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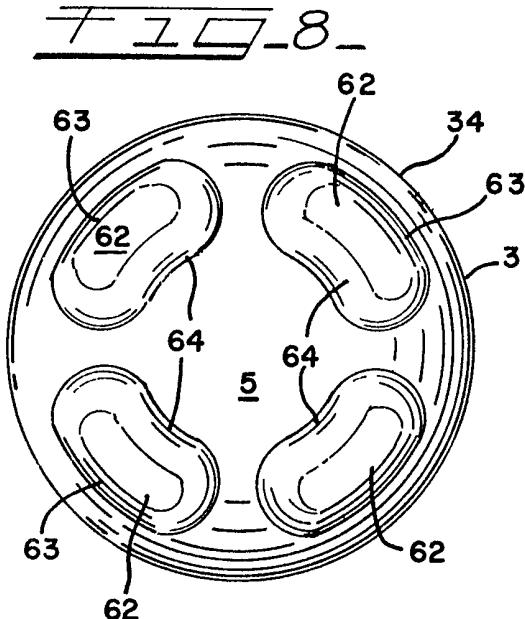
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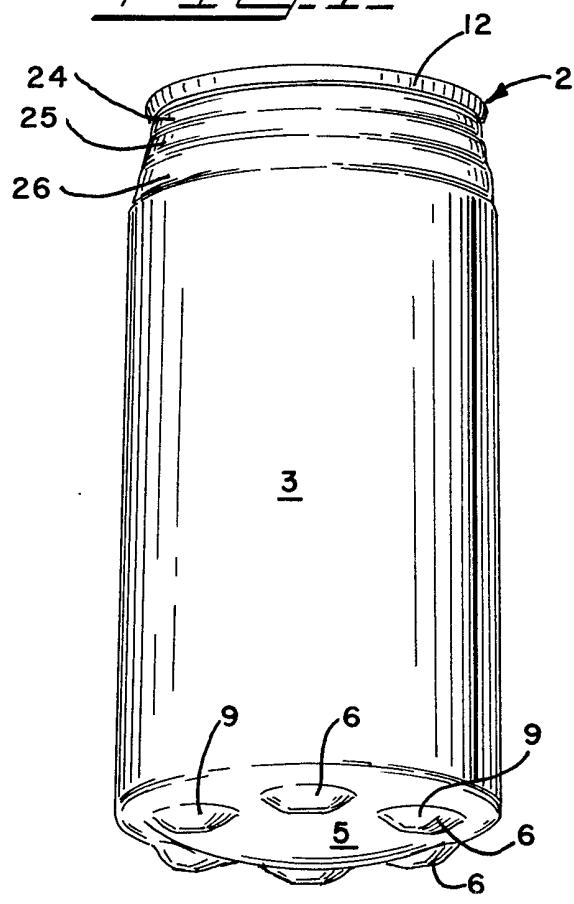
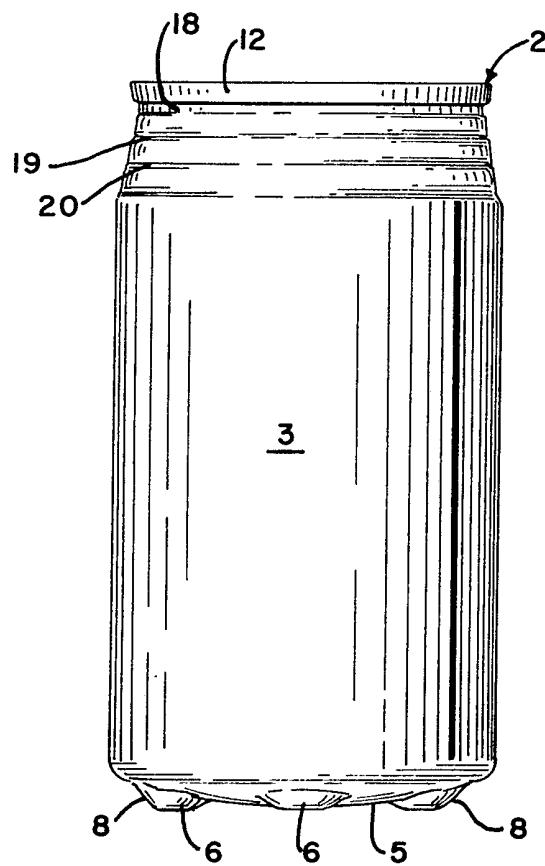
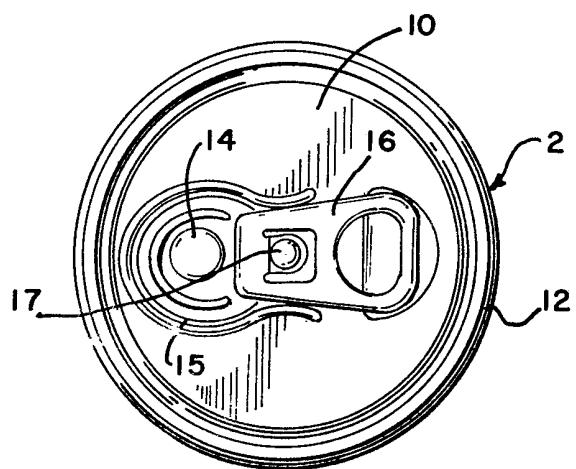
## (54) Convex-bottom, two-piece containers

