

Sept. 2, 1969

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3,464,579

WATER-TIGHT PLASTIC CONTAINER,

Filed June 1, 1967

4 Sheets-Sheet 1

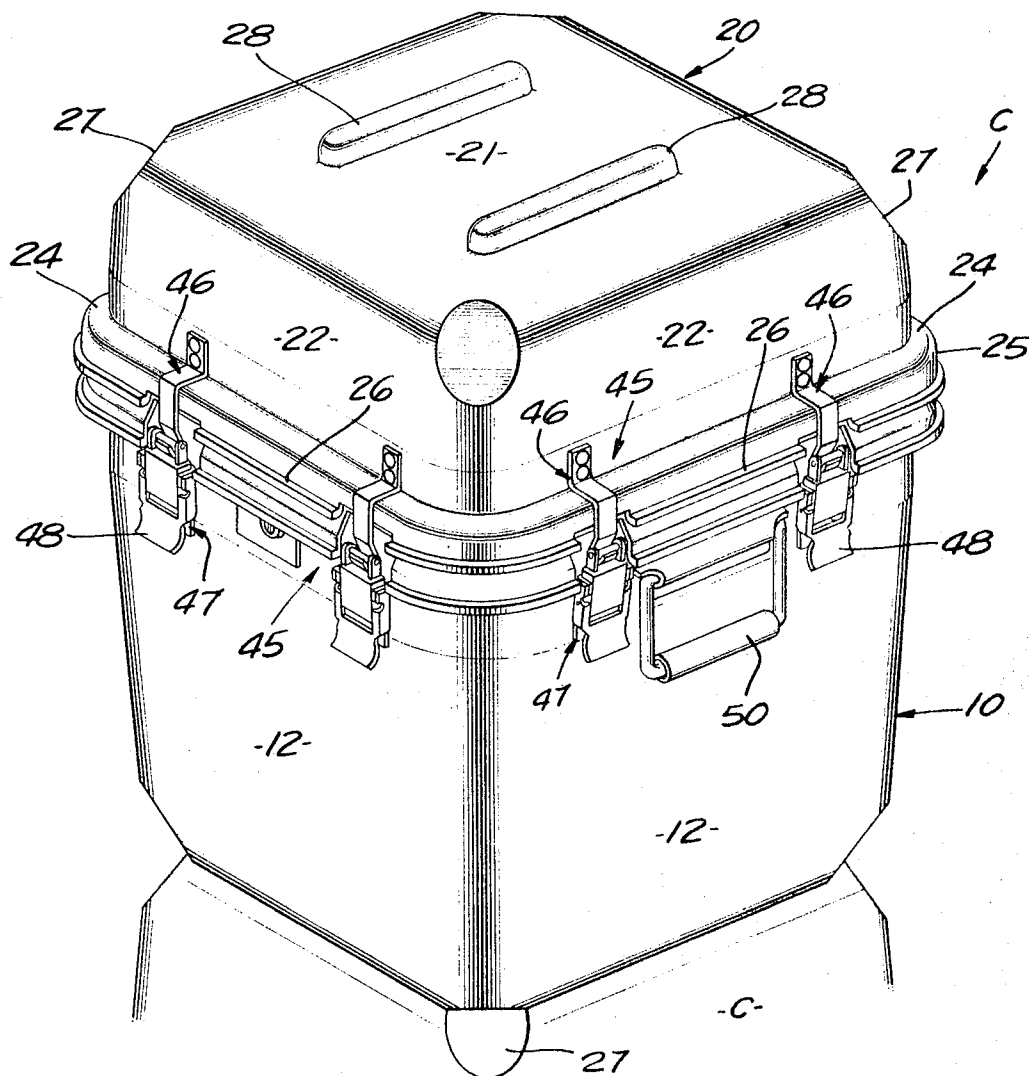


FIG. 1.

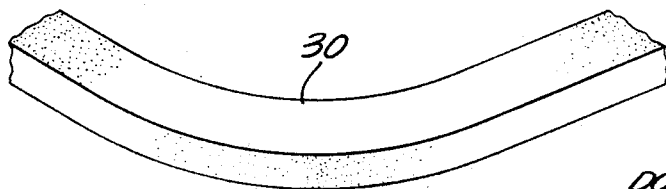


FIG. 12.

