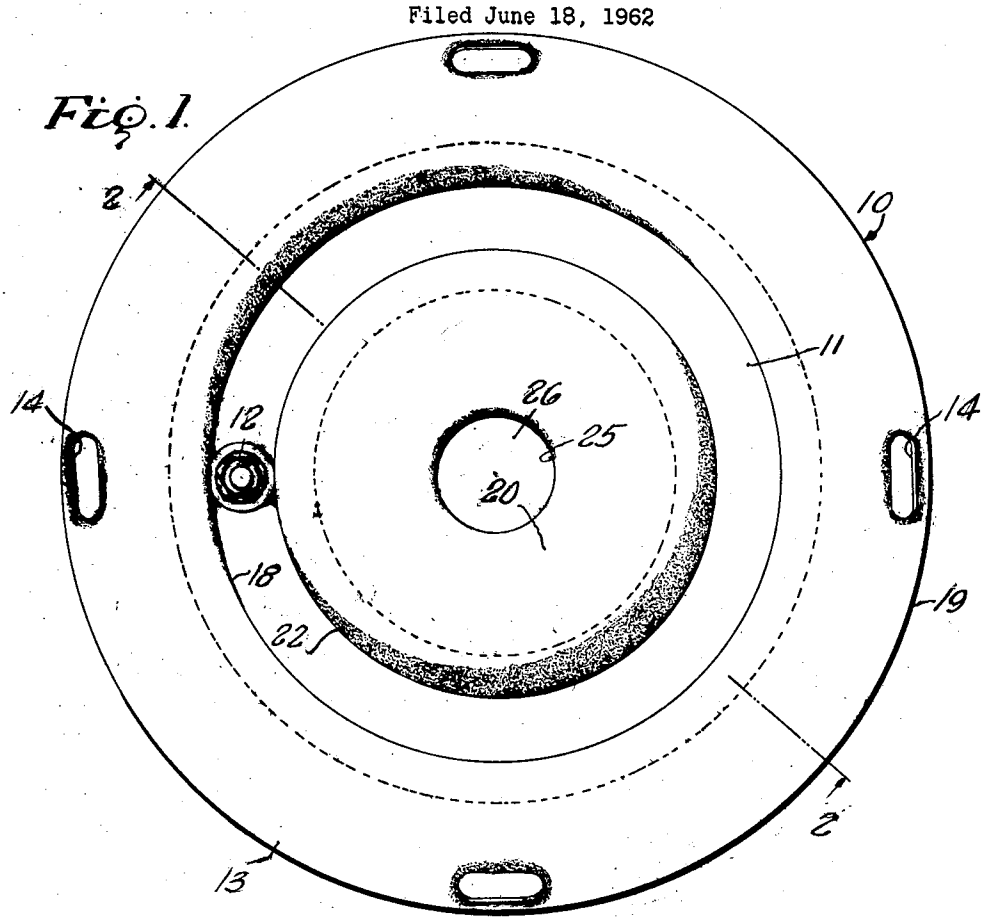
April 21, 1964 J. H. NOURSE ETAL 3,129,740

MODIFIED TORIC FREE DROP CONTAINER

Filed June 18, 1962

Fig. 1.



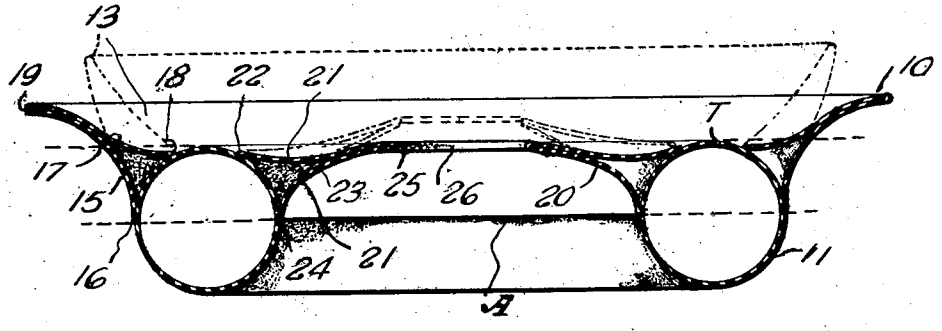


Fig. 2.

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MODIFIED TORIC FREE DROP CONTAINER

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7 Claims. (Cl. 150—.5)

The invention relates to free drop containers of the type used to drop commodities, usually liquids or powdered materials, from a flying aircraft without the use of conventional parachutes. In such devices, it is of the essence that the container be stabilized in some way so that it lands in a uniform position no matter how dropped and also that such position is the one in which the container can best absorb the shear effect of the contents of the container walls whereby to minimize the chances of the container bursting upon impact. Specifically, the invention is intended as an improvement over prior art devices such as the patents to Stavely, No. 2,700,517 and Bender, No. 2,784,755.

The Stavley patent aforesaid relies upon streamers to insure a stability during fall while the Bender patent relies upon an annular fin. Both of these patents are modified cylinders which are disc-like in structure whereby they tend to sail or side slip in flight whereby not to make flat landings regularly under adverse conditions such as high or gusty winds.

With the foregoing in view, it is an object of the invention to provide an improved free drop container of the class described.

A further object is to provide an improved free drop container in the form of a hollow torus which has been modified by the addition of an inverted, frusto-conical fin.