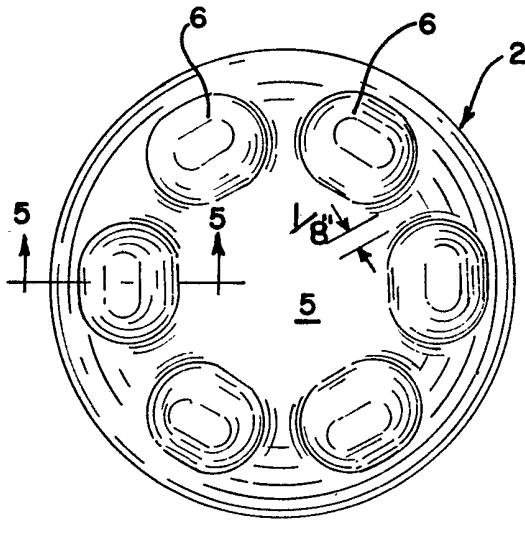
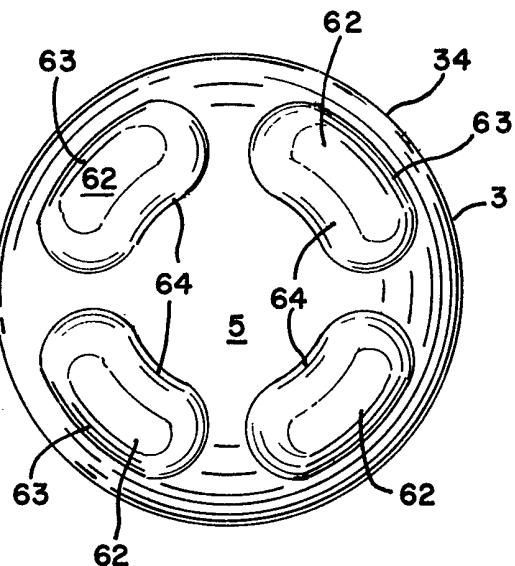
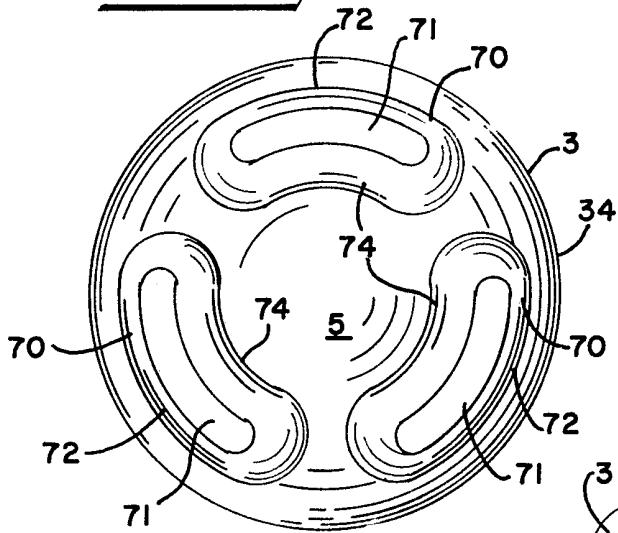
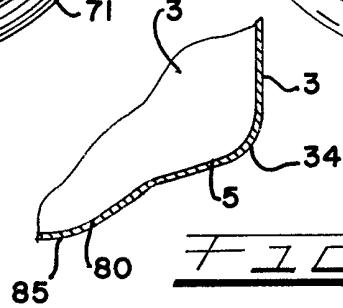
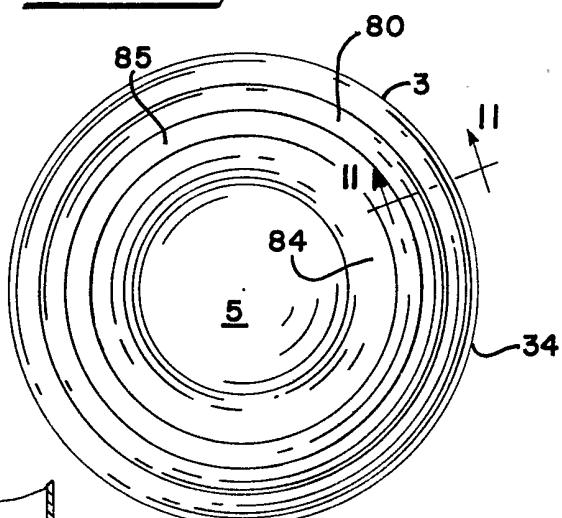
(57) A container made of thin sheet metal such as aluminium comprises a cylindrical side wall 3 substantially thinner than the bottom 5 which has a generally spherical section with at least one nonsymmetrical projections thereon providing a seating surface 62 offset outwardly of the axes of

