Sept. 20, 1966 H. E. FRANKENBERG 3,273,760

CONTAINER WITH EXPELLING MEANS FOR USE IN MANNED SPACE SHIPS

Filed Nov. 6, 1962

3 Sheets-Sheet 1

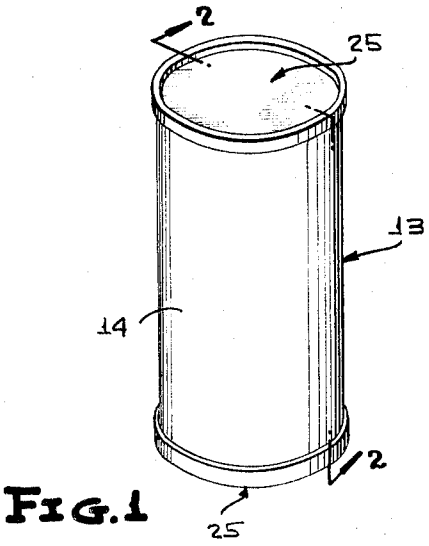


FIG. 1

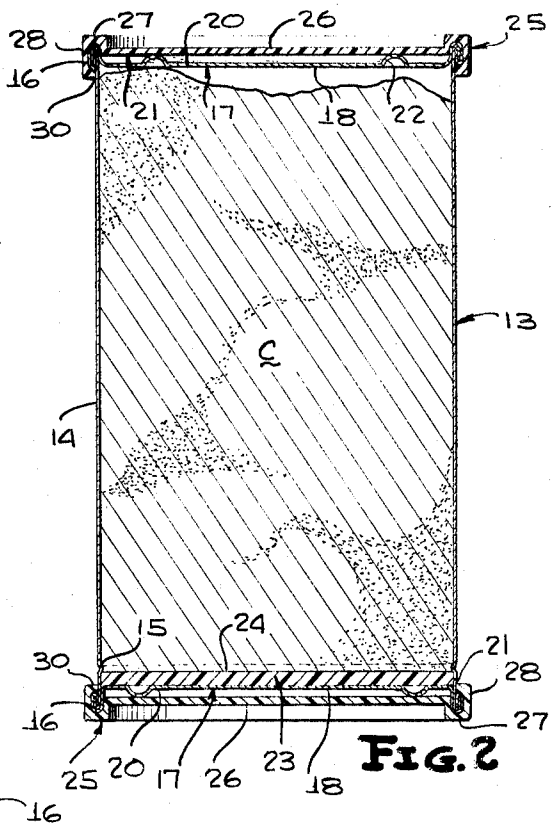


FIG. 2

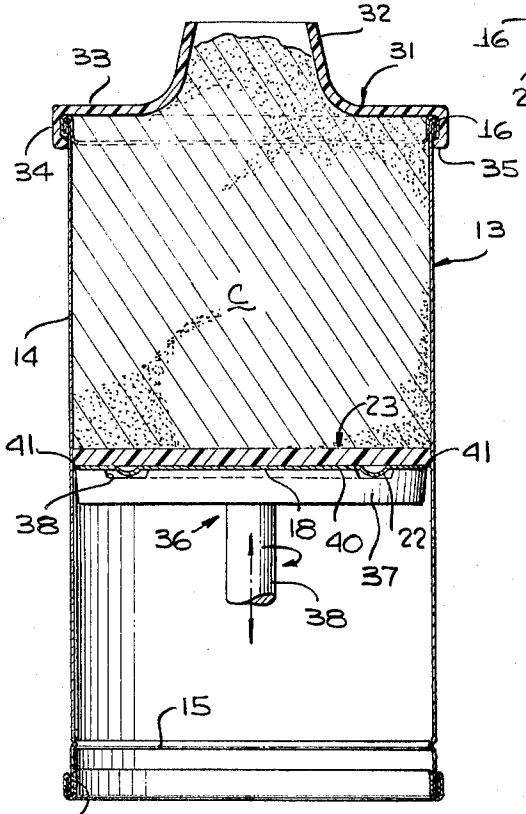


FIG. 4

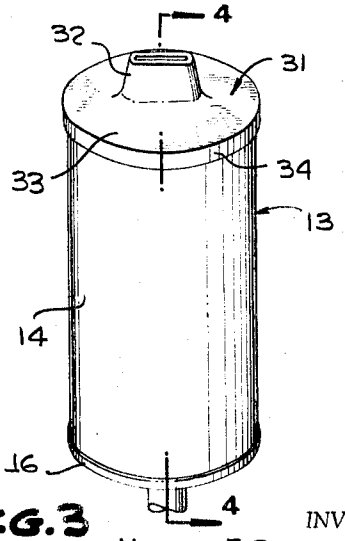


FIG. 3

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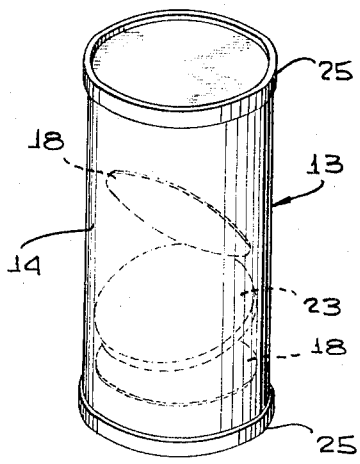
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FIG. 5



