July 7, 1953 D. J. KITCH 2,644,655

AERIAL CARGO LANDING CONTAINER

Filed Dec. 22, 1950 2 Sheets-Sheet 1

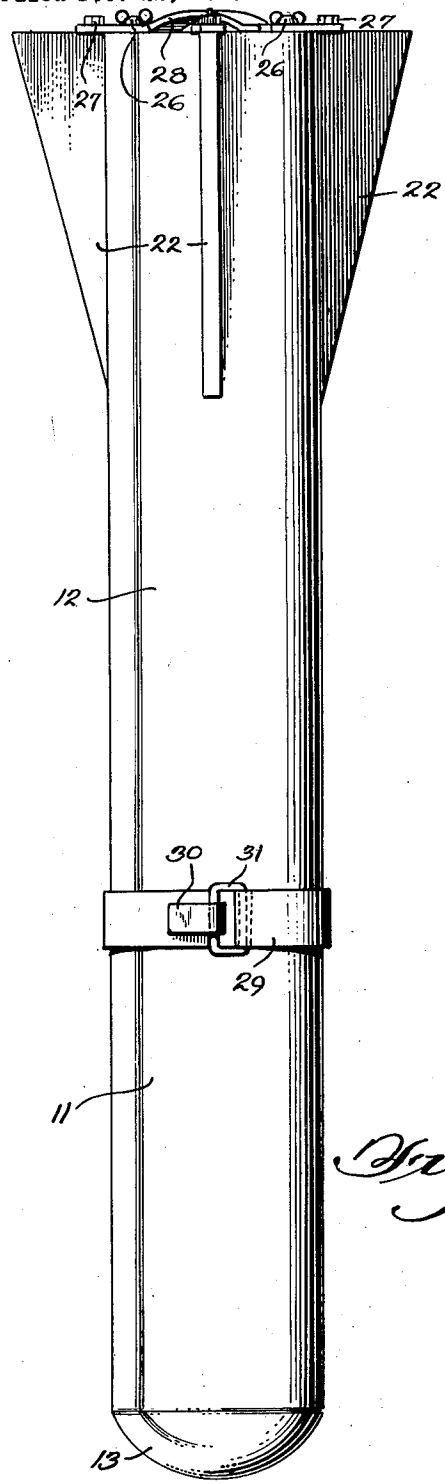