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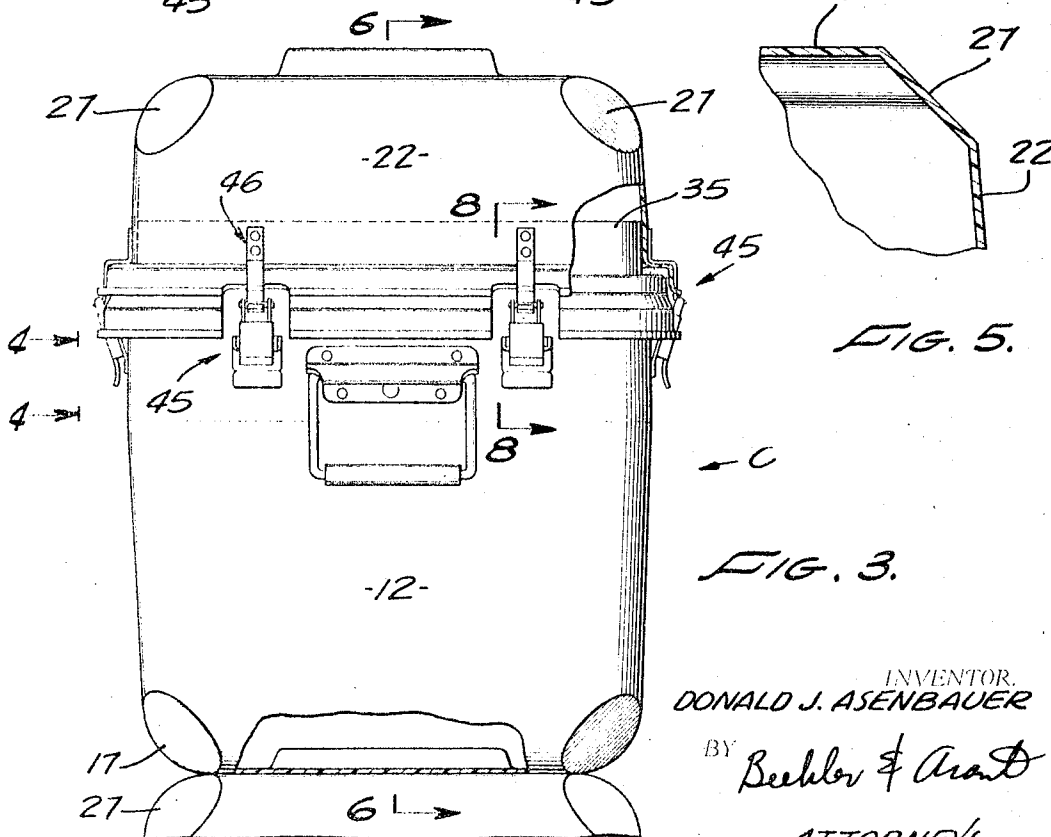
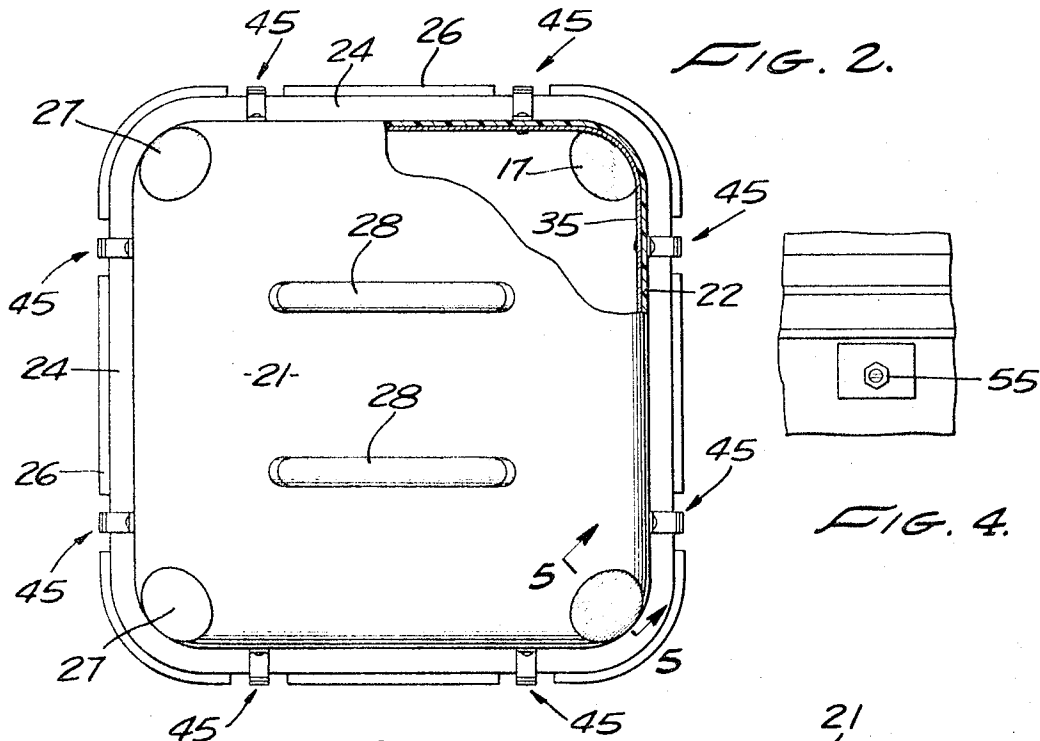
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WATER-TIGHT PLASTIC CONTAINER