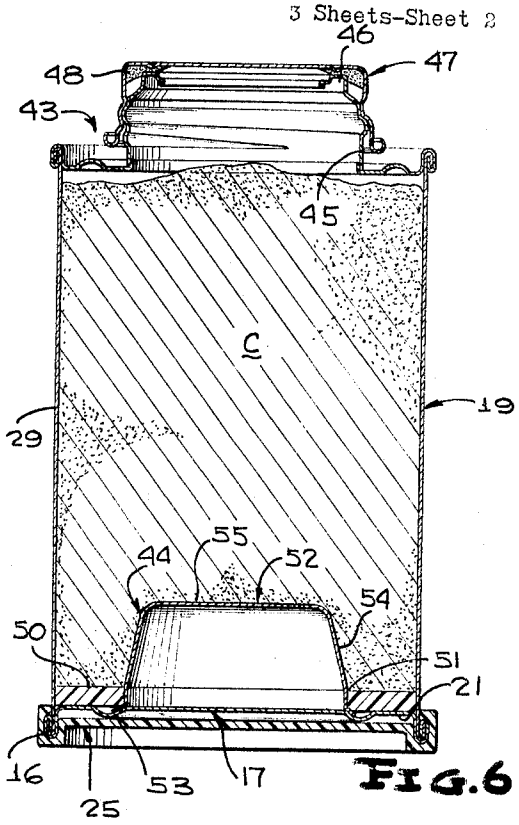


FIG. 6

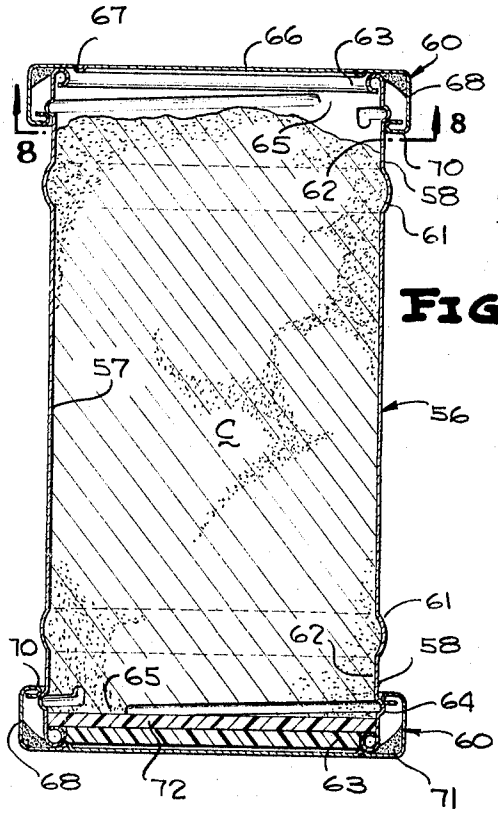


FIG. 7

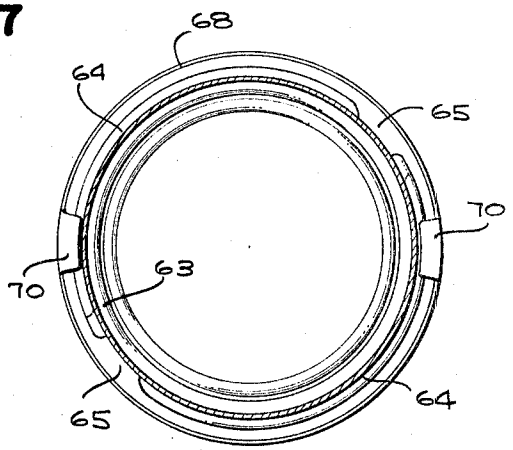


FIG. 8

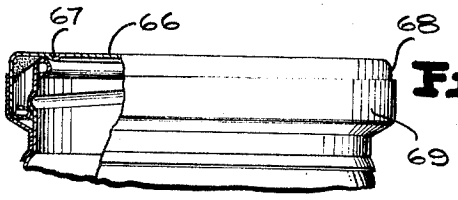


FIG. 9

