

Description

Title of Invention: METAL CONTAINER AND MANUFACTURING METHOD THEREFOR

Technical Field

[0001]

The present invention relates to a metal container and a manufacturing method therefor.

Background Art

[0002]

A metal container is mainly made of a metal such as aluminum or stainless steel and includes a storage space for storing contents and an opening portion through which the contents are put in and taken out of the storage space. Examples of the form of the metal container include a can in which the opening portion is sealed with a lid body, and a cup which is used with the opening portion opened.

[0003]

As a metal container of related art, a so-called tapered container is known (for example, see Patent Document 1 described below). This metal container is a cylindrical bottomed container having an upper opening, and has, as a sidewall extending from the upper opening portion to a bottom portion of the container, a tapered sidewall (a sidewall portion having a tapered profile) whose inner diameter gradually decreases toward the bottom portion.

[0004]

As a manufacturing method for this tapered container, a stock material is prepared, a cup is formed by punching and drawing, the cup is redrawn so as to have a predetermined height and a predetermined wall thickness, after that, the cup is cut so as to have the predetermined height, a tip portion of the cup is rounded, the cup is drawn to form a plurality of vertical wall sections, and after that, each of the plurality of vertical wall sections is expanded in diameter using a die in order to form a tapered profile (see Patent Document 2 described below).

Citation List

Patent Literature

[0005]

Patent Document 1: JP 1-150418 A

Patent Document 2: JP 2021-142566 A

Summary of Invention

Technical Problem

[0006]

Since the above-described metal container of the related art has the tapered sidewall (the sidewall portion having the tapered profile), the inner diameter of the opening portion is made

larger than the outer diameter of the bottom portion. During transportation before storing the contents in the container, the bottom portion of one container is inserted into another container through the opening portion, and these same containers are transported in a multiple stacked state (hereinafter referred to as a stacked state).

[0007]

When the metal containers each having the tapered sidewall as in the related art are transported in the stacked state, a phenomenon (so-called blocking phenomenon) may occur in which a container relatively on the upper side is inserted into a container on the lower side due to vibration or impact during the transportation, and separation of a container from the stacked state cannot be easily performed, and this phenomenon is regarded as a problem.

[0008]

Further, in the manufacturing method for the metal container of the related art, when forming the sidewall portion having the tapered profile, since the expansion of the diameter is performed after forming the vertical wall sections, the process is complicated and it is difficult to cope with formation of a complex shape, both of which are regarded as problems. Since it is difficult to cope with the formation of the complex shape in the manufacturing method for the metal container of the related art, there is a problem in that it becomes difficult to effectively form an effective shape for preventing the blocking phenomenon.

[0009]

In order to solve the problems described above, the present invention has been proposed. That is, it is an object of the present invention, with metal containers that are transported in a stacked state, to be able to easily separate the metal containers after transportation, for example.

[0010]

Further, it is another object of the present invention to provide a manufacturing method for a metal container that can cope with formation of a complex shape and can effectively form a shape capable of preventing a blocking phenomenon when transporting the metal container in a stacked state.

Solution to Problem

[0011]

In order to solve the problems described above, a metal container according to the present invention has the following configuration.

A metal container includes an opening portion, a sidewall portion, and a bottom portion. The opening portion includes a curled portion or a flange portion that are curved outward. An inner surface of the opening portion includes an inner surface contact portion that comes into contact with an outer surface contact portion provided at an outer surface of the sidewall portion when stacking the metal container. A holding portion formed by causing a periphery of the sidewall portion to bulge outward is provided between the outer surface contact portion and the

inner surface contact portion. An inclined wall is provided at the outer surface of the holding portion.

[0012]

Further, in order to solve the problems described above, a manufacturing method for a metal container according to the present invention has the following configuration.

In a manufacturing method for a metal container including an opening portion, a sidewall portion, and a bottom portion, the manufacturing method includes the steps of forming a bottomed cup by performing drawing processing on a sheet metal material, trimming the bottomed cup, performing tip diameter reduction drawing on the bottomed cup, forming the opening portion including a curled portion or a flange portion, and forming the sidewall portion having a tapered profile by performing diameter reduction drawing at a location closer to the bottom portion side than a portion at which the tip diameter reduction drawing is performed.