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4 Sheets-Sheet 2



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WATER-TIGHT PLASTIC CONTAINER

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4 Sheets-Sheet 3

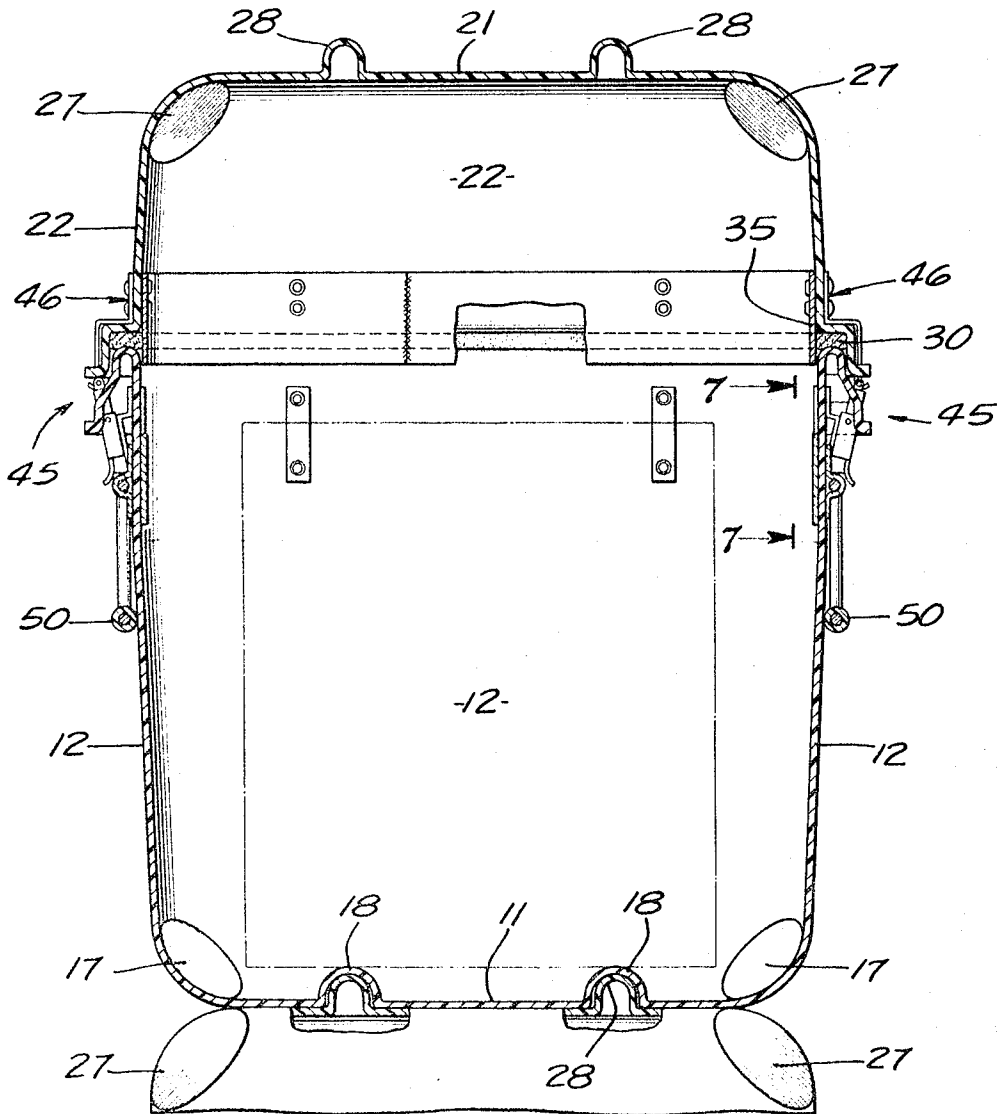


FIG. 6.