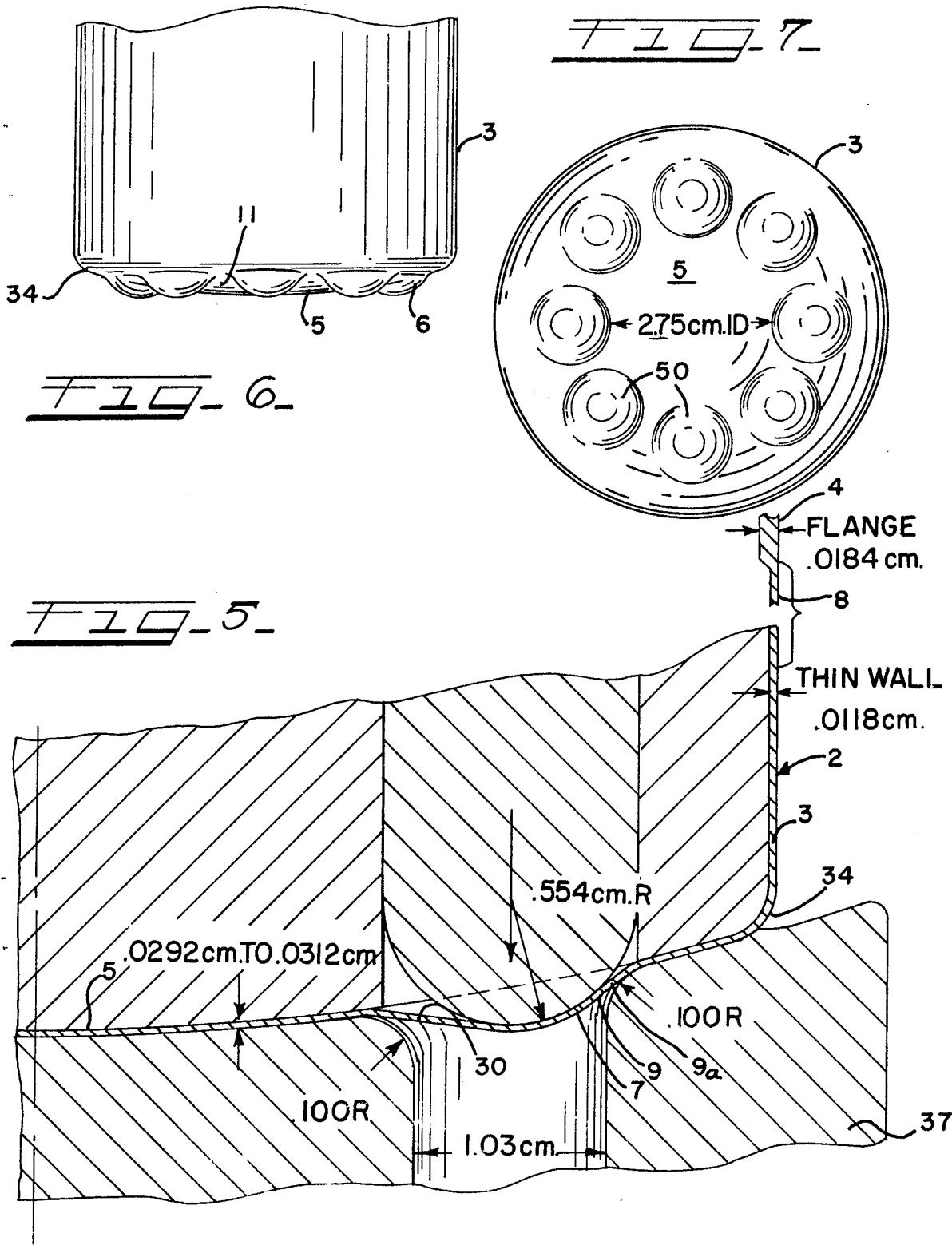
respective projection(s) to provide a stable support for the container. Transition areas between the projection(s) and the can bottom merge in broad curved surfaces which will not hinder spray coating of the bottom. The outer wall 63 of the or each projection forms a greater angle with the bottom than does the inner wall 64. The projection(s) may be oval, kidney-shaped circular or annular in plan view.



