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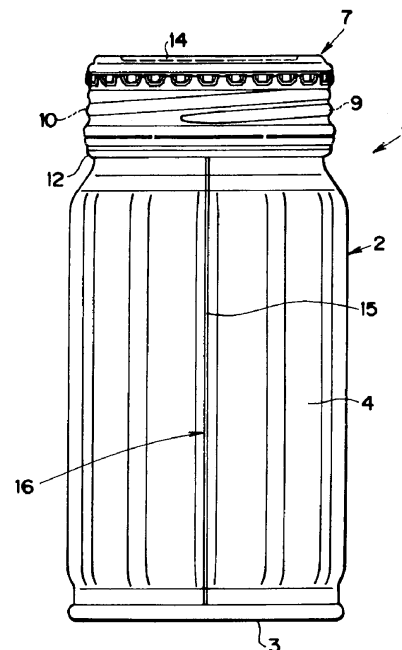
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(54) **CAN CONTAINER WITH SCREW**

(57) To reduce a torque to open a closure of a can container having a step of a lap side seam on a thread.

A threaded can container of the invention comprises: a cylindrical can body having a lap side seam 16 where longitudinal edges of a metal sheet forms a step portion; a container mouth 5 formed on an opening end of the can body where a thread ridge and a curled portion are formed thereon; a bottom lid seamed to a lower end of the can body; and a resealable closure, which is applied to the container mouth, and which has a resin sealing liner affixed to an inner face of a top panel thereof, and a thread groove rolled on a skirt portion thereof in conformity with the thread ridge; wherein the thread ridge is formed to rotate the closure in a direction from an outer edge of the lap side seam toward an inner layer of the lap side seam to open the closure.

FIG. 1



Description

TECHNICAL FIELD

[0001] This invention relates to a threaded can container, in which a roll-on closure having a resin sealing liner affixed to an inner face of a top panel of a metal shell is applied to a container mouth, and especially to a threaded can container comprising a lap side seam on its body where longitudinal edge of a metal sheet are overlapped, and a bottom lid seamed to a lower end of a can body.

BACKGROUND ART

[0002] A resealable packaging container for food products such as a glass bottle, in which an opening thereof is opened widely to discharge a content is known in the prior art. The content can be easily taken out from this kind of container to be put into another container. For this reason, this kind of packaging container is used to contain instant coffee granules, powder cream, jam, corn soup, wine with pulp and so on. In addition to above, since the user can enjoy fragrance of beverage, this kind of packaging container is also used widely for coffee, tea, green tea and so on.

[0003] Recently, a threaded can container, in which a resin sealing liner is affixed to an inner face of a top panel of a metal shell, and in which a thread is rolled on a closure mounted on a container mouth, has been distributed in the market. Both of the closure and the container of this kind are made of metal, therefore, this kind of can container is advantageous to block the light and air. Moreover, this kind of the container can be resealed by the closure, therefore, it is convenient to carry the container even after opening the closure. Further, this kind of the container is not as heavy as a glass bottle, that is, this kind of the container is comparable in weight to a PET bottle. For the reasons mentioned above, this kind of the metal container has been highly admired by the users and well marketed.

[0004] There is a wide range of variations in size of the threaded can container and diameter of a container mouth thereof. For example, Japanese Patent Laid-Open No. 2003-321039 discloses a new type of a resealable can container featuring the above mentioned advantage such as the wide opening. Thus, the wide-open type threaded can container of this kind is known in the art.

[0005] Basically in case of applying a resealable closure on a can container, a closure (or a shell) in which a thread has not yet been rolled on its cylindrical skirt extending from an outer circumference of a top panel is mounted on a container mouth first of all. Then, a thread groove is formed on the skirt portion of the closure along a thread ridge formed on a neck portion of the container mouth, by pressing thread rollers of a known capping apparatus against an outer face of the skirt portion, and

a lower end of the skirt portion of the closure is tightened. According to a known art, sealing ability of the liner to seal the container mouth is enhanced on the occasion of thus rolling a thread on a metal closure mounted on a container mouth. For example, Japanese Patent Laid-Open No. 2001-213417 discloses to press a sealing liner tightly to a container mouth by inwardly depressing a corner portion of a shell located between a top panel and a skirt portion.

[0006] Additionally, in case an inner diameter of a container mouth of the wide-open type resealable can is 30 mm or larger, a top height of a curled portion may be varied individually as a result of forming a thread ridge on a container mouth. In order to avoid above-mentioned problem, for example, Japanese Patent Laid-Open No. 2003-251425 discloses a method of forming a resealable can, by forming a pre-curved portion on an upper end of a can body first of all, then forming a thread ridge on the container mouth, and thereafter reforming the curled portion.

[0007] Thus, according to the forming method of wide-open type resealable can taught by Japanese Patent Laid-Open No. 2003-251425, the pre-curved portion is formed on the upper end portion of the can body firstly, the thread ridge is then formed on the container mouth, and the curled portion is thereafter formed again. Therefore, variation in a top height of the curled portion can be minimized so that an opening torque of the closure can be reduced. However, as it now stands, further improvement of easiness to open the closure of the wide-open type resealable can using a welded can body for a three-piece can having an overlapped side seam is still demanded.

[0008] In case of rolling a thread on a closure mounted on a container mouth, a thread groove is formed on a skirt portion of a cap shell along a thread ridge formed on the container mouth. As a result, a step of a lap side seam is marked on the thread groove of a closure. Here, such a step formed on the closure by the step portion of the lap side seam will be called as a "step mark" hereinafter. Specifically the step portion of the side seam and the step mark on the thread groove of the closure being applied to the container mouth are opposed to each other. As a result of various experimentations carried out by the applicant, the applicant has found that this is one of the factors to increase an initial torque to open the closure, if the step mark on the closure has to climb over the step portion of the lap side seam when the closure is twisted.

[0009] In addition to above, a resin film covering an outer edge of the lap side seam may be peeled, and an inner coating of the closure may be grinded by the exposed edge. The resultant resin scraps may attach to the container mouth and it may be mixed into the content. Moreover, the resin scraps may intervene between a sealing and the container mouth when the container is resealed by the closure. As a result, a sealing ability of the closure is degraded.

DISCLOSURE OF THE INVENTION

[0010] The present invention has been conceived noting the technical background as thus far described, and its object is to provide a threaded can container, which is improved in a sealing ability and an easiness to open a closure mounted on a container mouth, and which is capable of preventing generation of resin scraps and adherence of such foreign object to the container mouth when open the closure.