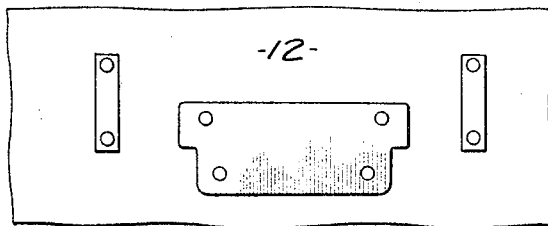


FIG. 7.

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WATER-TIGHT PLASTIC CONTAINER

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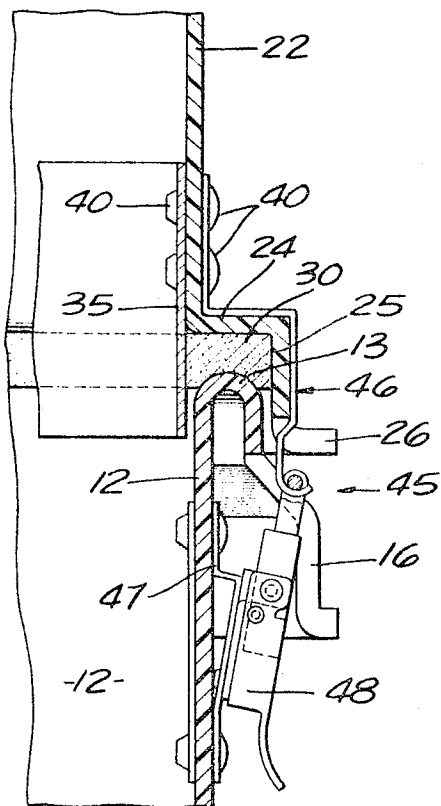


FIG. 8.

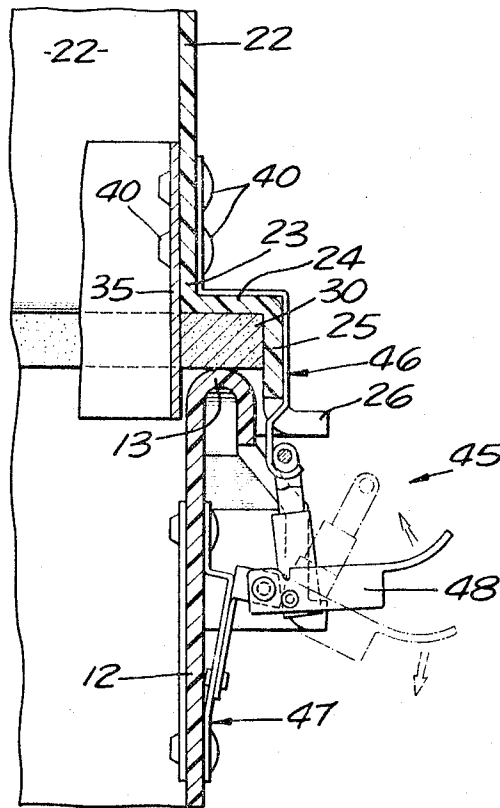


FIG. 9.

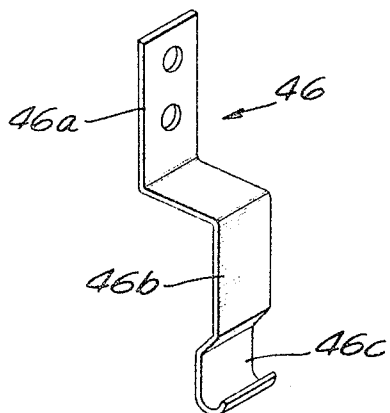


FIG. 10.

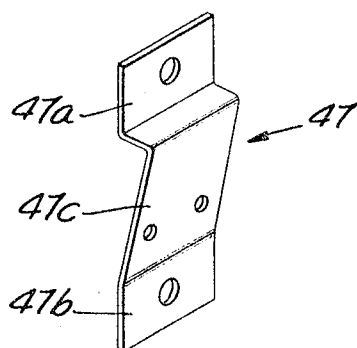


FIG. 11.