Advantageous Effects of Invention

[0013]

According to the metal container having the above-described configuration, when the metal containers are in a stacked state, the outer surface contact portion of the sidewall portion of the upper metal container comes into contact with the inner surface contact portion of the inner surface of the opening portion of the lower metal container, and the inclined wall is provided at the holding portion provided between the outer surface contact portion and the inner surface contact portion of one of the metal containers. Thus, the above-described blocking phenomenon can be prevented by using settings of a holding width of the holding portion and an inclination angle of the inclined wall.

[0014]

Further, according to the manufacturing method for the metal container having the above-described configuration, it is possible to cope with formation of a complex shape, and it is possible to effectively form a shape capable of preventing the blocking phenomenon transporting the metal containers in the stacked state.

Brief Description of Drawings

[0015]

FIG. 1 is an explanatory diagram (external view) illustrating of an appearance of a metal container according to an embodiment of the present invention.

FIG. 2 is a partial cross-sectional view illustrating a stacked state of the metal containers according to the embodiment of the present invention.

FIG. 3 is a partial cross-sectional view illustrating the metal containers according to another embodiment of the present invention.

FIG. 4 is an explanatory diagram illustrating steps of a manufacturing method for a metal container according to an embodiment of the present invention.

FIG. 5 is an explanatory diagram of a sidewall portion forming step (a processing procedure of the step is illustrated in order of (a) → (b) → (c)).

FIG. 6 is an explanatory diagram of the sidewall portion forming step ((b1) illustrates a first stage and (b2) illustrates a second stage).

Description of Embodiments

[0016]

Hereinafter, embodiments of the present invention will be described with reference to the drawings. In the following description, the same reference numerals in different drawings denote elements having the same function, and redundant descriptions with regard to each drawing are omitted as appropriate.

[0017]

As illustrated in FIG. 1, a metal container 1 according to an embodiment of the present invention includes an opening portion 1A, a sidewall portion 1B, and a bottom portion 1C, which are an integrally molded portion, and is a cup-shaped container that can be substituted for a known disposable paper cup or plastic cup. Although FIG. 1 illustrates an example in which the opening portion 1A is provided with a curled portion 10 that is curved outward and the opening portion 1A is used in an open state, the opening portion 1A may be provided with a curved flange portion to which an outer peripheral edge portion of a lid body is wound and fastened so that the metal container 1 is used as a can, as will be described in an example below. Note that the terms “above” and “below” in this specification and the like are based on an assumption that the opening portion 1A is located above and the bottom portion 1C is located below.

[0018]

The metal container 1 illustrated in FIG. 1 includes the sidewall portion 1B having a generally tapered profile so that the outer diameter of the bottom portion 1C becomes smaller than the inner diameter of the opening portion 1A. As a result, the metal container 1 can be in a stacked state in which, among a plurality of the metal containers 1, the bottom portion 1C of the upper metal container 1 is inserted into the opening portion 1A of the lower metal container 1, and when the metal containers 1 are not yet used, the plurality of metal containers 1 can be transported in the stacked state.

[0019]

In the metal container 1 illustrated in FIG. 1, a holding portion (bulge portion) 11 is provided on the lower side of the opening portion 1A (curled portion 10). Thus, in the stacked state, as illustrated in FIG. 2, an inner surface contact portion F2 on the inner surface of the opening portion 1A of the lower metal container 1 (bottom) is stacked in contact with an outer surface contact portion F1 on the outer surface of the sidewall portion 1B of the upper metal container 1 (top), and in one of the metal containers 1, the above-described holding portion 11 is provided between the outer surface contact portion F1 and the inner surface contact portion F2.

[0020]

The holding portion (bulge portion) 11 is a portion at which a periphery of the sidewall portion 1B is caused to bulge outward, and can be formed by bead processing, diameter expansion forming, diameter reduction forming, or the like, or a combination thereof. As an example, an upper side and a lower side of the holding portion 11 are formed by diameter reduction drawing, and the outer surfaces thereof form inclined walls (diameter-reduced drawn portions) 11a and 11b, respectively. Accordingly, the holding portion 11 is provided with a tapered surface Tp (a tapered portion t to be described later) whose diameter gradually decreases toward the outer surface contact portion F1, and is provided with the tapered surface Tp (a necking portion n to be described later) whose diameter gradually decreases toward the opening portion 1A.

[0021]

As illustrated in FIG. 2, at the holding portion (bulge portion) 11 of one of the metal containers 1, the maximum width between a perpendicular line Lp connecting the outer surface contact portion F1 with the inner surface contact portion F2 and the outer surface of the holding portion 11 is defined as a holding width f. Further, an inclination angle of the tapered surface Tp (tapered portion t) extending toward the outer surface contact portion F1 with respect to the perpendicular line Lp is defined as a taper angle α .