[0011] In order to achieve the above-mentioned object, according to the present invention, there is provided a threaded can container comprising: a cylindrical can body comprising a lap side seam where longitudinal edges of a metal sheet are overlapped thereby forming a step portion; a container mouth formed on an opening end of the can body where a thread ridge and a curled portion are formed thereon; a bottom lid seamed to a lower end of the can body; and a resealable closure, which is applied to the container mouth, and which has a resin sealing liner affixed to an inner face of a top panel thereof and a thread groove rolled on a skirt portion thereof in conformity with the thread ridge, characterized in that: the thread ridge is formed to rotate the closure in a direction from an outer step portion formed of an outer edge of the lap side seam toward an inner layer of the lap side seam to open the closure.

[0012] According to the invention, at least an inner surface of the lap side seam of the can body is covered with a protective coating.

[0013] In addition to above, according to the threaded can container of the present invention, the thermoplastic resin film covering the inner surface of the lap side seam is a thermoplastic resin tape. A circumferential width of the resin tape is within a range of 7 to 15 mm, and a thickness thereof is within a range of 15 to 45 μm . The resin tape comprises a first layer covering the lap side seam, and a second layer of biaxially-oriented thermoplastic resin formed on the first layer to contact with content in the can body. A melting point of the first layer is within a range of 175 to 230°C, and a melting point of the second layer is within a range of 200 to 255°C. The melting point of the resin forming the second layer is 15 to 80°C higher than the melting point of the resin forming the first layer, and the thickness of the first layer is more than 70 percent of a total thickness of the resin tape.

[0014] In addition to above, according to the threaded can container of the present invention, a level difference in the step portion of the lap side seam is 0.07 mm or smaller, a diameter of the container mouth is reduced more than 15 percent in comparison with that of the can body, and a level difference in the step portion of the lap side seam on top of the container mouth is 0.05 mm or smaller.

[0015] According to the invention, the thread ridge is formed on the cylindrical can body having the lap side seam to rotate the closure in a direction from the outer step portion of the outer edge of the lap side seam toward

the inner layer of the lap side seam to open the closure. In other words, the thread ridge is formed to situate an inwardly protruding step mark on the inner face of the closure in front of the outwardly protruding step portion of the outer edge of the lap side seam, and to open the closure in a direction in which the inwardly protruding step mark of the closure is moved away from the outwardly protruding step portion of the can body. Therefore, the step mark on the thread groove of the closure will not be caught in the step portion of the lap side seam when the closure is rotated to be opened. For this reason, the closure can be opened easily.

[0016] Moreover, the resin scraps will not be generated by the edge of the step portion when the closure is opened. Therefore, a foreign object will not adhere to the container mouth of the threaded can container.

[0017] In addition to the above-mentioned advantage, the thermoplastic resin film covering the inner surface of the lap side seam will not be cracked, peeled or ruptured even if severe forming processes are applied to the container mouth to form a thread and a curled portion, and to reduce a level difference of the step portion on the curled portion thereby improving easiness to open the closure. For this reason, corrosion resistance can be improved.

[0018] As explained above, according to the invention, at least the inner surface of the lap side seam of the can body is covered with a thermoplastic resin film. Specifically, the thermoplastic resin film covering the lap side seam is a resin tape. The circumferential width of the resin tape is within a range of 7 mm to 15 mm, and a thickness thereof is within a range of 15 to 45 μm . The thermoplastic resin tape comprises a first layer covering the lap side seam, and a second layer of biaxially-oriented thermoplastic resin formed on the first layer to contact with the content in the can body. The melting point of the first layer is within a range of 175 to 230°C, and a melting point of the second layer is within a range of 200 to 255°C, that is, the melting point of the resin forming the second layer is 15 to 80°C higher than that of the resin forming the first layer. Additionally, the thickness of the first layer is more than 70 percent of a total thickness of the thermoplastic resin tape. For this reason, the lap side seam can be covered completely with the first layer when the first layer is melted, even on the corner in between the inner edge of the lap side seam and the outer layer thereof. Moreover, since the melting point of the second layer is higher than that of the first layer, the second layer will not be melted so that the biaxial orientation thereof can be kept as it is even if the first layer is fused. Therefore, the corrosion resistance of the inner surface of the lap side seam can be improved.

[0019] Further, according to the invention, the thread ridge is formed to rotate the closure in an opening direction from the outer step portion formed of the outer edge of the lap side seam toward the inner layer of the lap side seam. Also, the can container of the invention comprises the outwardly curled portion on the upper end of the con-

tainer mouth where the inner surface of the metal sheet is reversed to be outer face. This means that the lap side seam is also reversed on the top end of the curled portion and the step portion thereof has to be situated against the rotational direction of the closure. However, according to the invention, the lap side seam on the inner surface of the can body is covered with the resin tape so as to minimize the level difference of the lap side seam thereby smoothening the step portion as much as possible. Therefore, interference between the step portion on the curled portion and the liner affixed to the closure can be minimized.

[0020] For the reasons mentioned above, the initial torque for opening the closure is reduced so that the closure can be opened smoothly even if the container mouth is pressed tightly against the sealing liner to improve sealing ability.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Fig. 1 is a front view showing one example of a wide-open type resealable can of the invention comprising a roll-on closure.

Fig. 2 is a front view showing an unthreaded metal closure and a can body before a bottom lid is seamed thereto.

Fig. 3 is a sectional view partially showing a curled portion and a liner.

Fig. 4 is an enlarged sectional view schematically showing a rotational direction to open the closure, and an engagement of a lap side seam of the can body and a step mark of the closure.

Fig. 5 is an enlarged sectional view showing a clearance between the can body and the closure when the closure is being rotated to reseal the can.

Fig. 6 (A) is an enlarged sectional view partially showing an engagement of the curled portion of the container mouth and the liner before the closure is rolled-on, and Fig. 6 (B) is an enlarged sectional view partially showing the thread rolled on the closure.

Fig. 7 is a sectional view partially showing the welded lap side seam.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0022] Here will be explained a preferable embodiment of the present invention. As illustrated in Figs. 1 and 2, a metal resealable can 1 (i.e., a can body except for a closure) comprises a welded can body 2 and a bottom lid 3 seamed to a lower end of the can body 2. More specifically, the welded can body 2 comprises a cylindrical trunk portion 4, a container mouth 5 formed on an upper portion of the trunk portion 4, and the bottom lid 3 seamed to a lower open end of the can body 2. A metal pilfer-proof closure 7 having a resin liner 6 is applied to

the container mouth 5, and a thread groove 9 is rolled on a skirt portion 8 of the closure 7 by a known capping apparatus.