Fig. 1

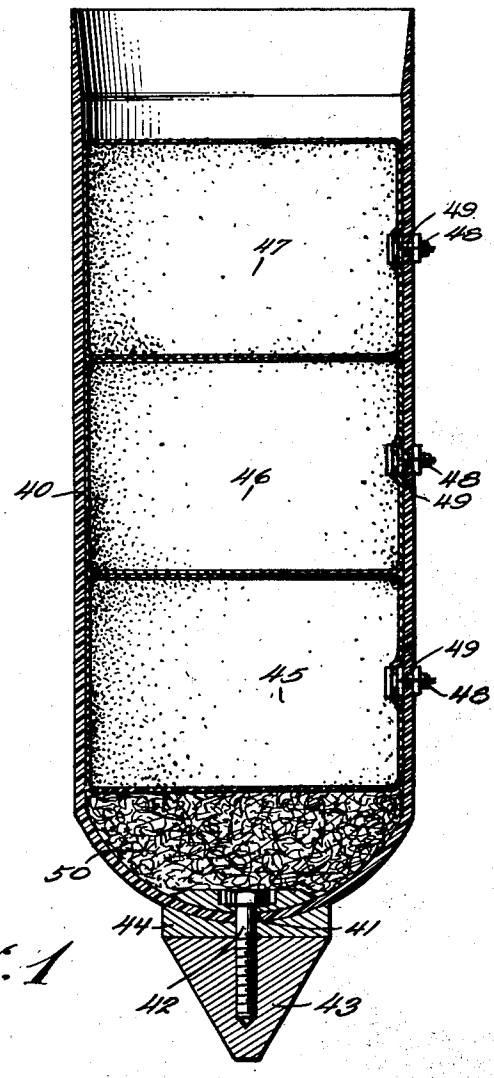


Fig. 7

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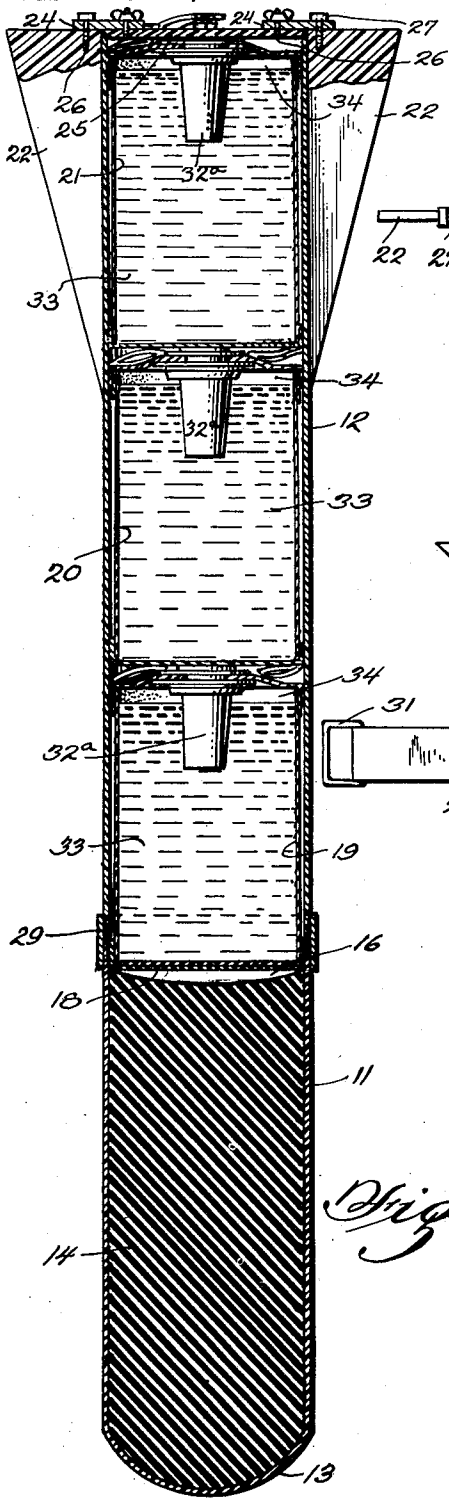


