHEET 3 OF 4

Fig. 4

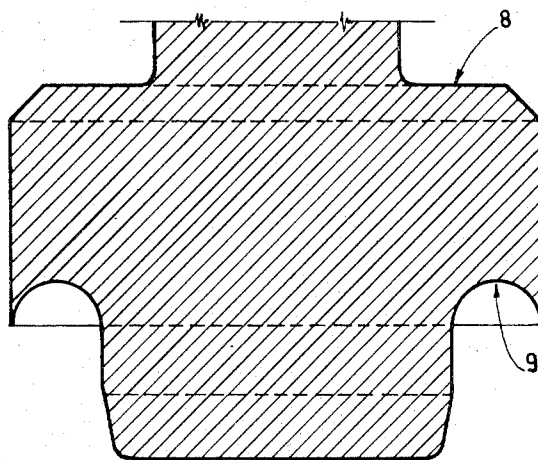


Fig. 5

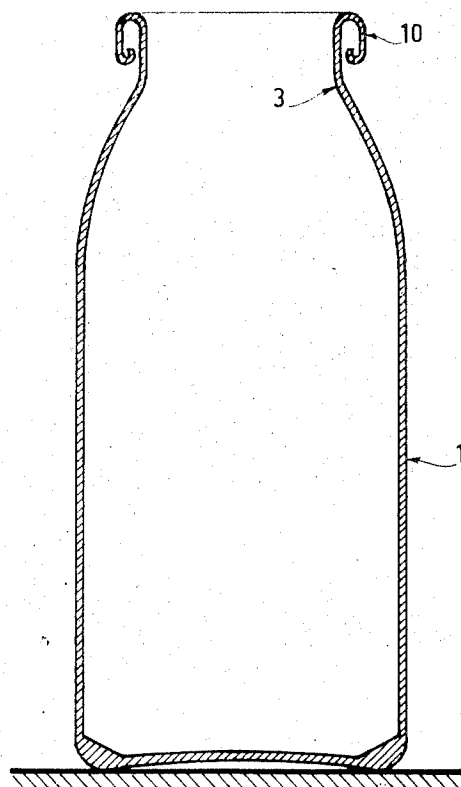


Fig. 6

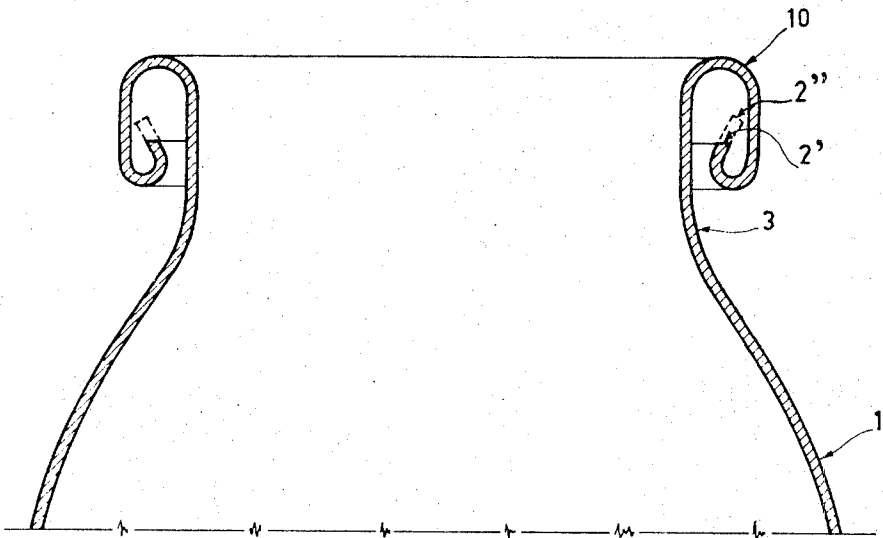
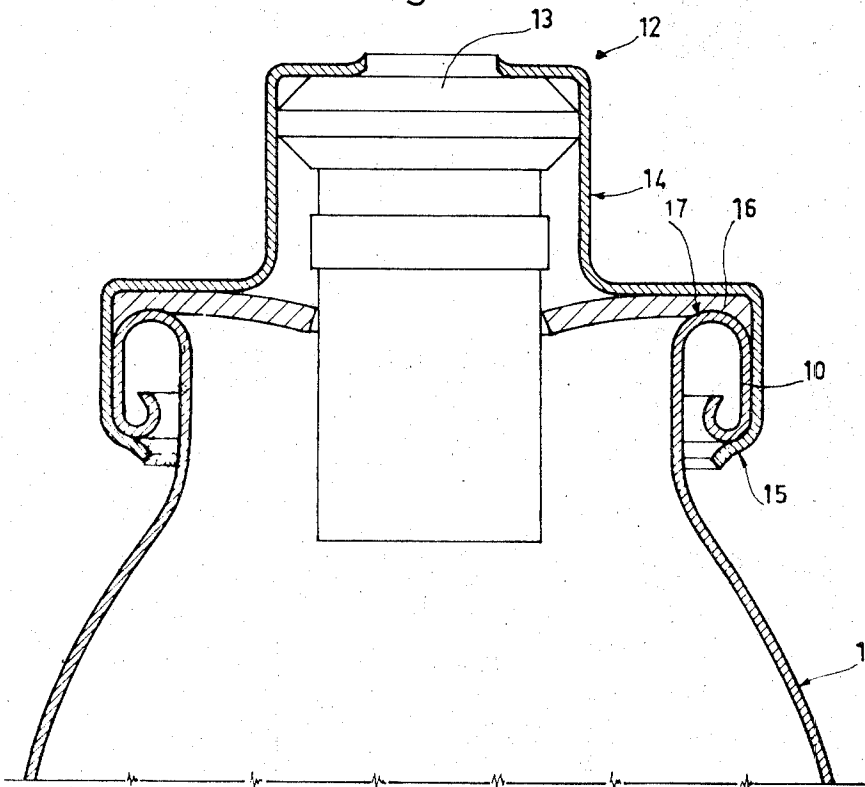


