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(54) METALLIC CONTAINER AND METHOD FOR MAKING THE SAME

(71) We RHEEM INTERNATIONAL, INC., a corporation organized and existing under the laws of the State of Delaware, United States of America, of 767 Fifth Avenue, New York, New York 10022, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention basically applies to metallic containers of the type consisting of a cylindrical body and cover crimped by winding of the peripheral edges of the said body and cover and/or bottom.

The characteristic features of the invention refer more in particular (but not exclusively) to containers of large capacity, e.g., drums of 100 to 200 liters.

By the very reason of these large capacities, the said containers present a contact between the bottom and body elements over a very substantial area.

The examination of photographic enlargements of the radial section of such a crimping, well known in itself, and more particularly as shown in figure 6 of the Belgian patent No. 418,665, industrialized by the applicant, reveals that it is difficult, if not practically impossible, to ensure a free, regular and continuous contact between the various metal thicknesses as exist alternately on the adjacent edges of the drum body and on the adjacent edges of the bottom or the cover.

The connection between the body and the bottom and/or cover thus implies that one should be assured not only of a large number of crimping folds, but also of additional arrangements capable of tolerating certain sliding movements of adjacent local parts, respectively of the body and the cover and bottom, during — even severe — impacts, without endangering the tight-

ness.

Moreover, it would seem that the authors of the previous patents relating to crimping between the body and the bottom or cover, have almost exclusively been considering this question of tightness.

In a general manner, the latter problem was solved by introducing between the adjacent parts of the body and the bottom or cover, an annular joint generally located in a portion of the crimping.

The object of the present invention is a metallic container of the aforementioned type, but with the characteristic that after the crimping operation, the said sealing element is designed in such a manner as to present several concentric and alternate layers in the crimping.

In a preferred embodiment, the said crimping is such that it presents seven metal thicknesses alternating with a plurality of layers of annular elements simultaneously forming an air seal and a deformable packing pro rata of the relative movements, if any, among the various metal thicknesses within the crimping. In so doing an alternation is obtained among at least five metal thicknesses and three thicknesses of a relatively elastic material.

The sealing product may consist of a natural or synthetic rubber material, well known in itself.

In the making of metallic containers, the invention provides for introduction of first and second quantities of sealing material at different times in the course of assembling a body and its cover to provide sealed crimped connection of flanges thereof.

According to the present invention there is provided a method of joining a cover to a cylindrical body to form a sealed metal container comprising the steps of applying a first quantity of sealing material in first flowability state, to a flange of the cover

before the cover is placed on the body, after said first quantity of sealing material exhibits a preselected second flowability state decreased from said first flowability state thereof, placing a flange of the body in facing relation with said first quantity of sealing material; and then introducing a second quantity of said sealing material in said first flowability state contiguous with such first quantity sealing material between said cover flange and said body flange while jointly winding said body and cover flanges together to form a seam.

In a preferred practice, the cover flange has a preliminary curl and the first quantity of sealing material is applied thereto during such winding to form a layer contiguous with the curled cover flange. The cover is then permitted to stand until the sealing material applied thereto decreases in flowability to achieve a relative set. The cover is next applied in interfitted relation with the as yet unwound drum radial flange and the second quantity of sealing material is introduced adjacent the first quantity sealing material into and adjacent the space between the body and cover radial flanges as they are jointly wound such that the fully crimped connection thereof has a continuous layer of sealing material contiguous with and intermediate the fully wound flanges. Such second application of sealing material may be accomplished by spray injection and the material is dispersed between the flange surfaces by centrifugal force generated by rotation of the drum and cover in a seaming or winding machine.

By way of non-limiting examples, practices and embodiments are described below with reference to the attached drawings.

Figs. 1 to 3 are sectional views of an edge of a cylindrical drum body and of a cover in assembly according to the preferred practice of the invention;

Fig. 4 is a sectional view, taken radially, of the seal between the cover and body of a completed container assembly;

Fig. 5 is a sectional view similar to Fig. 1 but showing an assembly according to an alternative practice of the invention.

Referring to the completed assembly of the invention in Fig. 4, the peripheral edge of the bottom or cover 1 and the portion juxtaposed on the corresponding portion of the adjacent edge of the body of the drum 2 are wound at the same time as the layer forming the sealing element, in such a manner that the resulting crimping presents seven metal thicknesses 3 to 9, alternating with at least three to five thicknesses of a sealing material, respectively 10 to 14.

In so doing, a crimping is obtained in which the contact area of metal on metal is for a large part replaced by a contact of metal on sealing material.