[0023] On the other hand, a thread ridge 10 is formed on an outer circumferential face of the container mouth 5, and an annular bead 11 is formed below the thread ridge 10. Specifically, an inner face of the skirt portion 8 where the bead 11 is formed is recessed but an outer face thereof at the same portion is protruded. The annular bead 11 is formed by pressing a lower end of the closure 7 (i.e., a lower portion of a pilfer-proof band 12 situated at the lower end of the skirt 8) mounted on the container mouth 5 against a lower portion of the container mouth 5 using a (not shown) forming roller of the capping apparatus. At this stage, the pilfer-proof band 12 has not yet been detached from the closure 7 so that the closure 7 mounted on the container mouth 5 can be fastened at the bead 11.

[0024] The closure 7 used in this embodiment comprises a metal shell 13 and a resin sealing liner 6. The shell 13 comprises a top panel 14 and a cylindrical skirt portion 8 extending from a circumferential edge of the top panel 14, and the liner 6 is affixed to an inner face (i.e., a lower face) of the top panel 14. Prior to mounting the closure 7 on the container mouth 5 of the can body 2 and to roll a thread on the skirt portion, the lower portion of the skirt 8 of the closure 7 (or the shell 13) below a portion where the thread is to be rolled has been sheared intermittently in the circumferential direction to form horizontal slits 12A and bridges 12B. Therefore, the pilfer-proof band 12 is separated from the closure 7 when the closure 7 is twisted and the bridges 12B situated between the slits 12A are thereby broken.

[0025] A material of the closure 7 (or the shell 13) is not especially limited to a specific material. For example, an aluminum alloy sheet, in which an epoxy-phenol resin containing olefinic resin powder, is applied to an inner face thereof is used as a metal material of the closure 7. On the other hand, a resin material, for example, a blending resin consisting of low density polyethylene and ethylene-propylene rubber polymer, a blending resin consisting of polypropylene and styrene elastomer, elastomer polyester and so on are used as a material of the liner 6. The liner 6 is formed by a known molding method, specifically, by pressing the melting resin material onto an inner face of the top panel 14.

[0026] According to the embodiment, a neck portion is formed on the cylindrical welded can body 2 by reducing a diameter of an open end side of the can body 2, and a thread ridge (or a male thread) 10 and the bead 11 are formed on the neck portion. As a result of various experimentations in this kind of welded can body, the applicant has found that easiness to open the closure 17 may be deteriorated depending on an orientation of a step portion 15 formed on an outer surface of the can body 2.

[0027] Here will be explained the welded can body 2 and the step portion 15. The welded can body is formed by the following procedure. First of all, the above-men-

tioned metal sheet is cut into a size of the can body. Then, the metal sheet is rolled into a cylindrical configuration, and longitudinal edge portions of the metal sheet are slightly overlapped and welded together. Fig. 4 is an enlarged sectional view showing the lap side seam 16 thus structured. As shown in Fig. 4, a thickness of the lap side seam 16 is thicker than that of the remaining portion of the metal sheet, and step portions are formed at both inner and outer edges of the overlapped metal sheet. Those inner and outer step portions inevitably protrude in the opposite directions. Specifically, in the example shown in Fig. 4, the step portion at the edge of the outer layer of the metal sheet protrudes outwardly. To the contrary, the step portion at the edge of the inner layer of the metal sheet protrudes inwardly.

[0028] At the stage of rolling a thread on the closure 7 mounted on the container mouth 5, the skirt portion 8 of the shell 13 is pushed by the thread forming rollers against the container mouth 5 along the thread ridge 10. As a result, the step portion 15 of the lap side seam 16 on the neck portion is marked on the closure 7. In other words, a step mark 17 is formed on the thread groove 9 of the closure 7 by the step portion 15 of the can body 2. Consequently, the step mark 17 formed on the thread groove 9 of the closure 7 and the step portion 15 of the lap side seam 16 of the can body 2 are being opposed to each other after the completion of the mounting process the closure 7 on the container mouth. More specifically an inclined face of the step mark 17 on the inner face of the closure 7 and an end face of the outer layer of the lap side seam 16 (i.e., the outer step portion 15) are being opposed to each other. In other words, the step mark 17 on the thread groove 9 formed on the inner face of the closure 7 and the step portion 15 on the outer face of the neck portion or the container mouth 5 are engaged with each other.

[0029] It has been found that a bigger initial rotational torque is required to open the closure 7 if the closure 7 has to be rotated in a direction in which a recession of the step mark 17 on an inner face of the closure 7 climbs over the protrusion of the step portion 15 of the lap side seam 16 on the container mouth 5.

[0030] In addition to above, a coating on an edge of the outer step portion 15 may be scraped off with the inner step mark 17 of the closure 7, and a coating on the inner face of the closure 7 may also be scraped off with the edge of the outer step portion 15, when the inner step mark 17 goes beyond the outer step portion 15 of the lap side seam 16. As a result, generated coating scraps (i.e., resin scraps) may adhere to the container mouth 5 and a sealing ability of the closure is thereby degraded when the closure reseals the container. Moreover, the generated resin scraps may be mixed into the content to deteriorate hygiene of the content.

[0031] In order to prevent above-mentioned problems, according to the welded can body 2 of the invention, the recession of the step mark 17 on the thread groove 9 of the closure 7 is opposed to the protrusion of the step

portion 15 of the lap side seam 16 on the container mouth 5 when the closure 7 is being mounted on the container mouth 5, and the closure 7 is rotated in the direction to separate the step mark 17 away from the step portion 15 when it is opened. Specifically, the thread ridge 10 is formed to rotate the closure 7 in the direction from the outer (or upper) edge of the lap side seam 16 toward the inner (lower) layer when twisting the closure 7. For this reason, the recession of the step mark 17 on the inner face of the closure 7 will not climb over the step portion 15 of the outer edge of the lap side seam 16 even if the closure 7 is rotated to be opened.

[0032] Once the closure 7 is opened, the pilfer-proof band of the closure is detached from the closure 7 and the skirt portion of the closure is expanded outwardly. Therefore, when the closure 7 is applied again to the container mouth 5 to reseal the can 1, a clearance between the thread ridge 10 and the thread groove 9, and a clearance C between the outer protrusion of the step portion 15 and the inner recession of the step mark 17 are broader than those before the closure 7 is opened, as shown in Fig. 5. For this reason, interference between the step portion 15 and the step mark 15 will not interrupt rotation of the closure 7 on the container mouth 5 when resealing the can 1.

[0033] The curled portion 18 formed at the upper end of the welded can body 2 is curled outwardly, that is, the lap side seam 16 is reversed at the top portion of the curled portion 18. Consequently, an orientation of the protrusion of the step portion 15 on the top portion of the curled portion 18 is opposite to that on the outer face of the container mouth 5. Therefore, such level difference on top of the curled portion 18 has to be reduced smaller than that on the step portion 15 on the thread ridge 10 so as to minimize adverse affect on the initial rotational torque to open the closure 7. For this purpose, the level difference resulting from an overlapping of the longitudinal edge portions of the metal sheet has to be minimized as small as possible at the stage of rolling the metal sheet into the cylindrical can body 2. Specifically, the longitudinal edge portions of the metal sheet are welded together to limit the level difference preferably to 0.07 mm or smaller. In addition, it is preferable to reduce a diameter of the container mouth 5 more than 15 percent in comparison with that of the welded can body 2, so as to reduce the level difference of the step portion 15 on the container mouth 5 by a compressing force from a circumferential direction.

