Dec. 26, 1967 D. SPENCER 3,360,160

ANTI-SPLASH GUARD FOR DRINKING RECEPTACLE

Filed Dec. 21, 1965 2 Sheets-Sheet 1

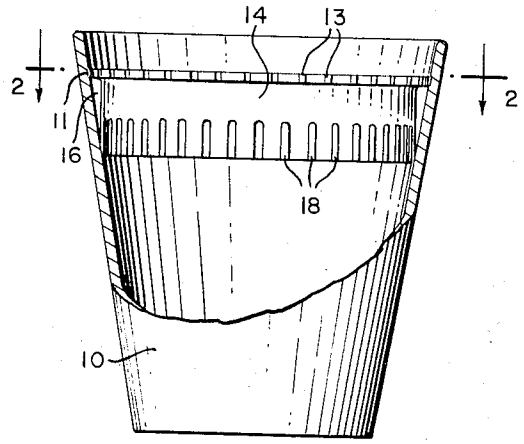

FIG. 1

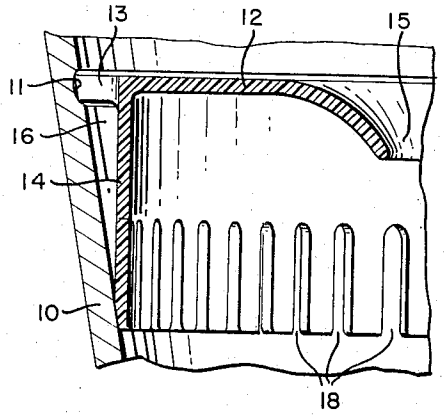

FIG. 3

FIG. 2

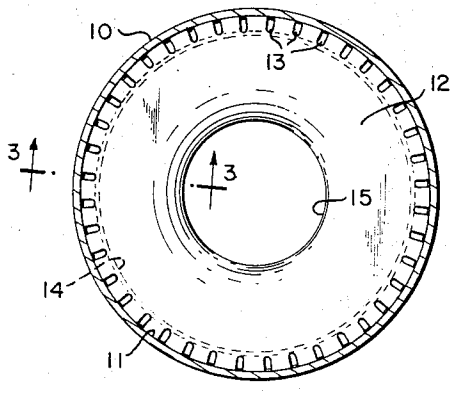

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FIG__4

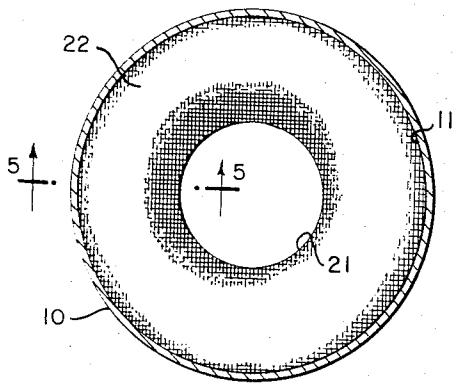


FIG__5

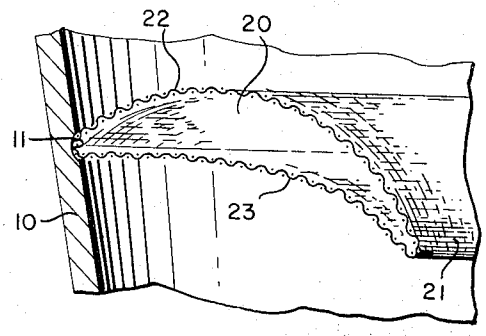


FIG__6

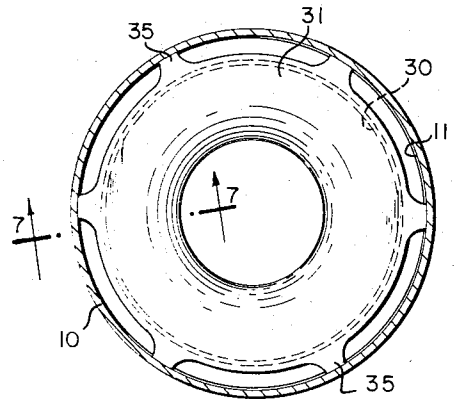
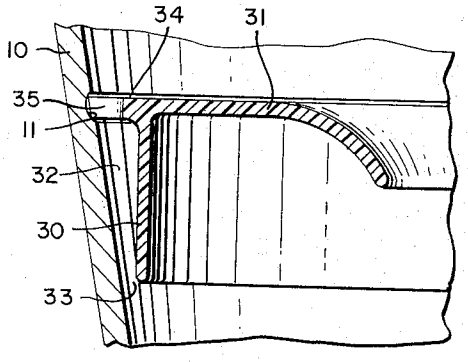