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FIG. 1FIG. 2FIG. 3

チユロ-4-チユロ-8-チユロ-9-チユロ-10-チユロ-11-



## SPECIFICATION

## Convex bottom two-piece container

This invention relates to thin metal containers.

Two-piece containers are well known. They

5 comprise a body with an integral bottom at one end and a top end seamed to the other end of the body. One of the problems encountered by the industry in forming a thin-walled metal can structure resided in forming a suitable bottom 10 which would seat the can in a stable position upon the conveyors. When empty, the cans are carried to the filler and then when the cans are filled, they are carried away to the packing stations. The way such cans were made was to form a callotte in the 15 can bottom so as to hold the pressure in the can without deforming and to provide an annular seating rim about the edge of the can body to stabilize the can as it was being transported. An example of such can is shown in U.S. Patent 20 3,029,507. Other cans provide flexible bottoms which are concaved toward the interior of the can when unpressurized and expand into convex shape when pressurized. An example of such can is shown in U.S. Patent 1,788,261.

25 The object of this invention is to provide a can which meets accepted standards of stability of a flat bottom can such that it will not easily tip and will withstand normal abuse of transport and stacking.

30 The present invention provides a thin metal container comprising a body providing a side wall, an outwardly convexed bottom wall integrally formed with said body, a plurality of outwardly projecting seating dimples formed in said bottom 35 wall having lower end portion extending below said bottom wall and providing seating surfaces for said container offset outwardly of the axes of respective dimples, said dimples being formed to provide transition areas with said bottom wall of 40 relatively shallow angles.

These and other features and advantages inherent in and encompassed in the invention will become more apparent from the specification and drawings, wherein:

45 Figure 1 is a perspective view of a can embodying one form of the invention;  
 Figure 2 is a side, elevation thereof;  
 Figure 3 is a top plan view thereof;  
 Figure 4 is a bottom plan view thereof;  
 50 Figure 5 is a fragmentary axial section taken on line 5—5 of Figure 4;  
 Figure 6 is a fragmentary side elevation of a can embodying another form of the invention;  
 Figure 7 is a bottom plan view of the can 55 shown in Figure 6;  
 Figure 8 is a bottom plan view of another embodiment of the invention;  
 Figure 9 is a bottom plan view of still another embodiment;  
 60 Figure 10 is a bottom plan view of still another embodiment, and  
 Figure 11 is an enlarged fragmentary cross section taken substantially on line 11—11 of Figure 10.

65 In Figures 1—5 there is shown a metal can made of H19—3004 aluminium or the like, which is drawn and wall-ironed. It comprises a thin wall body portion 3 of the order of .0118cm. (about .0047 inches) which at its upper end 4 is about .0184 cm. (about .0073 inches thick.) The bottom 5 has an outwardly convexed generally spherical contour of about 12.38 cm. (about 4-7/8 inch) radius and has a thickness of about .0292 cm to .0312 cm. (about .0115 inches to .0123 inches)

70 and about its periphery merges in a .0327 cm. (about a 1/8 inch) radius with the lower edge of the side wall of the body.  
 The bottom 5 is formed with a plurality of hollow outwardly bulged generally oval shaped 80 lopsided dimples or feet 6 which project below the bottom surface 11. In the container illustrated, six feet are provided spaced diametrically from each other center to center about 4.44 cm (about 1.75 inches). Each dimple has a cusp 7 of about 5.54 85 cm. (about .218 inch) radius and merges on its internal side in a steep sided wall portion 9a with the bottom wall surface 9 in a radius of about .254 cm (about .100 inches).