[0022]

In order to prevent the above-described blocking phenomenon, it is preferable that the holding width f be 0.3 mm or more, and more preferably 0.8 mm or more. If the holding width f is smaller than this, the opening portion 1A is likely to bite into the holding portion 11, and when vibration or impact is applied to the metal containers 1 in the stacked state during the transportation, the biting becomes larger, and the above-described blocking phenomenon is likely to occur.

[0023]

One factor for determining the upper limit of the holding width f is an outer diameter R11 of the holding portion 11 including the holding width f. The outer diameter R11 of the holding portion 11 is preferably smaller than an outer diameter R10 of the curled portion 10 (opening portion 1A). If the outer diameter R11 of the holding portion 11 is larger than the outer diameter R10 of the curled portion 10, when the metal containers 1 are stored side by side, the holding portions 11 protrude laterally beyond the curled portions 10, and a storage space is increased by an amount of the protrusion, which results in a deterioration in storage efficiency.

[0024]

Further, in order to prevent the blocking phenomenon, the taper angle (inclination angle of the inclined wall 11b) α is preferably in a range from 10° to 50°. If the taper angle α becomes smaller, the same situation as that in the above-described case in which the holding width f is made smaller arises, and the frictional resistance at a time of separating the metal container 1 from the stacked state becomes larger, and thus the blocking phenomenon is more likely to occur. Note that the holding width f and the taper angle α are adjustment factors that are related

to each other, and a countermeasure against the blocking phenomenon becomes more effective by combining the criteria of the two factors.

[0025]

Further, in the stacked state of the metal containers 1, as illustrated in FIG. 2, a distance between the upper end of the opening portion 1A of the upper metal container 1 (top) and the upper end of the opening portion 1A of the lower metal container 1 (bottom) is a stacking height h_s . The stacking height h_s affects the storage space in the height direction in the stacked state. By causing the stacking height h_s to be smaller, the storage efficiency in the height direction in a state in which the metal containers 1 are stacked is increased.

[0026]

The overall configuration of the metal container 1 illustrated in FIG. 1 will be further described. In the sidewall portion 1B, vertical portions s and the tapered portions t are alternately formed while including the above-described holding portion 11, and as a result, the entire sidewall portion 1B has a tapered profile. Then, in the vicinity of the center of the sidewall portion 1B, a longest tapered portion t_m is formed in which the taper length of the tapered portion t is the longest.

[0027]

By alternately forming the vertical portions s and the tapered portions t on the sidewall portion 1B in this manner, when the metal container 1 is used as a cup for beverages, steps formed by the vertical portions s and the tapered portions t function as a slip stopper when the metal container 1 is held by hand. In addition, the longest tapered portion t_m near the center of the sidewall portion 1B functions as a display space for implementing display by printing or the like. That is, the longest tapered portion t_m can be effectively used as the display space by including a printing step for printing a display on the longest tapered portion t_m .

[0028]

As a material of a base material constituting the metal container 1, aluminum, an aluminum alloy, stainless steel, steel, or the like can be used, and by adopting aluminum, an aluminum alloy, or steel, it is possible to obtain the metal container 1, suitable for a beverage container, which is light in weight, has a gloss appearance, and allows a user to easily feel the temperature of the contents (for example, cold water) by hand. Further, as a material of the metal container 1, a material can be used that is obtained by coating both surfaces of the base material made of aluminum, an aluminum alloy, or steel, with a single layer or multiple layers of a resin film such as a PET film.

[0029]

The metal container 1 is preferably in contact with the outer surface contact portion F1 only by the inner surface contact portion F2 in the stacked state. By causing a location at which the outer surface and the inner surface of the metal containers 1 come into contact with each other in the stacked state to be one location, it is possible to minimize contamination or damage

of the surface caused by the outer surface of the metal container 1 coming into contact with the inner surface of the other metal container 1 in the stacked state.

[0030]

Further, since the outer surface contact portion F1 is provided at the tapered surface Tp (tapered portion t), it is possible to stably maintain a state in which the outer surface contact portion F1 and the inner surface contact portion F2 are in contact with each other in the stacked state. As a result, even when vibration or the like occurs during the transportation in the stacked state, the sidewall portion 1B and the bottom portion 1C of the upper metal container 1 (top) do not excessively abut against the inner surface of the lower metal container 1 (bottom), and thus damage or deformation of the inner surface of the metal container 1 can be suppressed.