FIG__7



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United States Patent Office 3,360,160 Patented Dec. 26, 1967

3,360,160

ANTI-SPLASH GUARD FOR DRINKING RECEPTACLE

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Filed Dec. 21, 1965, Ser. No. 515,320
5 Claims. (Cl. 220—90.4)

This invention relates to a device for use with a drink-containing receptable to preclude the liquid within the receptacle from splashing over the edge should the receptacle be subjected to sudden motion such, for example, as that which frequently occurs upon an airplane, ship or other moving vehicle.

In my issued U.S. Patent No. 3,313,447, I illustrate and describe two embodiment of a device for the above purpose, each said embodiment being so formed that when a user tilts the receptacle incident to drinking therefrom the drink which he receives is accumulated from several streams each flowing through a passage-way of limited volumetric capacity. The passage-ways are characterized in that the flowing liquid travels a path of alterations, which is to say that the ingress and egress ends of each passage-way are positioned out of alignment, and between these ends is caused to commingle with liquid from other passage-ways. As a consequence of travelling this devious route, and mixing with liquid from other passage-ways, the accumulated issue has no opportunity to develop the splash-producing velocity which a shaking of the cup would otherwise produce.

The present invention has for its object to provide a device similar to the device of my said prior application in the sense that the liquid outflow available to a user is the accumulated issue from several limited-volume passage-ways, but which permits the ingress and egress ends of the passageways to be located either in or out of alignment and yet, in the circumstance of the drinking receptacle being subjected to an abrupt motion, functions to effectively preclude the liquid from becoming subject to such an accelerated flow as would be apt to cause spilling.

The above and other objects and advantages of the invention will appear and be understood in the course of the following description and claims, the invention consisting in the novel construction and in the adaptation and combination of parts hereinafter described and claimed.

In the accompanying drawings:

FIGURE 1 is a view partly in elevation and partly in vertical section showing in its operating position within a drinking cup a spill-proofing device embodying teachings of the present invention.

FIG. 2 is a horizontal sectional view on line 2—2 of FIG. 1; and FIG. 3 is a fragmentary transverse vertical sectional view drawn to an enlarged scale on line 3—3 of FIG. 2.

FIGS. 4 and 6 are each a horizontal sectional view taken on a line corresponding to that shown at 2—2 in FIG. 1 to show in plan two other spill-proofing devices which embody teachings of the invention; and

FIGS. 5 and 7 are fragmentary transverse vertical sectional views drawn to an enlarged scale on the lines 5—5 of FIG. 4 and 7—7 of FIG. 6, respectively.

As with my said co-pending application, the present invention provides an annular disc which is removably inserted in a cup to occupy a plane parallel with the upper edge of the cup and spaced a moderate distance below such edge. The cup is denoted by the numeral **10** and desirably presents a shallow circumferential groove **11** into which the disc is snapped.

The disc is intended to be a "throw-away" item. It need have little more than paper thickness and can be formed

from plastic, polypropylene for example, at a cost sufficiently low to permit profitable volume marketing at a fraction of a cent. For clarity in illustration the thickness shown in the drawings for the wall of the device is exaggerated.

In each of the three embodiments which I have elected to illustrate the disc presents a centrally apertured head wall, and the outer perimeter of this head wall engages in the groove of the cup. The inner perimeter desirably curls downwardly toward the central opening.