Fig. 7



METAL CONTAINER WITH ROLLED RIM

This invention relates to the production within very close tolerance limits of an elongated rolled rim on a metal container.

It relates more particularly to the formation of a rolled rim of this nature on aerosol flasks of small volume. Such flasks are used, for example, as pocket dispensers for perfumes or other substances which are currently in use. They can also be provided with a metering valve for dispensing predetermined amounts of the contents of the flask, one or more times. At present, use is made of standardized containers having a height of 56 mm, while the internal diameter of the mouth is 13 mm or 15 mm.

The small dimensions of the body of the container, and the valve which is fitted thereto, require very close tolerances, of the order of 0.1 mm, which are narrower than the tolerances for aerosol dispensers of normal size; this precision is essentially required in forming the rim of the container.

The basic problem lies in precision in the height of the finished container, and the height of the rolled rim at the mouth of the container. These dimensions must be absolutely constant from one article to another.

In fact, the rough blank, from which the containers to which this invention relates are fabricated, is formed by backwards impact extrusion. In this process, the lateral wall is formed by the impact of a punch on a metal disc placed in a die. The metal for forming the lateral wall rises parallel to the punch, leaving, between the punch and the die, the bottom of the container blank. Now, it is not possible to determine in advance, with absolute precision, the thickness of the container bottom, which difference, from one article to another, can be up to 0.3 mm.

At a subsequent stage in production of the containers, the edge of the container opening is trimmed, that is to say, leveled off. The tool for performing this operation is connected to a mandrel which extends into the container and bears against the internal face of its bottom, the result being that leveling off of the edge of the container opening is to be effected at a distance "h" from the inward face of the bottom of the container and, consequently, the outside height "H" suffers from the same variations, from one container to another, as the bottoms of the containers.

The variations in the outside heights of the containers are further increased when, as is generally the case, the neck of the container blank is reduced in width, over a certain height, by a contraction operation, and the differences from one container to another can then exceed 0.5 mm.

These differences are sufficient to make it impossible, at the time that the valve is fit, and in spite of an interposed sealing member, to achieve absolute fluid-tightness in every case, particularly because the container contents are under pressure.

The apparatus used for the last operation must operate on containers whose tolerance limits, both as regards the total height of the container and the height of the rolled rim, are less than 0.1 mm.

Furthermore, all the shaping operations had to be carried out on a container blank which had been pre-lacquered both internally and externally, without causing damage to the lacquered portions.

It is an object of this invention to provide a method for forming one-piece metal containers comprising an elongated rolled rim and which is of constant external height. For this purpose, in a first operation, the rim of the container blank, which has been previously leveled off at its periphery, is rolled over by a tool which is displaced parallel to the axis of the container and the end of the operating travel of which is determined by its distance to the plane of the bottom of the container. In a second operation, the rolled-over portion is displaced downwardly by a second tool having an operational engagement surface which is different from the first tool and which acts in the same direction, the end of the operating travel of the second tool also being determined by its distance from the plane of the outside face of the bottom of the container, the difference between the two distances determining the height of the rolled rim of the container.

The invention also includes the apparatus for carrying out this process, comprising at least two tools, each of which is provided with a downwardly open, semi-toric recess, the diameter of the opening being smaller in the case of the first tool than in the case of the second tool.

Preferably, the rolling-over of the first operation is effected over an angle equal to or greater than 360°.

All the operations can be carried out on container blanks which have been lacquered internally and/or externally. Normally, these operations are carried out on a container blank in which the diameter of the opening has previously been reduced by the formation of a constricted portion.

The method for shaping the container rim will be described by reference to the accompanying drawings, which are given by way of illustration and not by way of limitation, in which

FIG. 1 is a sectional elevational view of a container blank, before shaping of the rolled rim;

FIG. 2 is a sectional view of the tool used for the first rim-shaping operation;

FIG. 3 is a sectional elevational view of the container blank after the first operation;

FIG. 4 is a sectional elevational view showing the tool used for the second rim-shaping operation;

FIG. 5 is a sectional elevational view showing the container after the second operation;

FIG. 6 is a sectional elevational view showing on a larger scale the final rolled rim; and

FIG. 7 is a sectional elevational view showing the upper portion of the container, on which a valve is carried.