[0031]

As illustrated in FIG. 3, the metal container 1 according to another embodiment of the present invention includes a flange portion 20 at the opening portion 1A. The flange portion 20 is a portion for winding and fastening an outer edge portion of the lid body (not illustrated). By winding and fastening the lid body, the metal container 1 becomes a can body for sealing the contents. For example, a stay-on-tab lid made of metal can be used as the lid body to be wound and fastened here, but a lid body of another form may be used. Further, instead of the flange portion 20, the opening portion 1A of another form may be used, and with respect to that opening portion 1A, a lid body of another form such as a screw lid may be detachably attached.

[0032]

In a process (manufacturing method) for manufacturing the metal container 1 illustrated in FIG. 1, as illustrated in FIG. 4, first, a sheet metal material is prepared by cutting a sheet material wound in a coil shape (S0: sheet metal material preparation step), and the sheet metal material is punched and subjected to drawing and/or ironing to form a cup-shaped intermediate member (hereinafter referred to as a bottomed cup) (S1: cupping step).

[0033]

Subsequently, the formed bottomed cup is subjected to drawing and/or ironing again and processing for forming a bottom portion (step S1') as necessary, and then a tip portion of the bottomed cup having a predetermined outer diameter, a predetermined height, and a predetermined plate thickness is subjected to trimming (S2: trimming step). By the trimming, the height of the tip of the bottomed cup, which has become uneven due to the redrawing and/or ironing, is uniformly cut around the central axis, and after the trimming, the height of the tip of the bottomed cup becomes constant.

[0034]

Subsequently, the tip portion of the trimmed bottomed cup is subjected to tip diameter reduction drawing (S3: tip diameter reduction drawing step). The tip diameter reduction drawing is so-called necking, in which the diameter of a tip opening of the bottomed cup is reduced to form a necking portion n whose diameter is gradually reduced toward the tip, and a portion to be subsequently processed into the curled portion 10 or the flange portion 20 is formed.

[0035]

After the tip diameter reduction drawing step S3, the opening portion 1A including the curled portion 10 or the flange portion 20 is formed at the tip portion of the bottomed cup (the portion to be processed into the curled portion 10 or the flange portion 20) (S4: opening portion forming step). By forming the curled portion 10 or the flange portion 20 at the tip portion in this manner, the rigidity of the tip opening can be increased, and a deterioration in the roundness when forming the sidewall portion 1B at the next step can be suppressed.

[0036]

In the formation of the sidewall portion 1B (S5: sidewall portion forming step), the sidewall portion 1B having a tapered profile as a whole is formed by gradually reducing the diameter from the portion that has been subjected to the tip diameter reduction drawing toward the bottom portion 1C side.

[0037]

Hereinafter, an example of the sidewall portion forming step S5 will be described in detail. First, as illustrated in FIG. 5(a), after the tip diameter reduction drawing, an inner tool 100 is disposed inside a bottomed cup Cp in which the opening portion 1A including the curled portion 10 (or the flange portion 20) is formed, an outer tool 200 is disposed on the bottom portion 1C side of the bottomed cup Cp, and a pressing tool 300 is brought into contact with the bottom portion 1C of the bottomed cup Cp.

[0038]

The inner tool 100 is a columnar tool having a diameter smaller than the inner diameter of the bottomed cup Cp, and the outer tool 200 has, on the inner surface thereof, a drawing surface 201 for performing drawing while sandwiching the sidewall of the bottomed cup Cp between the outer peripheral surface of the inner tool 100 and itself, and an inclination forming surface 202 for forming the sidewall of the bottomed cup Cp in an inclined shape. The inclination forming surface 202 of the outer tool 200 has a conical surface or a curved surface (R surface) inclined outward with respect to a central axis 100P of the inner tool 100.

[0039]

At a first stage of the sidewall portion forming step S5, as illustrated in FIG. 5(b), from the state illustrated in FIG. 5(a), the outer tool 200 is moved from the bottom portion 1C toward the opening portion 1A with respect to the fixed inner tool 100 in a direction indicated by the arrow in FIG. 5(b) in order to perform the diameter reduction drawing on the sidewall of the bottomed cup Cp, and further, the inclination forming surface 202 of the outer tool 200 is brought into contact with the bottom portion 1C side of the necking portion n, which has been subjected to the tip diameter reduction drawing, in order to form the tapered portion t. After that, as illustrated in FIG. 5(c), when the outer tool 200 is returned to the bottom portion 1C side, on the tip side of the bottomed cup Cp, the holding portion 11 constituted by the necking portion n and the tapered portion t is formed on the bottom portion 1C side of the curled portion 10.