[0034] In case the can body is formed by so-called the "die-neck forming method", a reducing rate of the diameter of the container mouth 5 with respect to the can body 2 is smaller than 15%. Therefore, deforming effect on the lap side seam 16 is insufficient to reduce the step thereof.

[0035] A closure, in which a top panel 14 is depressed significantly as shown in Fig. 6 (A) may also be used to close a wide-open type resealable can, instead of a closure in which a top panel thereof is substantially flat. The above-mentioned reducing rate of the diameter of the

container mouth is effective in case of applying this kind of closure to the container mouth.

[0036] Specifically, in case of forming the curled portion 18 by curling the opening end of the container mouth 5 preliminary, and thereafter pressing the curled portion 18 inwardly, the formed curled portion 18 is thinned and vertically long. Therefore, a contact load between the curled portion 18 and the liner 6 established by a compressive load pressing the top panel 14 is smaller than that between a rounded (or deformed) curled portion and the liner. For this reason, sealing ability of the closure may be degraded. In order to enhance the contact load between the curled portion 18 and the liner 6, a corner portion 14a of the panel 14 is pressed outwardly and a corner portion 7a of the closure 7 is pressed inwardly, when rolling a thread around the container mouth 5. As a result, the curled portion 18 is pressed tightly by the liner 6 from both sides, and sealing ability of the liner 6 is thereby enhanced. Here, even in case the curled portion 18 is thinned as explained above, the step of the lap side seam 16 on the top of the curled portion 18 contacting to the liner 6 can be reduced to 0.05 mm or smaller by reducing the diameter of the container mouth 5 at the above mentioned reducing rate, and deterioration in the easiness to open the closure is thereby minimized.

[0037] Basically the lap side seam 16 of the can body 2 is bonded or welded. In case of welding the lap side seam 16, a coating layer 19 is applied to an inner face of a steel sheet except for both longitudinal edge portions to be welded in width of approximately 1.5 to 3.0 mm, as shown in Fig. 7. Both longitudinal edge portions of the steel sheet are thus welded without coating, therefore, the welded region has to be covered with a coating to ensure corrosion resistance. As explained above, a step is unavoidably formed at the lap side seam in consequence of forming the cylindrical trunk portion 4. The cylindrical can body 2 including the trunk portion 4 is thus formed, and the inner face thereof is covered with the coating layer 19 except for the lap side seam 16.

[0038] The uncoated inner surface of the lap side seam 16 is to be covered with a protective coating. In order to ensure both coating ability of the coating and workability, a width of a protective coating 20 shown in Fig. 7 is kept within the range of 7 to 15 mm. The protective coating 20 may consist of a single layer but also consist of a multi layers, and a coating material may be a lacquer but also be a resin tape.

[0039] A curable synthetic lacquer, more specifically, a thermoset synthetic resin of polyethylene series or phenol series can be used as the protective coating. However, a hardness of those kinds of the thermoset synthetic resins increases after heating. Therefore, the coating composition may be cracked or come off during necking and curling steps of the opening end of the container mouth 5, and pressing step of the folded layer of the curled portion. Thus, it is difficult to apply the coating thickly. For this reason, the resin tape is more favorable taking into consideration corrosion resistance.

[0040] In case of using the protective coating on the step portion 15 of the lap side seam 16, a thickness of the inner protective coating 20 has to be thin. However, if the thickness of the inner protective coating 20 is insufficient, it is difficult to cover the step portion 15 completely because of fluid nature of the lacquer. Additionally, the coating may be damaged and the corrosion resistance is thereby degraded as a result of hard forming processes such as necking and curling so as to improve easiness to open the closure. Such deterioration in corrosion resistance can be minimized by applying the resin tape having a constant thickness to the step portion 15. The resin tape will not be damaged or peeled off even after a hard forming process to enhance a sealing ability of the curled portion and flatness of the top of the curled portion, by curling the opening end of the container mouth and then pressing the curled portion inwardly. Thus, corrosion resistance can be ensured by employing the resin tape.

[0041] In case of coating the step portion 15 by affixing the resin tape onto the step portion 15, the area where the resin tape is to be applied is heated to 170 to 230°C, and then the resin tape is thermally affixed thereon. Both thermal adhesive resin tape and resin tape having a thermosetting resin adhesive layer are applicable as the inner protective coating 20. For example, polyester series resins such as a polyethylene terephthalate resin and a polybutylene terephthalate resin, a copolyester series resin consisting of polyethylene terephthalate and isophthalate, a transparent thermoplastic polymer resin selected from any of a polypropylene resin, a polycarbonate resin, a polystyrene resin, a polyolefin resin, a vinyl chloride resin, and a compound consisting of above listed resins can be used as the resin tape. In order to ensure covering ability, workability and post-formability, a thickness of the resin tape to be affixed to the inner lap side seam 16 is preferably kept within the range of 15 to 45 μm.

[0042] Both stretched tape and non-stretched tape may be used as the resin tape, however, the resin tape is preferably composed of multi layers such as a first layer to be affixed to the inner lap side seam 16 and a second layer as an inner layer formed on the first layer. Preferably, the first layer consists of a thermoplastic resin whose melting point is within the range of 175 to 230°C, and the second layer consists of biaxially-oriented thermoplastic resin whose melting point is within the range of 200 to 255°C.

[0043] In addition to above, the melting point of the second layer is preferably 15 to 80°C, more preferably, 20 to 40°C higher than that of the first layer. Here, the thickness of the first layer is more than 70% of the total thickness of the resin tape. The resin tape is thermally affixed onto the lap side seam 16, and then heated at the temperature higher than the melting point of the first layer but lower than the melting point of the second layer. The thermoplastic resin, e.g., a polyethylene resin, a modified polyethylene resin, a polypropylene resin, a modified polypropylene resin, a polyolefin series resin may also

be used as the first layer, however, in case the inner coating layer 19 is a polyester series resins such as a polyethylene terephthalate resin, the first layer is preferably formed also of the polyester series resins so as to enhance adhesiveness with the inner coating layer 19. In order to ensure corrosion resistance, workability and post-formability, a thickness of the inner protective coating 20 is preferably kept within the range of 15 to 45 μm , more preferably, 18 to 30 μm .