Fig. 3

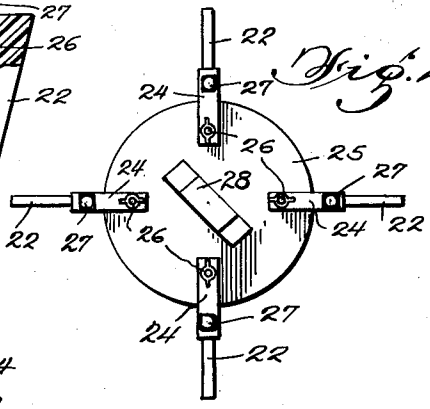


Fig. 2



Fig. 4

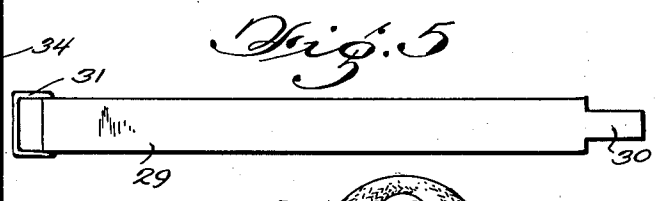


Fig. 5

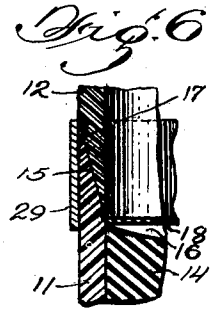


Fig. 6

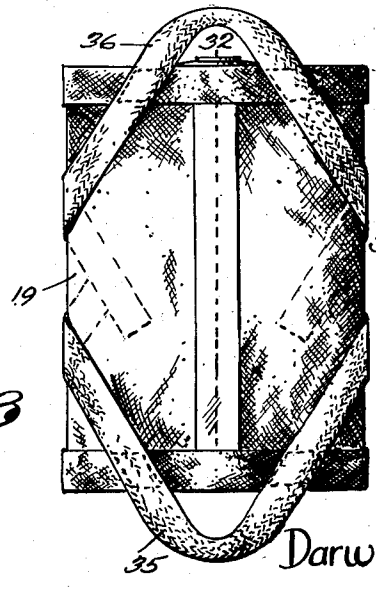


Fig. 8

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UNITED STATES PATENT OFFICE

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AERIAL CARGO LANDING CONTAINER

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10 Claims. (Cl. 244—138)

(Granted under Title 35, U. S. Code (1952), sec. 266)

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The invention described herein, if patented, may be manufactured by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to packages or containers adapted to be dropped from airplanes for the purpose of supplying troops or persons in distress with food, medical supplies, petroleum products and other things needed by them. It is well known that when earthquakes, tidal waves, floods, hurricanes, blizzards or other disasters occur, frequently there are groups of people who are isolated for considerable periods, that is, they cannot be rescued for some time and can only receive aid by air. Also, troops in forward battle areas frequently must have petroleum products or other supplies to permit further advance against the enemy or to make retreat possible. Heretofore, dropable containers have been devised for such situations but usually these containers have been attached to parachutes, which being wind-blown may carry their loads into inaccessible places and besides in warfare are easily spotted by the enemy, sometimes drawing artillery fire or even bombers to that area.

The invention broadly aims to provide a container which has no parachute, yet may be dropped from a considerable height without damage to or loss of its contents. In accordance with the invention, a container is provided which has the following unique characteristics, among others:

(1) It is specially constructed to hold several of the "fuel cells" which have been developed for Army use;

(2) It will fall nose down so that the shock-absorbing nose end will strike the ground first;

(3) It will absorb the shock of impact with the ground without spillage of its liquid contents;

(4) The shock of impact is absorbed partly by cushioning means in the nose end, partly by a shifting and compression of the contents of the container, and partly by shearing off closure-fastening elements;

(5) After it strikes the ground, it will frequently come apart or open, so that the "fuel cells" may be removed without difficulty;

(6) The "fuel cells" are removable by a soldier lying prone so as to protect himself against enemy fire.

In the accompanying drawings forming a part of this specification,

Fig. 1 is an elevation of the complete container;

Fig. 2 is an end view of the same;

Fig. 3 is a longitudinal section through the body

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member with three properly filled "fuel cells" in position;

Fig. 4 is a side elevation of the cap per se;

Fig. 5 is a plan view of the metal band shown extended;

Fig. 6 is a detail in enlarged section showing the joint between the nose member and the body member;

Fig. 7 is a longitudinal section through a modified form of nose member; and

Fig. 8 is a side elevation of one of the "fuel cells."

Referring particularly to the drawings, the preferred container consists of two principal parts, a nose member 11 filled with cushioning material, and a hollow body member 12 secured end to end to the nose member and adapted to hold the "fuel cells" or other cargo to be dropped.

The nose member 11 is preferably a drawn plastic casing or tube having a rounded and closed lower or striking end 13. This casing may have walls approximately one-half inch thick, and may have an internal diameter of about twelve inches, with an over-all length of about thirty-six inches. In the preferred form, the hollow interior of said casing is completely filled with hard cellular synthetic rubber 14 up to a point about four inches from the top end, which is internally beveled as indicated at 15. The cellular rubber 14 is bonded to the internal walls of the nose member either by an adhesive coating or by heat, so that it will not become displaced except under the shearing stresses set up upon impact with the ground, as will be described. Preferably the top surface of the cellular rubber mass 14 at the upper end of the nose member is dished or made concave as shown at 16 to receive a part to be described. The density of the nose member and its contents is always greater than that of the body member 12 when fully loaded, so that the container is "nose heavy" and will fall with its nose down.