The upper flange portion 8 of the container 90 body wall with the flange portion 4 is triple-necked to reduce the diameter of the top end of the container. An end member 10 is double seamed at 12 to the portion 4 of the body.  
 The end panel comprises an openable segment

95 14 which is defined by a score 15 adapted to be ruptured by lifting a lever tab 16 which has a hinge lug secured by a rivet 17 to the end panel as is well known in the art.  
 A steeped arrangement is provided by three 100 necked in annular portions 18, 19 and 20 and the provision of the intervening frusto-conical juncture bands 24, 25 and 26, which are of relatively shallow conical angle not exceeding substantially 30° axial. The positioning of the 105 necked in regions adjacent to the end of the body obtains axial loading strength in the can body within require parameters.

It will be seen that the outer walls 9a of each dimple is more abrupt or extends axially at an 110 abrupt angle to the bottom 5 than the inner wall portion 30 of each dimple which merges with wall 5 at a relatively shallow angle of about 11—12° whereas wall 9a is closer between 30—47°.  
 Thus, the seating area 32 of each dimple is 115 disposed as far as possible toward the peripheral edge 34 defined by the juncture of the bottom wall and side wall 3.

In the container illustrated, the inner concave of 120 side of each dimple provides smooth transition surface areas allowing the spraying and deposition of coatings onto the entire bottom inside surface area. Sharp angled contours preclude and inhibit good even application of the coating.

Figure 5 illustrates tooling including an anvil 37 125 with a concave upper face and an opposing main punch 33 with a convex matching face 40 to form the wall 5 therebetween. Periodically a plurality of concave pockets are formed in the anvil and an opposing punch 44 is slidable within guide bores

45 in the punch 39. The forming face 46 on the punch 44 is convex and opposes a forming face in pocket. The punches 39 and 44 advance and retract with respect to the surfaces 38 and 48 and 5 form the metal of the bottom wall 5 therebetween.

In the embodiment of Figures 6 and 7, the container has hemispherical dimples 50,50 which project from the initially preformed outwardly 10 convexed bottom 5. The dimples are equally spaced in an annular series and are eight in number. They project below the bottom surface 11.

In the embodiment of Figure 8 the container 15 has kidney-shaped dimples 60,60 which are four in number equally spaced along the periphery 34 each is convexed outwardly and presents a seating area 62 offset toward the periphery 54. Outer wall 63 of each dimple is steeper than the 20 inner wall 64.

In the embodiment of Figure 9, the kidney-shaped dimples 70 are longer and are three in number, arranged in an annular series. The seating areas 71 are offset toward periphery 34 and the 25 outer walls 72 are steeper than the inner walls 74. The pronounced arcuate shape of the inner walls obtains added strength which is also true of the inner walls 64 of Figure 8.

In the embodiment of Figures 10 and 11, the 30 container has a toroidal continuous ring 80 provided which in cross section is non-symmetrical and has an outer wall which is steeper than inner wall and presents a seating area 85 offset toward periphery 34.

35 Thus in each embodiment the feet or dimples extend below the spherical bottom and the seating area is offset within practical limits toward the periphery 34 consistent with the requirements of adequate strength and having non-sharp easy flowing interior surface contours which are easy to 40 spray with coating layers or other materials.

## CLAIMS

1. A thin metal container comprising a body providing a side wall, an outwardly convexed bottom wall integrally formed with said body, a plurality of outwardly projecting seating dimples formed in said bottom wall having lower end portion extending below said bottom wall and providing seating surfaces for said container offset outwardly of the axes of respective dimples, said dimples being formed to provide transition areas with said bottom wall of relatively shallow angles.
2. The container according to Claim 1, wherein said dimples have an outer wall portion adjacent to the periphery of said bottom wall and positioned at an abrupt angle to said bottom wall.
3. The container according to Claim 2, wherein said outer wall portions of said dimples have an inclination to the axis of the containers of 30° or less and said inner wall portions of said dimples have an inclination substantially greater than 30°.
4. The container according to Claim 1, 2 or 3, wherein said dimples are of generally obloid form having their major axes extending circumferentially of the container.
5. The container according to Claim 1, 2 or 3, wherein said dimples in the bottom wall are of generally kidney shape oriented about the axis of the container.
6. The container according to Claim 1, 2 or 3, wherein said dimples comprise a continuous ring which is flatter toward the center of the container and deeper adjacent to the outer periphery of the container.
7. The container according to any of Claims 1 to 6, wherein said dimples are no more than eight in number.
8. A thin metal container substantially as herein described with reference to the embodiment of Figures 1 to 4, the embodiment of Figures 6 and 7, the embodiment of Figure 8, the embodiment of Figure 9 or the embodiment of Figures 10 and 11.