[0044] Since the thickness of the first layer is more than 70% of entire thickness of the resin tape, the inner lap side seam 16 can be covered completely with the resin tape even on the corner of the step portion 15. Therefore, the lap side seam 16 can be prevented certainly from rusting. In addition, a thickness of the resin tape covering the inner lap side seam 16 is preferably 15 μm or thicker thereby further reducing the level difference of the step portion 15 on the surface of the curled portion 18. As a result, the level difference of the step portion 15 on the surface of the curled portion 18 covered with the resin tape can be kept smaller than 0.05 mm, more preferably smaller than 0.04 mm. Therefore, resistance between the curled portion 18 and the liner 6 to be generated when open the closure can be minimized.

[0045] If the thickness of the resin tape covering the inner lap side seam 16 is thinner than 15 μm , it is difficult to feed and handle the resin tape at a step of affixing the resin tape to the inner lap side seam. To the contrary, if the thickness of the resin tape is excessively thick, specifically, thicker than 45 μm , it is difficult to cut the resin tape and it is economically disadvantageous.

[0046] An ordinary material for three-piece can is used for the can body 2 of the embodiment. For example, a tin free steel having two-layered coating of chrome metal and hydrated chrome, a tin plated chromate steel sheet, an extremely thin tin plated steel sheet prepared by applying nickel plating and diffusion treatment and then applying tin plating and chromate treatment, a nickel plated and chromate steel sheet and so on can be used. Basically, one of the faces of those kinds of steel sheets (i.e., a face to be an inner face of the can body) is covered with a coating layer (i.e., below-mentioned inner coating layer 19), and a thickness thereof is 0.10 to 0.25 mm.

[0047] Specifically, a tin plated steel sheet prepared by applying tin-plating in the amount of 0.5 to 3.0g/m² and thereafter applying chemical conversion surface treatment, a nickel plated steel sheet prepared by applying nickel plating in the amount of 0.3 to 2.0g/m² and thereafter applying chemical conversion surface treatment, a tin/nickel plated steel sheet prepared by sequentially applying tin-plating in the amount of 0.5 to 2.0g/m² and nickel plating in the amount of 0.1 to 0.5g/m² and thereafter applying chemical conversion surface treatment, a chrome-chromate treated steel sheet, i.e., an ordinary "tin-free steel sheet" in which a deposition amount of oxidized chrome is 0.5 to 20 mg/m² and so on, can be used as a material of the can body 2 of the invention.

[0048] An outer face of the welded can body 2 is to be decorated with a pattern or letters. Such decoration is printed, for example: by a dry laminate method comprising laminating a film in which a lubricant and a decorative pattern is applied in advance, on a metal sheet in which an adhesive agent is applied on its surface; by a method comprising applying a lubricant and a decorative pattern to a synthetic resin film such as a polyethylene terephthalate, applying a thermosetting adhesive agent to an ink layer and applying a thermoplastic adhesive agent to a surface of the film to be adhered, and thereafter drying the film and laminating the film on the metal sheet; or by a method comprising printing a decorative pattern on one of the faces of a film and applying a lubricant thereon, and laminating other face of the film directly on a metal sheet. The resin coated metal sheet thus prepared is formed into a can body of a three-piece can such as a welded can or cement seamed can by a known body forming method.

[0049] As mentioned above, the resin film for coating both inner and outer face of the can of the invention is a polyester series resin film. In order to ensure heat resistance of the film during a forming and filling steps of the can and to widen applicability of the can, the film containing alcohol component and acid component and the melting point thereof is approximate 260°C should be selected. In addition, it is preferable to use the film with elongating orientation.

[0050] The inner coating film 19 is a thermoplastic resin film the thickness thereof is thinner than 20 μm . If the thickness of the inner coating film 19 is thinner than 5 μm , the film 19 is to be damaged during the can forming process and the metal sheet material is thereby rusted. In order to prevent corrosion of the metal sheet material, it is advantageous to thicken the inner coating 19, however, it is economically disadvantageous if the thickness of the inner coating 19 is too thick. Accordingly, the thickness of the inner coating film 19 is preferably kept within the range of 5 to 20 μm .

[0051] On the other hand, an indication of content and brand are printed on an outer coating film 21 in most cases, and a thermoplastic resin film the thickness thereof is thinner than 20 μm is used as a material of the outer coating film 21. If the thickness of the outer coating film 21 is thinner than 8 μm , it is difficult to feed the film 21 at the printing step. To the contrary, if the thickness of the outer coating film 21 is thicker than 20 μm , an apparent condition is degraded and it is economically disadvantageous. Accordingly, the thickness of the outer coating film 21 is preferably kept within the range of 8 to 20 μm . Here, a urethane resin is mainly used as a binder of the ink, therefore, a heat-resistance and retort-resistance of the ink is excellent. A thickness of the ink layer is variable depending to a pattern to be printed.

[0052] The decorative pattern is to be printed on the film by a known method, and a gravure printing is preferable to improve a showing of the printed can.

[0053] As mentioned above, an adhesive agent may

be applied to the coating film to be laminated. In this case, a thickness of the agent is kept within the range of 1 to 10 μm . In order to improve an appearance of a completed can, the thickness of the adhesive agent is preferably kept within the range of 5 to 7 μm . Additionally, a white pigment of oxidized titanium or the like may be added to the adhesive agent for the purpose of camouflaging metal color of the metal sheet.

[0054] In order to ensure sufficient adhesive strength of the printed film to adhere to the can entirely, in other words, in order to prevent peeling-off of the laminated film at the can forming and heat sterilization steps after filling the content in the can, a thermosetting organic coating layer, i.e., a base coating layer may be formed underneath the resin coating film. In order to further improve vividness of the printed decoration, a white pigment of oxidized titanium or the like may also be added to thermosetting organic coating layer. Here, an additive amount of the pigment is within the range of 1 to 30 wt%. If the additive amount of the pigment is less than 1wt%, whitening effect is insufficient. To the contrary, a further improvement of the whitening effect cannot be expected even if the pigment is added more than 30wt%, and a coating performance of the coating film tends to be deteriorated if the pigment is added excessively. Thus, the additive amount of the pigment is preferably less than 30wt%, more preferably, within the range of 10 to 25wt%. In case the white pigment is not added, a thickness of the coating layer may be 1 to 3 μm , and in case the white pigment is added, the thickness of the coating layer may be 5 to 15 μm .