[0040]

The next stage of the sidewall portion forming step S5 will be described with reference to FIG. 6. While the inner tool 100 with a tool radius $Tr1$ is used in the above-described diameter reduction drawing at the first stage, the inner tool 100 with a tool radius $Tr2$ is used in diameter reduction drawing at a second stage ($Tr1 > Tr2$). At this time, the inner diameters of the drawing surface 201 and the inclination forming surface 202 of the outer tool 200 are set in accordance with the tool diameter of the inner tool 100.

[0041]

While a moving stroke $St1$ of the outer tool 200 is a stroke length necessary for forming the tapered portion t of the holding portion 11 in the diameter reduction drawing at the first stage (see FIG. 6(b1)), in the diameter reduction drawing at the second stage (see FIG. 6(b2)), a moving stroke $St2$ of the outer tool 200 is made shorter than the moving stroke $St1$ of the first stage, and the vertical portion s is formed on the bottom portion 1C side of the tapered portion t of the holding portion 11.

[0042]

After that, by gradually reducing the tool radius of the inner tool 100 and repeating the diameter reduction drawing at the second stage and thereafter, as illustrated in FIG. 1, the sidewall portion 1B having the tapered profile, in which the tapered portions t and the vertical portions s are alternately formed, is formed below the holding portion 11. At this time, when the moving stroke of the outer tool 200 in the diameter reduction drawing at the next stage is made closer to the moving stroke at the previous stage, the tapered portions t can be continuously formed without interposing the vertical portion s therebetween. Further, in the diameter reduction drawing at the second stage and thereafter, the inner surface of the curled portion 10 is arranged so as to be in contact with the outer surface of the inner tool 100 (see FIG. 6(b2)). This is to inhibit the curled portion 10 (mouth portion) from becoming an oval shape, and this also makes it possible to suppress an occurrence of blocking when the metal containers 1 are stacked.

[0043]

When the above-described resin-coated base material is used as the base material constituting the metal container 1, it is preferable to include a step of locally heating the portion to be processed in the curled portion 10 or the flange portion 20 as a step preceding the opening portion forming step S4, illustrated in FIG. 4, at which the curled portion 10 or the flange portion 20 is formed. In the local heating, for example, high-frequency heating is used to locally heat the portion to be processed on the tip side of the necking portion n , at a target temperature of $200^{\circ}\text{C} \pm 30^{\circ}\text{C}$. By performing such local heating, the adhesion force between the base material and the coated resin is increased, and it is possible to inhibit the resin film from being peeled off from the base material during processing of the curled portion 10 and the flange portion 20. As a result, a good finish can be achieved.

[0044]

As described above, according to the metal container according to the embodiment of the present invention, the metal container 1 includes the opening portion 1A, the sidewall portion

1B, and the bottom portion 1C, the opening portion 1A includes the curled portion 10 or the flange portion 20 that are curved outward, the inner surface of the opening portion 1A has the inner surface contact portion F2 that comes into contact with the outer surface contact portion F1 of the sidewall portion 1B when the metal containers are stacked, the holding portion 11, which is formed by causing the periphery of the sidewall portion 1B to bulge outward, is provided between the outer surface contact portion F1 and the inner surface contact portion F2, and the inclined wall 11b extending toward the outer surface contact portion F1 is provided at the holding portion 11. As a result, by setting the holding width f of the holding portion 11 and the taper angle α of the tapered surface T_p , it is possible to effectively prevent the blocking phenomenon when the metal containers 1 are stacked.

[0045]

Further, as described above, according to the manufacturing method for the metal container according to the embodiment of the present invention, by forming the sidewall portion 1B by the diameter reduction drawing from the bottom portion 1C side, it is possible to cope with formation of a complex shape, and it is possible to effectively form a shape capable of preventing the blocking phenomenon when transporting the metal containers in the stacked state.

[0046]

Further, as described above, when the resin-coated base material is used as the sheet metal material, a lubricant (coolant) is not necessary at the sidewall portion forming step S5. This makes it possible to realize a manufacturing method in which a cleaning step is not provided between or after a series of steps. As a result, it is possible to carry out manufacturing with high productivity without washing and drying steps, and it is possible to carry out manufacturing advantageous from an environmental point of view by eliminating disposal of the lubricant.