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WATER-TIGHT PLASTIC CONTAINER

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U.S. Cl. 220—4

8 Claims

ABSTRACT OF THE DISCLOSURE

A container having upper and lower parts, each of which is integrally formed of thin-walled plastic material, one of the container parts having an extremity which is curved through an angle of 180° to form a circumferentially extending male joint, the extremity of the other container part being first turned radially outward to form a shelf and then turned at the outer edge of the shelf to form a projecting flange serving as an extension of the container wall; a rigid metal band attached to the inner wall of the second container part adjacent the shelf, and extending beyond the shelf in parallel relationship to the projecting flange; a resilient sealing ring located on the shelf and retained in place by both the flange and the rigid band; latch devices located in circumferentially spaced positions around the container and each including an upper plate secured to one of the container parts and a lower plate secured to the other container part; and rigid fastening means attached to the rigid band and extending through the associated container wall and attached to the corresponding latch plates.

The present invention relates to a water-tight plastic container having a novel construction of the sealing joint between the two portions of the container.

Background of invention

Practical considerations involved in the manufacture of plastic containers limit both the configurations and the mechanical strength characteristics of the end product. In forming a two-part container in which one part has a circumferential edge acting as a male joint member and the other has a circumferential edge acting as a female joint member, the forming of the male joint member is a relatively straight-forward proposition. Where the parts are being made by a stretch-forming process it is not conveniently possible to form the entire female joint member from the plastic sheet material.

The present invention provides such a structure in which a rigid band is inserted on the interior of the container part that is to form the female joint member. The plastic material itself is then used to provide the bottom and outside walls of the female joint, while the rigid metal band provides the inner wall. Latch devices for securing the two halves of the container together are mounted on the outer wall surfaces, and a further significant feature of the invention is that an ingenious and very effective method is used for supporting the latch devices from the rigid metal band rather than merely from the plastic parts themselves.

Drawing summary

Reference is now made to the drawings illustrating the presently preferred embodiment of the invention, wherein:

FIGURE 1 is a perspective view of the container in assembled condition with the latches closed;

FIGURE 2 is a top view of the container of FIGURE 1, with a portion of the lid structure being shown in cross-section;

FIGURE 3 is a side elevational view of the container,

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with portions being broken away in cross-section to illustrate internal features of construction;

FIGURE 4 is a fragmentary view taken on the line 4—4 of FIGURE 3;

FIGURE 5 is a fragmentary cross-sectional view taken on the line 5—5 of FIGURE 2;

FIGURE 6 is an elevational cross-sectional view taken on the line 6—6 of FIGURE 3;

FIGURE 7 is a fragmentary view of an interior wall portion of the container taken on the line 7—7 of FIGURE 6;

FIGURE 8 is an enlarged fragmentary cross-sectional view of the joint construction, taken on the line 8—8 of FIGURE 3;

FIGURE 9 is like FIGURE 8 but shows the latch in a partially open position;

FIGURE 10 is a perspective view of an upper latch plate;

FIGURE 11 is a perspective view of a lower latch plate;

FIGURE 12 is a fragmentary perspective view of the sealing ring.

Preferred embodiment

Reference is now made to the drawings for a description of the presently preferred embodiment of the invention. Identical containers C (FIGURES 1 and 3) are adapted to be stacked on top of each other in conventional fashion, with proper alignment being assured by the interengagement of lugs 28 on the top of one container with lugs 18 on the bottom of the superimposed container. Each container includes a lower part or box member 10 which has a bottom wall 11 and a generally perpendicular side wall 12. It also includes an upper part or lid member 20 having a top wall 21 and downwardly depending side wall 22. A male joint portion 13 is formed on the upper circumferential edge of the box member 10, as will subsequently be described; and a female joint is formed on the lower circumferential edge 23 of the lid member 20. A plurality of latch devices 45 are circumferentially spaced at separated locations around the container, for securing the upper and lower parts of the container together.

The structure of the male joint will now be described in detail. Side wall 12 of a second wall member or box member 10 is substantially vertical but somewhat outwardly flared. At its upper extremity the male joint portion 13 is formed, which consists of a 180° outward turn in the wall, the wall then extending vertically downward at the outer circumferential edge of the joint. Beyond the male joint 13 an additional flange 16 is provided, which extends outwardly and downwardly at an angle of about 45° relative to the side wall 12 and also at an angle of about 45° relative to the horizontal. The flange 16 is a useful part of the container as a whole but is not an essential part of the male joint itself.