[0055] As explained above, the thread ridge 10 is formed around the neck portion of the welded can body 2 to rotate the closure 7 in the direction from the outer edge of the lap side seam 16 toward the inner layer to open the closure 7. For this reason, the recession of the step mark 17 on the thread groove 9 formed on the inner face of the closure 7 does not have to climb over the step portion 15 of the outer edge of the lap side seam 16 even when the closure 7 is rotated to be opened. On the other hand, the level difference of the step portion on the top face of the curled portion 18 is smaller than that on the thread ridge 10. That is, the level difference of the step portion is reduced by reducing the diameter of the neck portion of the can body 2 and covering the inner lap side seam 16 by the resin tape. As a result, resistance between the curled portion 18 and the liner 6 can be minimized so that the initial torque to open the closure 7 can be reduced.

[0056] Here will be further explained the film bonded can. First of all, a metal sheet on which a transparent, colorless or white resin film is laminated (a titanium white may be added to an adhesion layer), or a metal sheet without coating layer is formed into a cylindrical welded can body 2. Then, a coating film of thermoplastic resin printed in advance is cut into a size larger than the circumferential length of the can, and affixed to the outer circumferential face of the can body 2. The outer lap side

seam 16 is thus decorated with the printed pattern, and outer face of the welded can body 2 is repaired at the same time.

[0057] For example, homo-polyester series resins such as a polyethylene terephthalate resin and a polybutylene terephthalate resin, a copolyester series resin consisting of polyethylene terephthalate and isophthalate, a transparent thermoplastic polymer resin selected from any of a polypropylene resin, a polycarbonate resin, a polystyrene resin, a polyolefin resin, a vinyl chloride resin, and a compound consisting of above listed resins can be used as the thermoplastic resin film to be affixed to the can. The thermoplastic resin film comprises a clear coating layer on one of the faces thereof, and a decoration is printed on the other face. The decoration pattern can be printed by a gravure printing method, a flexographic printing method, a screen printing method, an electro printing method and so on. Here, in order to ensure quality of apparent of the can and vividness of printed pattern, the most preferable printing method is gravure method.

[0058] It is necessary to use an adhesive agent for affixing the thermoplastic resin film to the can, which is capable of preventing the peeling-off of the film even at the after-mentioned curing step of the coating layer, threading step, and curling step, and which is capable of preventing wrinkles on the film and the peeling-off of the film during a retort process. For this purpose, a thermosetting adhesive agent of polyester series, polyurethane series, epoxy series, polyethylene series and so on may be used.

[0059] The adhesive agent of polyurethane series consists of polyisocyanate. The adhesive agent of polyurethane series may also be prepared by mixing polyisocyanate with a compound of polyol comprising active hydrogen which reacts readily with isocyanate group. The compound of polyisocyanate is exemplified by: an aliphatic diisocyanate group including ethylene diisocyanate, 1,6 hexamethylene isocyanate; alicyclic diisocyanate such as isophorone diisocyanate; an aromatic diisocyanate group such as naphthalene diisocyanate and so on. On the other hand, the compound of polyol is exemplified by polyester polyol, polycarbonate polyol and so on.

[0060] The adhesive agent of epoxy series is exemplified by: bisphenol A, a phenol resin of diglycidyl ether and oligomer thereof, ortho phthalic acid diglycidyl ester, isophthalic acid diglycidyl ester, terephthalic acid diglycidyl ester and so on. In addition, a white pigment such as titanium dioxide and zinc oxide, a yellow pigment such as zinc chrome, a red pigment such as cinnabar and colcothar, a blue pigment such as iron blue and cobalt ultramarine, a green pigment such as chromic green and green earth and so on can be added to the adhesive agent used in this embodiment depending on the intended use.

[0061] In order to prevent seizing of the film during a high-speed can forming process by improving smooth-

ness of the outer surface of the thermoplastic resin film, and to improve threading performance of the metal sheet, a clear coating layer is formed on the outermost face of the film. A coefficient of static friction of the clear coating layer is 0.2 or smaller, and a material of the clear coating layer is prepared by adding fine particles of silica series and organic lubricant to a coating compound of acrylic or polyester series. A thickness of the clear coating layer is 0.5 to 4 μm . If the thickness of the clear coating layer is thinner than 0.5 μm , coefficient of friction cannot be reduced. To the contrary, further reduction of the coefficient of friction cannot be expected if the thickness of the clear coating layer is thicker than 4 μm . Thus, the clear coating layer is adapted to improve smoothness of the outer surface of the thermoplastic resin and to avoid seizing of the thermoplastic resin film. For example, a material of the clear coating layer is prepared by adding curing agent such as an amino resin to a polyester resin, an epoxy resin, a modified epoxy polyester resin, an acrylic resin or the like. In addition, a known lubricant may be added to the curing agent.

[0062] A circumferential length of the printed film to be affixed to the outer face of the can is 0.5 to 5 mm longer than that of the can body 2. On the other hand, a longitudinal length of the film is 0.3 to 1 mm shorter than that of the can body 2 in order not to exceed the height of the can. In order to prevent oxidization of an exposed area which is not covered by the film is preferably coated. For example, such uncovered area, i.e., both upper and lower ends of the printed can body is pressed against a felt impregnated with coating compound.

[0063] Here, a method of printing a decorative pattern on the outer face of the can body should not be limited to the above-explained method. That is, a conventional decoration method, i.e., a conventional printing and coating method in which an inner face of a uncut metal sheet material of the can body is coated to improve corrosion resistance to retain the content, and in which a trademark indicating the content is printed directly on the face of the metal sheet to be an outer face of the can body may also be applied to the invention. Moreover, in order to manufacture a wide variety of products in small quantity, a method of decorating the plain can by covering the can with a printed cylindrical heat-shrinkable thermoplastic resin film may also be applied to the invention.

Example

[0064] First of all, an outer coating film was prepared by applying a thermosetting polyester coating containing silicone lubricant in thickness of 2 μm to a biaxially-oriented polyester film of 12 μm thickness, and the film was dried. Then, a trademark was printed on the opposite face of the film (in thickness of 2 μm) by the gravure method using four colors, and an adhesive agent of urethane series to which oxidized titanium was added was applied to the printing ink layer in thickness of 5 μm . The film was then dried again. A total thickness of the outer

printed film was 21 μm .

[0065] The inner coating film was prepared by applying adhesive agent of urethane series in thickness of 1 μm to a biaxially-oriented polyester film of 11 μm thickness. Accordingly, a total thickness of the inner coating film thus prepared was 12 μm .

[0066] A chrome-chromate treated steel sheet of 0.19 mm thickness, the hardness thereof was T2.5, was used in the example. The outer printed film and the inner coating film were thermally bonded to each face of the steel sheet.

[0067] The laminated steel sheet thus prepared was cut into the size of a can body, and rolled into cylindrical configuration to expose the face to which the outer printed film was affixed. A portion where longitudinal edges of the steel sheet were overlapped was welded together, and a level difference of such overlapping portion was 0.06 mm. An outer surface of the welded lap side seam 16 was covered with the thermosetting lacquer layer 22 of epoxy series, as shown in Fig. 7. On the other hand, the lap side seam 16 of inner side was covered with a polyester resin tape 20.