This embodiment can be applied in shapes that are basically variable pro rata of the number of crimping folds, of the number of thicknesses of sealing material, and of the nature of the utilized sealing material.

It can be seen that contrary to the conventional embodiments of crimping with an air seal, the illustrated seal is not confined to a relatively restricted portion of the crimping, but is designed in such a manner as to present a maximum contact area with the metal. Moreover, the layers of sealing material are applied at a height which adjoins the height of the crimping.

It results from this novel concept that the sealing material participates much more in the crimping, by ensuring a satisfactory tightness, as well as a crimping in which the metal folds may possibly absorb certain relative movements, e.g. in case of accidental impacts. These possible relative movements are such that, even in case of permanent deformation—of course within certain given limits—a contact continuity is maintained between the metal thicknesses and the layers of sealing material.

In reaching the completed assembly of Fig. 4, cover 1 is wound or curled at its flange 1a, to the extent (exceeding 180°) as shown in Fig. 1, while unassembled with drum body 2. The pre-curved cover has a first quantity of sealing material S_1 applied in flowable state to flange interior surface 1a-1 during such curling. Next, after sealing material quantity S_1 exhibits a preselected decrease in flowability and forms sealing material thickness 11, the cover is assembled with the flange 2a of drum body 2 with sealing material quantity S_1 facing drum flange surface 2a-1 as shown in Fig. 1, and flanges 1a and 2a are jointly wound, as shown in transition in Figs. 2 and 3 to the final crimped connection of Fig. 4. A second quantity S_2 of sealing material is introduced in the course of such joint flange winding, as shown in Fig. 2, contiguous with the relatively set sealing material quantity S_1 and with the opposing flange surfaces, forming sealing material thickness 12 successive to thickness 11 and thickness 13 successive to thickness 12. The final phase of joint winding of the flanges forms sealing material thickness 10.

In an alternative practice shown in Fig. 5, cover 1 and drum 2 are disposed as indicated with flange 1a of cover 1 having radial extent beyond that of flange 2a of drum 2 and having the first quantity S_1 of sealing material previously applied to and set upon cover flange surface 1a-1. Flange 1a is now wound or curled initially, as shown in Fig. 1, such that flange 2a is intermediate successive courses of flange 1a. Such preliminary winding of the flange,

practiced as shown in Fig. 1, is now continued as in Figs. 2, 3 and 4 with sealing material quantity S_2 being introduced as above discussed.

- 5 The pre-curved (Fig. 1) or uncurved (Fig. 5) cover flange is permitted to stand, before assembly with the drum, for a sufficient period of time to affect a decrease in the flowability of sealing material quantity S_1 from its degree of flowability at the time of its application to flange surface 1a-1 such that the first quantity material S_1 is not displaced within the flanges upon introduction and winding of the second quantity material S_2 . In the case of natural or synthetic rubber material, a standing period of several hours is sufficient. As will be appreciated, in use of sealing materials having a gelling or relative setting facility which is faster than that of natural or synthetic rubber, the setting time period may be reduced from such several hour period.

In introducing the sealing material quantities in the described practices, spray injection techniques are effective and are practised by use of spray gun SG (Fig. 2) with the spray being applied over somewhat more than the entire circumference of the flanges. In winding the flanges in a customary seaming machine, the latter introduced sealing material is desirably dispersed between the flange surfaces by centrifugal force generated upon rotation of the cover and drum by the seaming machine.

35 The invention refers to metallic containers and more particularly to metallic drums in which the bottoms and/or covers are fixedly connected with the body of the container by crimping.

40 WHAT WE CLAIM IS:—

1. A method of joining a cover to a cylin-

drical body to form a sealed metal container comprising the steps of applying a first quantity of sealing material in first flowability state to a flange of the cover 45 before the cover is placed on the body; after said first quantity of sealing material exhibits a preselected second flowability state decreased from said first flowability state thereof, placing a flange of the body 50 in facing relation with said first quantity of sealing material; and then introducing a second quantity of said sealing material in said first flowability state contiguous with such first quantity sealing material between 55 said cover flange and said body flange while jointly winding said body and cover flanges together to form a seam.

2. A method as claimed in claim 1 wherein said first quantity of sealing 60 material is applied to a cover flange which has a curled edge.

3. A method as claimed in claim 2, wherein said cover flange curled edge is curled through an angle exceeding 180°. 65

4. A method as claimed in claim 1, 2, or 3, wherein said body is rotated whereby said second quantity sealing material is dispersed between said flanges by centrifugal force. 70

5. A method of making a sealed metal container substantially as hereinbefore described with reference to the accompanying drawings.

6. A container when made by the 75 method of any preceding claim.

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