In the embodiment of FIGS. 1–3, the head wall **12** has a rim portion which is provided along its entire margin with a multiplicity of closely-spaced radial notches **13**. These notches have a fairly deep penetration and give the outer perimeter of the disc a comb-like appearance. At or about the inner limit of the produced teeth a skirt **14** depends from the underside of the head wall concentric to the center opening **15**. The skirt is made more or less cylindrical in shape so that the chamber **16** which is defined between the skirt and the sloping wall of the cup expands upwardly. The length of the skirt is such that its lower edge is in touching or near-touching relation to the wall of the cup, and such lower edge presents a series of notches **18** which are or may be much the same in point of their number, width and depth as the notches **13**. Upon a tilting of the cup, so as to drink therefrom, liquid within the cup passes through the chamber **16**, entering through the notches **18** and leaving through the notches **13**. The restriction provided by such ingress and egress openings meters the flow and, in conjunction with the expanding nature of the chamber which lies therebetween, effectively controls surges which may occur in consequence of wave action or pressure generated in the cup. Perforations could perforce be used in lieu of the notches.

The embodiment shown in FIGS. 4 and 5 likewise provides an expanding surge chamber with restricted openings for metering flow of liquid to and from the same. In this instance the disc is made hollow so that the chamber, denoted by **20**, surrounds the center opening **21**. The upper and lower walls **22–23**, respectively, which define the chamber are perforated and may be formed from separate sheets of expanded or open-cell plastic stock, molded to shape and bonded along the inner and outer margins.

In the embodiment illustrated in FIGS. 6 and 7, the disc somewhat resembles the FIGS. 1–3 embodiment to the extent that a cylindrical skirt, here denoted by **30**, depends from the head wall **31**. An upwardly expanding chamber **32** is defined between this skirt and the side wall of the cup. The skirt is so dimensioned that its lower edge does not contact the wall, and thus provides a circumscribing narrow slit **33** which serves as the constricted access throat to meter the liquid which enters the chamber. The head wall could have a radially slotted rim like or similar to that provided for the FIG. 1–3 embodiment but as here shown obstructs the outflow of liquid only by a lip **34** which somewhat overhangs the chamber. Tabs **35** projecting radially beyond said lip engage in the groove **11** of the cup.

The embodiments which are here illustrated are only three of a considerable number of designs which I have experimentally established to be practical. I find that a metering of the flow both into and from the surge chamber is more advantageous than a design (FIGS. 6 and 7) where the restriction is limited largely to the inflow, and that the most satisfactory arrangement is one in which the metering is performed by narrow slots or clusters of small-diameter holes. These experiments show that a placement of the egress openings so as to be out of vertical alignment with the ingress opening is not necessary but that it does add to the effectiveness of the design.

It is my intention that no limitations be implied and that the hereto annexed claims be given the broadest interpretation to which the employed language fairly admits.

What I claim is:

1. In a structure for the described purpose, in combination with a downwardly tapering receptacle open at the top and used for drinking a liquid contained in the receptacle, a disc fitting in said open end of the receptacle, the disc being formed with a head wall which bears by a rim portion thereof against the interior wall of the receptacle and having an annular skirt depending from the head wall in inwardly spaced relation to said bearing rim concentric and parallel with the axial line of the receptacle, thus converging toward the tapered wall of the receptacle and with the latter providing an upwardly expanding space exteriorly of the skirt, said space acting as a surge chamber through which liquid passes when a user tilts the receptacle incident to drinking therefrom, the disc being so formed that openings are provided along both the bottom and the top of the disc throughout the circumference thereof for the inflow of liquid to the chamber and the outflow therefrom to the user, the structure being characterized in that the amount of liquid which flows to the user upon a normal tilting of the receptacle has substantial volume but represents the accumulation of a considerable number of streams entering the chamber which individually supply only a miniscule fraction of such accumulation.

2. The structure claimed in claim 1 wherein the liquid issues from the chamber through a multiplicity of openings each so restricted as to individually pass only a miniscule fraction of the accumulation.

3. The structure claimed in claim 1 in which the lower edge of the skirt approximately touches the interior wall of the receptacle and wherein the inflow and outflow openings are each comprised of closely spaced narrow notches the former formed in the lower edge of the skirt and the latter formed in the bearing edge of the head wall's rim portion.

4. The structure claimed in claim 1 in which an annular slit is provided between the lower edge of the skirt and the interior wall of the receptacle for said inflow of liquid to the surge chamber.

5. The structure claimed in claim 1 in which the disc has a ring shape with the head wall curled downwardly about the center opening which said ring shape produces.

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