[0068] That is, the first layer of resin tape covering the inner lap side seam 16 was formed of the thermoplastic resin the melting point thereof was 205°C, and the second layer was formed of the biaxially-oriented thermoplastic resin the melting point thereof was 235°C. Thus, the melting point of the thermoplastic resin forming the second layer was 30°C higher than that of the thermoplastic resin forming the first layer. Additionally, the thickness of the first layer was 82 % of the total thickness of the resin tape.

[0069] A diameter of a trunk of the welded can body thus manufactured was 200 size (inner diameter of the can trunk was 50 mm), and an open end of the can trunk side was expanded to 202 size (inner diameter of the expanded can trunk was 52.35 mm). On the other hand, multiple times of necking-in was applied to other open end of the can body to reduce the inner diameter 20%, i.e., to 40 mm, so as to form a container mouth. Then, the open end of the container mouth was folded into a pre-curved portion, and a thread ridge 10 was formed around the container mouth. The pre-curved portion was then pressed inwardly (i.e., a seam curling) to reduce the level difference on the top of the curled portion to 0.04 mm or smaller, and a bead portion was formed at the lower portion of the neck portion. An aluminum closure, in which an epoxy-phenol resin containing olefinic resin powder was applied to an inner face thereof, and in which a blending resin consisting of low density polyethylene and ethylene-propylene rubber polymer was used as a liner, was used in this example. The closure was mounted on the threaded container mouth, and a thread groove (i.e., a female thread) was rolled on a cylindrical skirt portion along the thread ridge (i.e., a male thread) of the container mouth by pushing the skirt portion by not shown thread rollers of a known capping apparatus (e.g., taught by the U.S. Patent No. 3,760,561) while pressing a top panel. At the same time, a lower end of a pilfer-proof

band situated at the lower end of the skirt portion was tightened to fit to a lower portion of the bead portion by a not shown band rollers. As a result, a wide-open type threaded can container in which an outer step portion formed of the outer edge of the lap side seam was oriented to the opening direction of the closure was prepared.

[0070] Appropriate amount of hot water of 80°C was filled in the treaded container thus prepared, and a bottom lid was seamed to a bottom of the can body. The container was then sterilized in a retort pot at 125°C for 30 minutes while being pressurized. After that, an initial torque to open the closure was measured. As a result of the measurement, it was found that the torque for opening the closure of the example was reduced 10% in comparison with the torque for opening the closure of the conventional threaded can container, in which an outer step portion formed of the outer edge of the lap side seam was oriented against the opening direction of the closure (i.e., a can container in which a step portion on the thread groove and a step mark formed on the closure interfere with each other when the closure is rotated to be opened).

[0071] After the closure was opened, attachment of scraps was examined at the outer face of the can body and the inner face of the closure, especially at the lap side seam and vicinity thereof. However, no resin scraps attaching to those portions was found, that is, there was no problem with the quality of the can. In this example, the thread was formed to open the closure anticlockwise, however, the present invention may also be applied to the can container in which a closure is opened clockwise, if the outer step portion formed of the outer edge of the lap side seam is oriented to the opening direction of the closure.

Claims

1. A threaded can container comprising:

a cylindrical can body comprising a lap side seam where longitudinal edge portions of a metal sheet are overlapped thereby forming a step portion;
a container mouth formed on an opening end of the can body where a thread ridge and a curled portion are formed thereon;
a bottom lid seamed to a lower end of the can body; and
a resealable closure, which is applied to the container mouth, and which has a resin sealing liner affixed to an inner face of a top panel thereof and a thread groove rolled on a skirt portion thereof in conformity with the thread ridge;

wherein the thread ridge is formed to rotate the closure in a direction from an outer step portion formed of an outer edge of the lap side seam toward an inner

layer of the lap side seam to open the closure.

2. The threaded can container according to claim 1, wherein:

at least an inner surface of the lap side seam of the can body is covered with a thermoplastic resin tape.

3. The threaded can container according to claim 2, wherein:

the thermoplastic resin film covering the lap side seam is a thermoplastic resin tape;
a circumferential width of the resin tape is within a range of 7 to 15 mm, and a thickness thereof is within a range of 15 to 45 μm ;
the resin tape comprises a first layer covering the lap side seam, and a second layer of biaxially-oriented thermoplastic resin formed on the first layer to contact with a content in the can;
a melting point of the first layer is within a range of 175 to 230°C, and a melting point of the second layer is within a range of 200 to 255°C;
the melting point of the resin forming the second layer is 15 to 80°C higher than the melting point of the resin forming the first layer; and
the thickness of the first layer is more than 70 percent of a total thickness of the resin tape.

4. The threaded can container according to claim 3, wherein:

a level difference in the step portion of the lap side seam is 0.07 mm or smaller;
a diameter of the container mouth is reduced more than 15 percent in comparison with that of the can body; and
a level difference in the step portion of the lap side seam on top of the container mouth is 0.05 mm or smaller.