[0047]

Although the embodiments of the present invention have been described in detail with reference to the drawings, specific configurations are not limited to these embodiments, and design changes and the like within a range not departing from the gist of the present invention are also included in the present invention. Further, each of the above-described embodiments can be combined with each other by mutually using the technology of each of the embodiments, as long as there is no particular contradiction or problem in the purpose, configuration, and the like thereof.

Reference Signs List

[0048]

1: Metal container, 1A: Opening portion, 1B: Sidewall portion, 1C: Bottom portion, 10: Curled portion, 11: Holding portion, 11a, 11b: Inclined wall (diameter-reduced drawn portion), 20: Flange portion, t : Tapered portion, t_m : Longest tapered portion, s : Vertical portion, n : Necking portion, F1: Outer surface contact portion, F2: Inner surface contact portion, 100: Inner

tool, 100P: Central axis, 200: Outer tool, 201: Drawing surface, 202: Inclination forming surface, 300: Pressing tool, S0: Sheet metal material preparing step, S1: Cupping step, S2: Trimming step, S3: Tip diameter reduction drawing step, S4: Opening portion forming step, S5: Sidewall portion forming step, St1, St2: Moving stroke, Tr1, Tr2: Tool radius, Cp: Bottomed cup

Claims

[Claim 1]

A metal container including an opening portion, a sidewall portion, and a bottom portion, wherein

the opening portion includes a curled portion or a flange portion that is curved outward, an inner surface of the opening portion includes an inner surface contact portion that comes into contact with an outer surface contact portion provided at an outer surface of the sidewall portion when stacking the metal container,

a holding portion formed by causing a periphery of the sidewall portion to bulge outward is provided between the outer surface contact portion and the inner surface contact portion, and an inclined wall is provided at an outer surface of the holding portion.

[Claim 2]

The metal container according to claim 1, wherein

a holding width is set to 0.3 mm or more, the holding width being a maximum width between a perpendicular line that connects the outer surface contact portion with the inner surface contact portion and the outer surface of the holding portion.

[Claim 3]

The metal container according to claim 1 or 2, wherein

an inclination angle of the inclined wall with respect to the outer surface is in a range from 10° to 50°.

[Claim 4]

The metal container according to any one of claims 1 to 3, wherein

the inclined wall is a tapered surface, and a taper angle of the tapered surface is in a range from 10° to 50°.

[Claim 5]

The metal container according to any one of claims 1 to 4, wherein

the opening portion, the sidewall portion, and the bottom portion are an integrally molded portion made of aluminum, an aluminum alloy, or steel.

[Claim 6]

The metal container according to any one of claims 1 to 5, wherein

an upper side and a lower side of the holding portion are diameter-reduced drawn portions.

[Claim 7]

The metal container according to any one of claims 1 to 6, wherein an outer diameter of the holding portion is smaller than an outer diameter of the opening portion.

[Claim 8]

A manufacturing method for a metal container including an opening portion, a sidewall portion, and a bottom portion, the manufacturing method comprising the steps of:
forming a bottomed cup by performing drawing processing on a sheet metal material;
trimming the bottomed cup;
performing tip diameter reduction drawing on the bottomed cup;
forming the opening portion including a curled portion or a flange portion; and
forming the sidewall portion having a tapered profile by performing diameter reduction drawing at a location closer to the bottom portion than a portion at which the tip diameter reduction drawing is performed.

[Claim 9]

The manufacturing method for the metal container according to claim 8, wherein the diameter reduction drawing is performed from the bottom portion side toward the opening portion.

[Claim 10]

The manufacturing method for the metal container according to claim 8 or 9, wherein tapered portions and vertical portions are alternately formed at the sidewall portion by the diameter reduction drawing.

[Claim 11]

The manufacturing method for the metal container according to claim 10, wherein a longest tapered portion having a longest length, among the tapered portions, is formed in a vicinity of a height center of the sidewall portion.

[Claim 12]

The manufacturing method for the metal container according to claim 11, comprising performing printing on the longest tapered portion.

[Claim 13]

The manufacturing method for the metal container according to any one of claims 8 to 12, wherein
a base material of the sheet metal material is aluminum, an aluminum alloy, or steel.

[Claim 14]

The manufacturing method for the metal container according to any one of claims 8 to 13, wherein

the sheet metal material is a resin-coated base material.

[Claim 15]

The manufacturing method for the metal container according to claim 14, comprising locally heating a portion to be processed in the curled portion or the flange portion.

[Claim 16]

The manufacturing method for the metal container according to claim 14 or 15, wherein cleaning is not performed between or after a series of the steps.