The female joint is formed in part by the first wall or lid member 20 and in part by a rigid metal band 35. The construction of the lid member 20 will first be described. At the lower extremity 23 of the side wall 22 the wall is turned outwardly to form a horizontally outwardly extending shelf 24. The shelf 24 has a considerable width, several times the thickness of side wall 22. At the radially outward edge of shelf 24 the wall is turned downward to form a downwardly projecting flange 25 which is essentially an extension of the wall 22. At the downward extremity of flange 25 the wall is curved and turned outwardly for a short distance forming an additional flange 26. The additional flange 26 is not an essential part of the female joint, but is, however, a useful part of the container as a whole.

The rigid metal band 35 is a single flat piece which

extends circumferentially around the entire interior surface of the wall 22, the ends of the band 35 being butt-welded together at a location not shown. The thickness of band 35 is somewhat less than the thickness of wall 22, and its width is about three times as great as the vertical projection of flange 25. The upper portion of the rigid band 35 is secured to the interior surface of wall 22 in such a position that the lower portion of band 35 extends below the shelf 24 in parallel relationship with the flange 25. The lower extremity of band 35 is at about the same elevation as flange 26.

A sponge neoprene sealing strip or ring 30 completes the female joint structure. Sealing ring 30 is of a substantially rectangular cross-section with its width being approximately equal to the width of shelf 24, and the thickness of the ring being less than its width. Sealing ring 30 is disposed on the under surface of shelf 24 and is therefore retained in position both by the flange 25 and by the rigid metal band 35.

The latch devices 45 are circumferentially spaced about the container. Each latch device includes a first or upper metal latch plate 46, a second or lower metal latch plate 47, and a latch means or clamping mechanism 48. The clamping mechanism 48 is of conventional construction and need not be described in detail. The upper latch plate 46 and the lower latch plate 47 are shown in FIGURES 10 and 11, respectively. The latch plates are also of generally conventional construction, but their shapes are adapted to meet the requirements of this particular container. Specifically, the upper latch plate 46 has an upper shank 46a in which a pair of rivet holes are formed for the purpose of fastening the latch plate to the container wall 22, and it also has a lower shank 46b which is parallel to the upper shank 46a but displaced outwardly therefrom by a lateral distance which is equal to the width of shelf 24. A hook 46c is located directly beneath and at the lower end of the shank 46b.

The lower latch plate 47 has an upper shank 47a in which a single rivet hole is formed, and a lower shank 47b in which a single rivet hole is formed, these two shanks being aligned so that both will engage the flat outer surface of container wall 12. The central longitudinal portion 47c of the latch plate 47 is inclined upwardly and outwardly at an angle of about 10°, as is most clearly seen in FIGURES 8, 9 and 11. The clamping mechanism 48 is fastened to the central latch plate portion 47c, and is adapted for a purely longitudinal pull. Therefore, in the operation of the latch as shown in FIGURES 8 and 9, the clamping of the clamp mechanism serves to pull the hook 46c in a primarily downward direction, but at the same time inwardly of the container. The effect of this latch arrangement is that the sealing ring 30 is even more narrowly restricted against radially outward flow toward the flange 25 when the latches are closed, than it would otherwise be. So a very effective sealing joint is obtained.

An additional feature of great significance is the use of rigid fastening means which join the upper shank 46a of each of the upper latch plates with the metal band 35. As best seen in FIGURES 8 and 9 a pair of rigid fastening means or rivets 40 pass through the openings in latch plate shank 46a, hence through the plastic wall 22 of the lid member 20 immediately adjacent the shelf 24, hence through the rigid metal band 35, and are turned over and secured on the inner surface of the metal band. In this manner a rigid support of the metal band 35 is achieved from the latch plate 46, and at the same time, a rigid support of the latch plate 46 is achieved from the rigid metal band 35. The rigid metal band 35 is therefore firmly secured against radially inward movement, and effectively prevents radially inward flow of the sealing ring 30 when the container is in its closed condition with the latches fastened.

An additional feature of some significance is that the outer flanges 26 of the lid member and the outer flange 16

of the box member are recessed at each of the various latch locations. This feature of the construction is clearly seen from FIGURES 1, 2, and 8. The advantage of this feature of the construction is that the latches are located within the exterior outline of the container, and are therefore less subject to damage or interference than they would be if in an exposed position.