The preferred body member 12 is a straight hollow plastic tube with walls also one-half inch thick, with an inside diameter of about twelve inches and an over-all length of about fifty-three inches. It has a beveled lower end 17 to fit snugly into the beveled end 15 of the nose member, and when so assembled forms a casing approximately 85 in. long. A rubber or other flexible, resilient diaphragm 18 is secured by an adhesive along its edges to the beveled lower end 17 on the inside and it may directly contact a fuel cell 19 which is one of preferably three cells (19, 20, 21) housed within the body member. These cells will be de-

scribed later. When the container is substantially vertical, under static load the weight of the fuel cells will not cause the rubber diaphragm to bulge outwardly to lie in the concave recess 16. A plurality of plastic fins 22 are preferably bonded to the outside of the body member to lie in radial planes. A plurality of straps 24 are secured to a cover or cap 25 which fits in and closes the upper end of the body member. Preferably, the straps 24 are secured to the cap by screws 26 having wing nuts and preferably the straps extend radially and lie flat against the outer surface of the cap and also lie flat against the upper edges of the fins. Screws 27 secure each strap 24 to the upper edge of a fin 22. It is preferred that the screws 26, 27 be made of plastic or other easily sheared material. A strap handle 28 is fixed to the outside of the cap 25 to facilitate its removal. To hold the body and nose members together when assembled, a thin, flexible metal band 29 may be passed around the circumference of the container outside the joint formed by the interfitting beveled ends 15, 17, and the band may be drawn tight and locked by inserting its end extension 30 through loop 31 fixed to the other end (Fig. 5) and then bending back the end extension. If preferred, the beveled ends 15, 17 may be coated on their contacting surfaces with an adhesive or bonding agent (not shown) so as to unite the two members 11, 12, or some mechanical connection such as a bayonet joint (not shown) may lock the parts together.

The "fuel cells" or liquid-cargo-carrying bodies (Figs. 3 and 8) are each flexible containers made preferably of nylon fabric of about 4 oz. per sq. yd. weight, coated on the inside and outside with a resin to be substantially leakproof and diffusion-resistant when partly filled with gasoline. Each is closed and sealed by a screw plug 32 or the like and each is preferably about $11\frac{11}{16}$ in. diameter by $17\frac{1}{4}$ in. long (inside dimensions) with a capacity of 8 U. S. gallons, yet weighs less than three pounds. Each is filled so as to contain not more than $7\frac{1}{2}$ gallons, leaving a substantial air space of at least one-half gallon or one-sixteenth of the total capacity. Preferably each cell has a reversible flexible pouring spout 32*a* which extends within the cell several inches and prevents complete filling of the cell, thus insuring the necessary air space. Such a spout when pulled out will facilitate pouring without spillage. The gasoline in each cell is indicated at 33, and the air space at 34. Three such cells will fit snugly in the chamber provided inside body member 12 (Fig. 3) giving the container a capacity of $22\frac{1}{2}$ gallons. Fig. 3, however, exaggerates the space between adjacent ends of the cells, so as to show the construction. Two flexible loop handles 35, 36 are sewed to the outside of each gas cell so as to extend above either end thereof (Fig. 8). Hence, the cells may be pulled out of the container when the lid or cap has been removed. If desired, the three cells may be secured together by tying their adjacent handles with cord to facilitate removal by a soldier while in prone position. The described "fuel cells" per se form no part of my invention.