FIG. 1

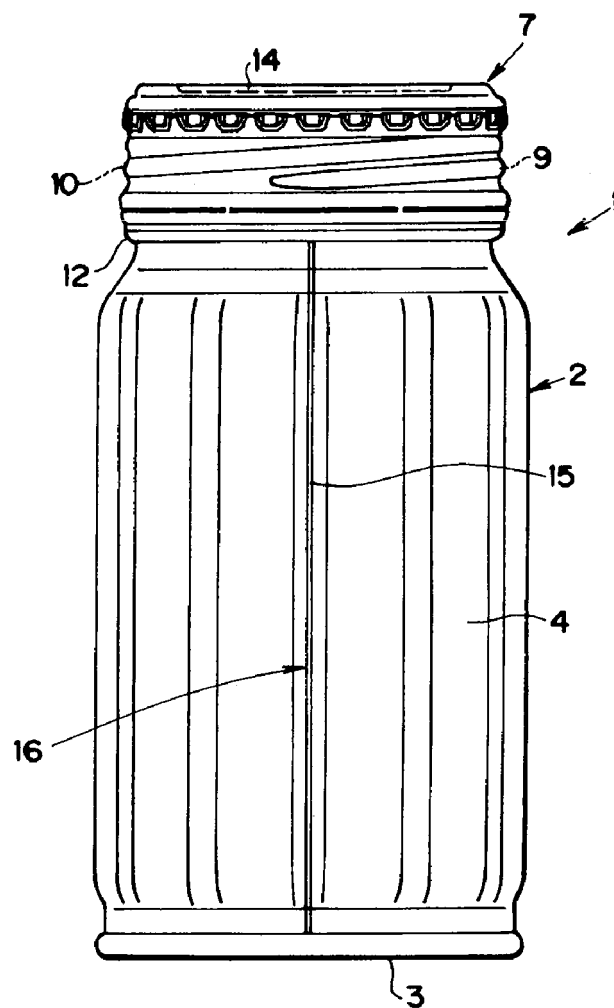


FIG. 2

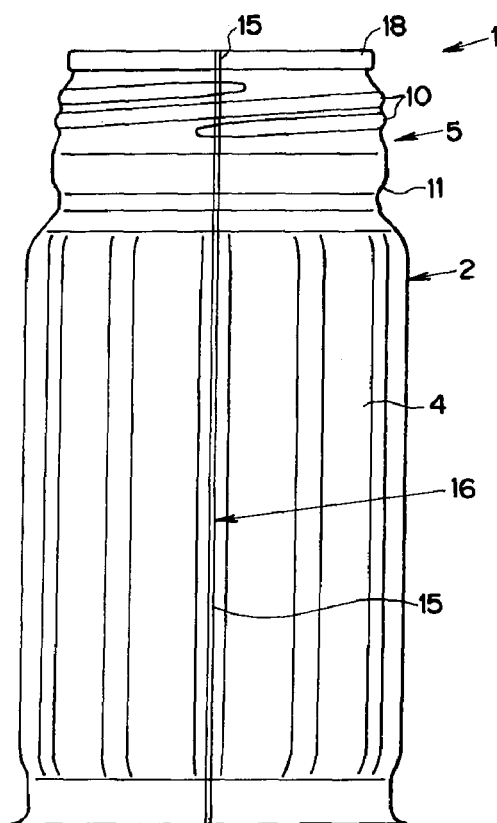
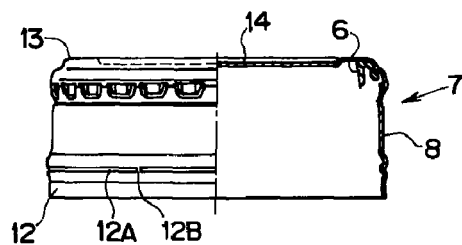


FIG. 3

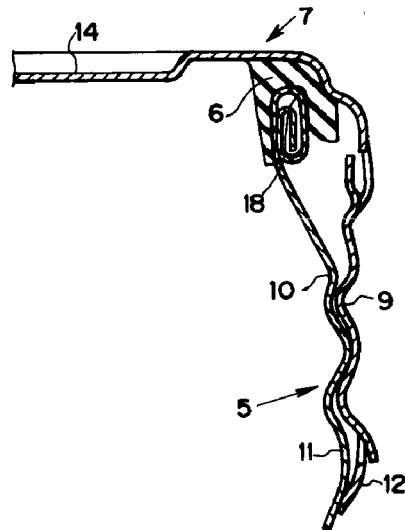


FIG. 4

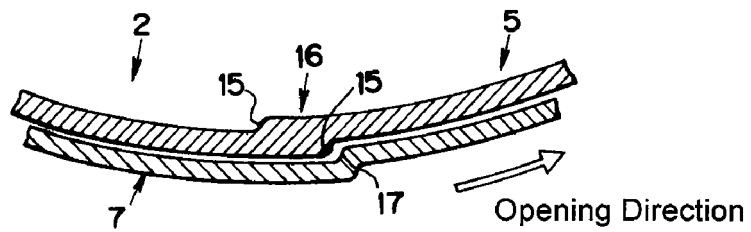


FIG. 5

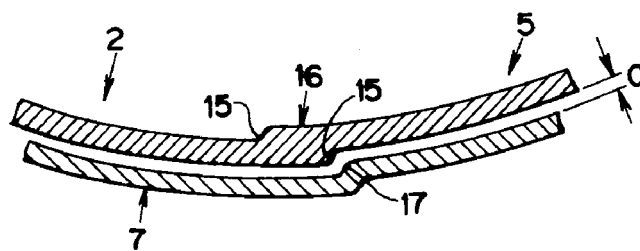


FIG. 6

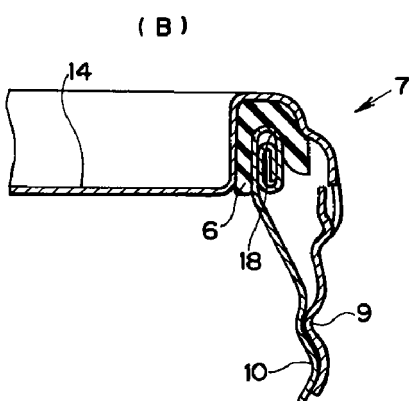
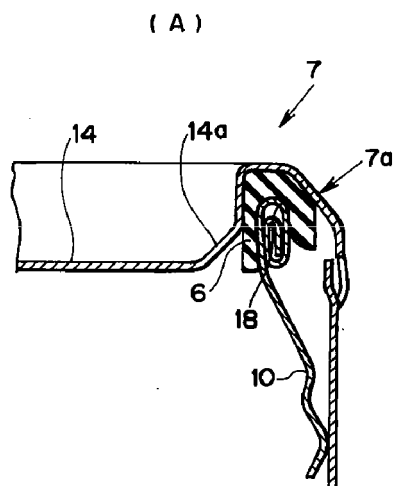
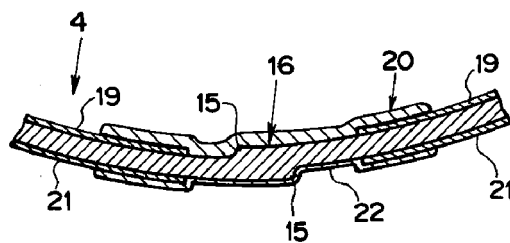


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/308023

A. CLASSIFICATION OF SUBJECT MATTER B65D8/18 (2006.01) , B65D41/04 (2006.01)		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) B65D8/18, B65D41/04		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2006 Kokai Jitsuyo Shinan Koho 1971-2006 Toroku Jitsuyo Shinan Koho 1994-2006		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2003-321039 A (Daiwa Can Co.), 11 November, 2003 (11.11.03), Par. Nos. [0030] to [0051]; Figs. 1 to 8 (Family: none)	1, 2 3, 4
Y	JP 2002-193253 A (Daiwa Can Co.), 10 July, 2002 (10.07.02), Par. Nos. [0014] to [0020]; Figs. 1 to 6 (Family: none)	3, 4
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 28 April, 2006 (28.04.06)		Date of mailing of the international search report 16 May, 2006 (16.05.06)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (April 2005)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2003321039 A [0004]
- JP 2001213417 A [0005]
- JP 2003251425 A [0006] [0007]
- US 3760561 A [0069]