The container is also provided with a pair of carrying handles 50 on two of its opposite sides, as shown in FIGURE 1. This feature is not absolutely essential because the downwardly depending flange 16 of the box member 10 may be very effectively used as a carrying handle.

In its presently preferred form the container is of a generally rectangular configuration. The box member 10 is of essentially square configuration in the horizontal plane, and so is the lid member 20. In its presently preferred application as an instrument case the container must be secure against breakage for any reason. It is therefore preferred to provide the lid member 20 with flat truncated corners 27 and similarly provided the box member 10 with flat truncated corners 17. The truncated corners increase the strength of the corner structures and minimize the possibility of breakage of the container due to falls or jarring.

An additional special feature of the container is a pressure equalizing valve 55 which is shown in FIGURE 4. This valve is used in the application where the container is used as an instrument case in aircraft, and it is desired to equalize the internal and external pressure levels.

Alternate forms

While the presently illustrated container is of rectangular configuration it will be readily appreciated that the unique sealing joint construction may be utilized equally well in a container that is of circular, oval-shaped, or other cross-sectional configuration. The rigid band 35 while preferably made of metal may also be made of another rigid material such as rigid plastic. Handles 50 are not essential and may readily be dispensed with. While the presently illustrated container utilizes eight of the latches 45, two on each side wall, four latches would be quite sufficient for most applications. A particular configuration of the latch arrangement is illustrated, but it will be readily appreciated that many other suitable latch arrangements could be used that would provide satisfactory results.

The invention has been described in considerable detail in order to comply with the patent laws by providing a full public disclosure of at least one of its forms. However, such detailed description is not intended in any way to limit the broad features or principles of the invention, or the scope of patent monopoly to be granted.

Having described the invention, what is claimed as new in support of Letters Patent is:

1. A fastening and sealing joint for a container having two joining parts, comprising:

- a first thin-walled resilient wall member having an extremity formed into a generally Z-shaped cross-section so as to provide a substantially flat shelf and a flange projecting beyond said shelf;
- a flat rigid metal band disposed in generally parallel relationship to said flange and engaging said first wall member on the surface thereof remote from said flange, said shelf, flange, and metal band together providing a generally U-shaped trough;
- a plurality of first metal latch plates each having a generally Z-shaped cross-section, being disposed in spaced locations along the length of said flange and each engaging said first wall member on the outer surface of said flange, beneath said shelf, and on the wall portion immediately adjacent to said shelf;
- a plurality of rigid fastening means attached to said metal band and each extending through said first wall member immediately adjacent to said shelf and being rigidly fastened to a corresponding one of said first

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latch plates whereby said metal band and said first latch plates together provide a rigid supporting structure for said resilient shelf and flange;

a second wall member having a rounded edge forming a male joint portion adapted to cooperate with said U-shaped trough to provide a joint;

a plurality of second metal latch plates attached to said second wall member;

and a plurality of latch means each cooperable with a corresponding pair of said latch plates to force said latch plates together and thereby maintain said two wall members substantially in alignment in a common plane while compressively forcing said male joint portion of said second wall member into and against said U-shaped trough provided by said first wall member and said metal band.

2. A joint as claimed in claim 1 wherein said second wall member is made of thin-walled resilient material and is curved through an angle of 180° to provide said male joint portion.

3. A joint as claimed in claim 1 which further includes a resilient sealing strip disposed on said shelf and compressed between said male joint portion and said shelf.

4. A joint as claimed in claim 2 which further includes a resilient sealing strip disposed on said shelf and compressed between said male joint portion and said shelf.

5. A water-tight container as claimed in claim 1 wherein said first wall member forms a hollow box having said U-shaped trough extending around the entire circumferential edge thereof, and said second wall member forms a

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hollow lid having said male joint portion extending around its entire circumferential edge.

6. A water-tight container as claimed in claim 5 wherein said second wall member is made of thin-walled resilient material and is curved through an angle of 180° to provide said male joint portion.

7. A water-tight container as claimed in claim 5 which further includes a resilient sealing strip disposed on said shelf and compressed between said male joint portion and said shelf.

8. A water-tight container as claimed in claim 6 which further includes a resilient sealing strip disposed on said shelf and compressed between said male joint portion and said shelf.

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U.S. Cl. X.R.

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