A number of the described containers, loaded with gasoline or other liquid products such as lubricating oil, are placed in the bomb bays of a bomber for delivery to the dropping zone. When the described container is dropped from an airplane, it quickly assumes a vertical position with the nose down because its nose is heavier than its tail. Its descent is made straighter by the provision of the fins 22. When its nose strikes the ground, the hard cellular rubber mass 14 is pushed upwardly by the collapsing nose, and the thrust is transmitted through the flexible diaphragm 18 to the lowermost fuel cell 19. The effect is the same as a hammer blow on the flexible bottom of cell 19: the bottom bulges upwardly and the liquid in the cell consequently rises to compress the air in air space 34. Cell 19 will then move upwardly as an entirety, thrusting against the bottom of the intermediate cell 20, where the process just described is repeated, with compression of the air at the top of cell 20. However, considerable energy has been absorbed by the cellular rubber mass 14 and the partial collapse and shifting of cell 19, so that the compression of air in cell 20 will probably be less than the compression in cell 19. Cell 20 then moves upwardly, but to a lesser extent, whereupon cell 21 is lifted at the bottom, compressing the air in its top air space 34. The thrust of cell 21 is imposed against the underside of the lid or cap 25, and said cap will shear off screws 26, 27 if the force is sufficient. When the cap shears off the screws, it may be pulled away without trouble, which exposes the interior of the body member with its three gas cells. If the screws are not sheared off, the cap may be removed by turning the wing nuts on screws 26. A soldier lying prone may grasp the handles and pull the cells out of the end of the container and either carry them away one at a time or drag them over the ground until he reaches cover or the safety of his lines. If preferred, the flexible handles 35, 36 may be supplemented by shoulder straps (not shown) to facilitate carrying a cell on the back.

Referring to Fig. 7, a modified form of nose member is there shown comprising a plastic tubular shell 40 similar to nose member 11 except that it has a bore 41 centrally of the forward end through which a bolt 42 is passed, said bolt holding a metal weight 43 on the outside of the nose member, with an adapter or washer 44 interposed between the metal weight and the rounded end of the shell 40. The purpose of this weight is to increase the mass of the nose member by an amount such as will make the container nose heavy so that the nose will strike the ground first. The remainder of the nose member is light in weight as it contains several air cells in the form of rubber or synthetic rubber bladders 45, 46, 47, each having an air valve 48 by which it may be blown up, for instance by a compressed air line, a hand pump or by a bottle of CO_2 or other gas. The air valves 48 are shown projecting through small apertures 49 formed in the side of the plastic shell 40 so that the air cells may be inflated from outside the container. For convenience of illustration these apertures are shown aligned longitudinally of the shell, but to obviate a line of weakness in the plastic shell the apertures may be spaced 120° apart around the circumference of the nose member if three air cells are provided as shown. A mass of excelsior, cotton or rayon waste, a felt pad or pads, or other inexpensive granular or porous cushioning material 50 may fill the lower end of the nose member. If preferred, a single air cell substantially completely filling the chamber in the nose member may be used. If desired, the metal weight 43 may be shaped like a tool head, for instance a hammer head or wedge, so that it may be put to use after removal from the dropped nose member. The de-

scribed cushioning nose member is more expensive to manufacture than the preferred form of Fig. 3 and requires some maintenance, but avoids the use of a considerable mass of cellular rubber which may become a strategic material.

Assembly of the described containers will present no difficult problems, hence will not be described.

While specific materials and dimensions of parts have been mentioned in the foregoing, it will be understood that other materials and dimensions may be used. Also the invention is not limited to the dropping of petroleum products: on occasion it may be used to drop foods such as coffee, soup, etc. or other needed products. Furthermore, the container may be designed to drop a single cell or as many cells as its shock-absorbing capacity will permit. While a two-part container is preferred, it is within the scope of my invention to provide a one-part container body. I do not desire to be limited except as required by the appended claims defining the invention.

I claim:

1. An aerial cargo landing container comprising an elongated nose member constructed and arranged to cushion the impact when the nose of the container strikes the ground; an elongated hollow cargo-carrying body member axially aligned with the nose member; means to secure the body member and nose member end to end; a closure removably fixed upon the opposite end of the body member and closing said end; a plurality of fins fixed to the body member on the outside, said fins being adapted to guide the container in its descent; and means securing the closure to the adjacent ends of the fins.