The container 1, which is shown in FIG. 1 in the form of a container blank which has not yet been provided with a rim, has already been subjected to a certain number of operations, and more particularly:

the trimming operation for leveling off the free edge 2;

the provision of the constricted portion 3, which is effected by a series of passes, after which the diameter 4 of the container mouth is reduced to the dimension required for mounting a dispensing member.

The container blank now has an internal height "h" which is determined by the plane of the free edge 2 and the inward face of the bottom of the container, the height "h" varying from one container blank to another.

The container 1 is then subjected to a first rim-shaping operation, that is to say, an operation for rolling over the free edge 2, by means of a tool 5, which is shown in FIG. 2, and which comprises a semi-toric groove 6. When the central part 7 of the tool engages, preferably in fitting relation, into the mouth of the container blank, the face edge 2 engages into the groove 6 and is rolled over on itself over an angle, which is greater or smaller, depending on the depth of engagement of the tool into the blank. The end of the operating travel of the tool is determined by the distance of the bottom 6 of the groove from the level of the outside face of the bottom of the container and, since the height of the blank before the rolling-over operation may differ from one container to another, the rolled-over portion may also vary.

Preferably, the free edge 2 makes a complete turn-over itself, and is displaced upwardly along the outside surface of the groove, as shown in FIG. 3. After this operation the blank is as shown in FIG. 3.

The second operation to which this invention relates is that of elongating the rim, to give it the shape referred to as a "bead" ("carnette"). It is onto the bead that the edge of the closing dispensing member will be crimped. In general, the entire assembly is identified by the term valve.

To carry out this second operation, use is made of a tool 8 (FIG. 4) similar to the first tool, from which it differs only by the dimension of the groove 9. In the embodiment illustrated, the radius of curvature of the groove 9 is greater than that of groove 6 of the tool which was used in the first operation.

By way of example, it can be mentioned that, for a container mouth with the diameter of 20 mm, the radius of curvature of the groove 6 of the first tool is 0.75 mm, and the radius of curvature of the groove 9 of the second tool is 1.25 mm.

Because of this difference, the pushing force applied by the second tool to the rolled-over portion shaped by the first operation does not introduce any change in the rolled-over portion. Instead, that portion is displaced towards the base of the container over the desired distance to produce the bead 10.

The result of this operation is shown in FIGS. 5 and 6, FIG. 6 showing diagrammatically and on a highly enlarged scale the bead 10 in its finished form.

In particular, FIG. 6 shows the result of the operation in two extreme cases, that is to say, corresponding to the extremes in the variation in thickness of the bottom of the container, from one container to another.

When the container, as a result of the extrusion operation, has resulted in a very thin container bottom, the result is that the operation of trimming off the free edge 2 of the container is effected at a lesser distance to the outside face of the container bottom, and the portion of the rim which is rolled over is of smaller dimension, the free edge only extending as far as the position indi-

cated by reference 2' (FIG. 6).

If, on the other hand, in the extrusion operation, the bottom of the container remains thicker, the support for the trimming apparatus engages to a lesser depth into the blank and, the outside height of the container being greater, the first tool produces more extensive rolling-over, the free edge then extending as far as the position indicated by reference 2'.

After the first operation, all of the blanks are therefore of precisely the same outside height. This will also apply after the second operation. The width and the height of the beads 10 are not variable from one container to another.

As shown in FIG. 7, it is possible to fix on the rim of the container a dispensing member 12 which essentially comprises a valve 13 (shown in highly diagrammatical form) which is held in place by a metal cap 14, retained on the bead 10 by a crimped edge 15. A resilient seal 16 is interposed between the upper edge 17 of the bead 10 and the cap 14.

Because of the precision achieved in the outside dimensions of the container, the operation for fixing the dispensing member can be effected under ideal conditions and perfect operation of the dispensing members is ensured.

It will be understood that changes may be made in the details of construction and operation without departing from the spirit of the invention, especially as defined in the following claims.

I claim:

1. A method for shaping metal containers to provide an elongated rolled rim and having a constant outside height in which a container blank is provided which has been formed by impact extrusion and previously been leveled off at the open upper end, characterized in that in a first operation a tool having an annular downwardly facing open toric recess is displaced parallel to the axis of the container and to bring the recessed portion into engagement with the levelled off open end of the blank to form a roller-over rim portion, the end of the operating travel of said tool being determined by its distance from the plane of the outside face of the bottom of the container and to effect roll-over with any variation in the amount of roll-over corresponding to any variation in the outside height of the original blank, and in a second operation engaging the rolled-over portion with a second tool having an annular downwardly facing open toric recess of larger diameter than the toric recess of the first tool to provide an operational engagement surface different from that of the first tool and whose operating travel is also limited axially by its distance from the plane of the outside face of the bottom of the container, the difference between the two operating travels determining the height of the rolled rim of the container.

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