A further object is to provide an improved free drop container as that last described to which has been added an annular diaphragm extending inwardly and upwardly of the container.

Other objects and advantages reside in the particular structure of the invention, the structure of the several elements thereof, combinations and subcombinations of such elements, all of which will be readily apparent to those skilled in the art upon reference to the attached drawing which illustrates one species of the invention and to the following specification wherein the invention is described and claimed.

In the drawing:

FIGURE 1 is a plan view of the invention; and

FIGURE 2 is a transverse vertical sectional view taken substantially on the plane of the line 2—2 of FIGURE 1.

Referring specifically to the drawing, wherein like reference characters designate like parts in all views, **10** designates generally the free drop container according to one species of the invention which comprises a hollow torus **11** formed of flexible sheet material such as fabric reinforced elastomeric sheets. Torus **11** is provided with any suitable filling opening which may be closed by any suitable closure means **12**. Torus **11** has a horizontal axis or center of gravity designated by the plane A and a normal topmost point lying along the horizontal plane T. To stabilize the container **10** during its free fall, there has been provided an annular fin **13** which is preferably of inverted frusto-conical form and which may be formed of any suitable flexible material. In the embodiment illustrated, the fin **13** is formed with a plurality of hand holes **14** around the edge thereof to aid in manually transporting the loaded container. Also, fin **13** is hollow and comprises a lower wall **15** which has a lower edge **16** which is secured to the torus **11** in the region of the horizontal axis A or even slightly above the same. Fin **13** also includes an upper wall **17** which has an inner edge

18 which is secured to the torus **11** in the region of its topmost point as defined by the plane T. Fin walls **15** and **17** converge in outward and upward directions to provide the hollow fin **13**. Their outer or free edges merge and are integrally connected together to provide a common outer rim **19**. The interior of the fin **13** may be filled with resilient compressible cushioning material such as an inert gas as in our co-pending applications, Serial Nos. 203,414 and 203,415 both filed June 18, 1962 for the same purpose as there set forth.

To further stabilize the container **10** during free fall, there has been provided an annular diaphragm **20** of any suitable flexible sheet material. Diaphragm **20** extends upwardly and inwardly of the torus **11** concentrically thereof. In the embodiment illustrated, the diaphragm **20** comprises upper and lower walls **21** and **23** respectively. The upper wall **21** has an inner edge **22** which is secured to the torus **11** in the region of its topmost point as defined by the plane T. Also, the lower wall **23** has a lower edge **24** which is secured to the torus **11** in the region of the horizontal axis thereof as defined by the plane A. Diaphragm walls **21** and **23** converge upwardly and inwardly and are integrally connected together to provide a common inner edge or rim **25** which defines a center opening or hole **26** through the diaphragm.

As in the case of the fin **13**, the diaphragm **20** is hollow and is preferably filled with any suitable resilient cushioning material to alleviate the shock of impact upon the walls of the torus **11**.

During static conditions, it is understood that the container **10** when its torus **11** is filled with fluid or the like will assume the shape shown in full lines in FIGURE 2. However, during free fall the fin **13** and, to a lesser extent, the diaphragm **20**, will be deflected upwardly to the broken line positions of FIGURE 2. By offsetting the fin and diaphragm upwardly of the horizontal axis A, the container is assured of presenting its underside to the impact surface at all times. The diaphragm **20** together with its opening **26** minimizes any sailing or side slip and insures a level fall, opening **26** functioning like the like opening in a conventional parachute to increase stability. Fin **13**, of course, assists in stabilizing the container and to a lesser extent retards the free fall speed. As aforesaid, both fin **13** and diaphragm **20** by virtue of their resilient contents reinforce inner and outer portions of the torus wall against the shock of impact.

While there has been shown and described what is now believed to be a preferred species of the invention, it should be understood that the same is susceptible of other forms and expressions. Consequently, we do not limit ourselves to the exact embodiment shown and described hereinabove except as hereinafter claimed.

We claim:

1. In a free drop container, a hollow toric fluid container formed of flexible sheet material, an inverted frusto-conical skirt surrounding said container concentrically thereof to provide an annular fin, said fin being hollow and being defined by upper and lower walls converging in upward and outward directions, and said walls being formed of flexible sheet material.

2. In a free drop container, a hollow toric fluid container formed of flexible sheet material, an inverted frusto-conical skirt concentrically surrounding said container to provide an annular fin, said fin being formed of flexible sheet material, and an annular diaphragm of flexible sheet material carried by said container and extending radially inwardly and concentrically thereof.

3. A free drop container according to claim 1, wherein said lower wall of said fin includes an inner edge secured to said container in the region of its horizontal axis, and said upper wall of said fin having an inner edge secured to said container in the regions of its topmost point.

4. A free drop container according to claim 3, there being an annular diaphragm carried by said container and extending radially inwardly and concentrically thereof.

5. A free drop container according to claim 4, wherein said diaphragm is hollow and comprises upper and lower walls of flexible sheet material, and said walls of said diaphragm converging in upward and inward directions.

6. A free drop container according to claim 5, wherein said upper wall of said diaphragm has an inner edge secured to said container in the region of its topmost point, and said lower wall of said diaphragm has an inner edge secured to said container in the region of the horizontal axis thereof.

7. A free drop container according to claim 2, wherein both said fin and diaphragm are connected to said container above the horizontal center of gravity thereof.

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