2. An aerial cargo landing container comprising an elongated nose member constructed and arranged to cushion the impact when the nose of the container strikes the ground; an elongated hollow cargo-carrying body member axially aligned with the nose member; means to secure the body member and nose member end to end; a closure removably fixed upon the opposite end of the body member and closing said end; an elastic diaphragm being secured to and closing that end of the body member which is secured to the nose member.

3. An aerial cargo landing container comprising in combination, a hollow nose member substantially filled with cushioning material; an elongated hollow body member fixed end to end to the nose member and adapted to hold the cargo; a plurality of fins fixed to the sides of the body member and extending to the opposite end of the body member and adapted to guide the container in its downward flight; a cap closing said opposite end of the body member; and fastening elements including shearable elements securing the cap to the adjacent ends of the fins.

4. The invention defined in claim 3, wherein the hollow body member is closed by an elastic diaphragm secured to that end which is fixed to the nose member.

5. The invention defined in claim 3, wherein the body member is closed by an elastic diaphragm secured to that end which is fixed to the nose member; the end of the body member which is secured to the nose member being beveled, and the nose member being complementarily beveled so that the two beveled ends closely fit together to form a joint; a thin flexible band being passed around the joint on the outside and locked at its ends to bind the two members together.

6. A package adapted to drop liquid products from the air without spillage comprising an elongated hollow container which has a removable closure at one end but is otherwise totally closed, an impact-cushioning member on the other end of the container, a sealed liquid-product-containing cell inside the hollow container but free of attachment thereto and adapted to be inserted in and removed from the end closed by said closure, said cell being adapted to impinge against the closure upon impact of the cushioning member against the ground and having flexible walls and an air space above its liquid contents so that the air therein is compressed when the cell impinges as aforesaid, and readily-sheared fastening elements securing the closure to the container and adapted to be sheared when the cell impinges as aforesaid.

7. A package adapted to drop liquid products from the air without spillage comprising an elongated hollow container which has a removable closure at one end but is otherwise totally closed; impact-cushioning means at the other end of the container, said means comprising an inflatable gas cell having an air valve by which it may be blown up, a shell enclosing said gas cell and having an aperture through which the air valve projects so that the gas cell may be inflated from outside the shell; means to secure the shell at one end to the hollow container, a weight being secured to the opposite or nose end of the shell on the outside and adapted to make the package nose-heavy; a sealed liquid-product-containing cell inside the hollow container but free of attachment thereto and adapted to be inserted in and removed from the end closed by said closure, said cell having flexible walls and being adapted to impinge against the closure on the inside when impact-cushioning means takes the impact of a fall upon the ground; and readily sheared fastening elements securing the closure to the container and adapted to be sheared when the cell impinges as aforesaid.

8. A container adapted to drop liquid products from the air without spillage comprising a hollow elongated body member, a shock-absorbing nose member adapted to hit the ground first and cushion the impact, means securing the nose member to the hollow body member, a liquid-product-containing cell inserted in the hollow body member but free of attachment thereto, said cell having flexible walls and being sealable and having a substantial air space to provide an internal cushion upon impact, a removable closure closing the end of the body member opposite to the one which is attached to the nose member, said cell being substantially in contact with the inside of the closure when in body-closing position, and means having cushioning characteristics filling the space between said cell and the cushioning nose member and acting upon impact of the nose member to transmit a thrust longitudinally of the body member to said cell and closure.

9. The invention defined in claim 8, wherein the removable closure member is secured to the end of the body member in body-closing position by means of readily sheared off fastening elements.

10. The invention defined in claim 8, wherein the means having cushioning characteristics are two flexible-walled cells each having a substantial air space, and these two cells together with the first-mentioned cell fill the interior of the hollow body member, so that substantially the

entire space between the nose member and the closure is occupied by said cells.

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