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FIG. 10

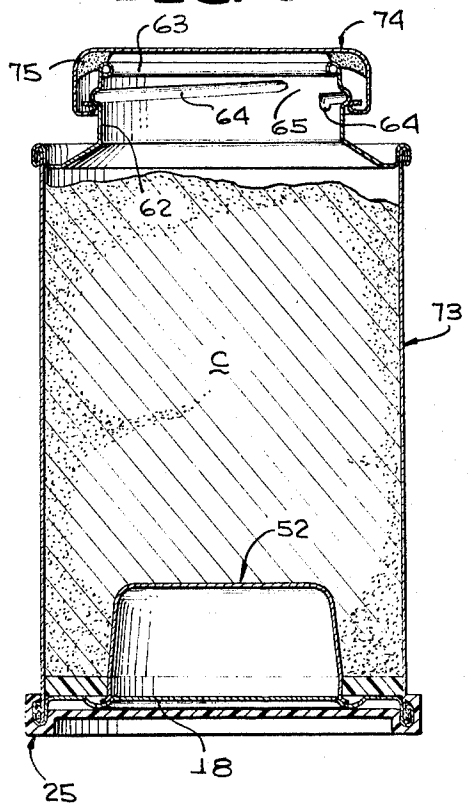
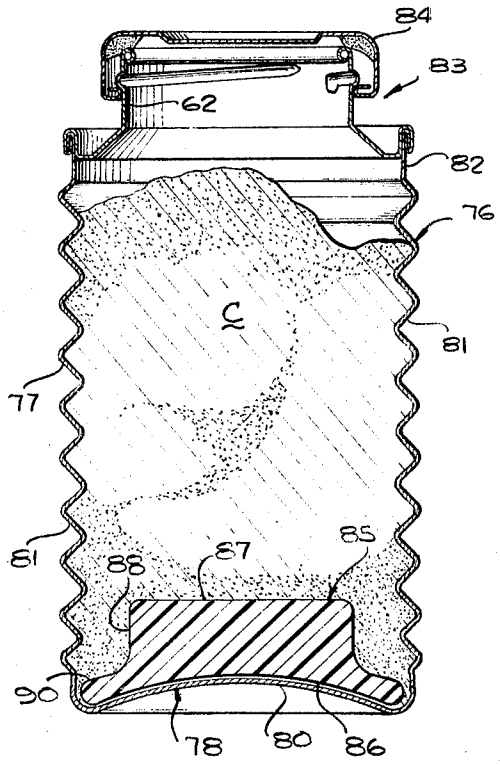


FIG. 11



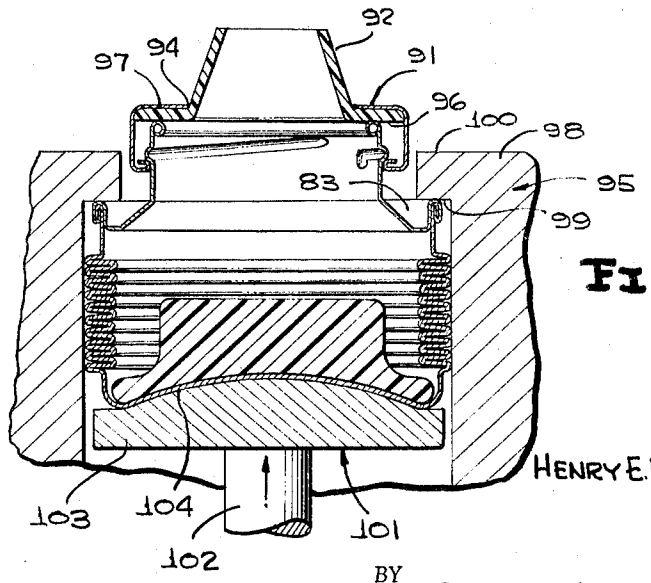


FIG. 12

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3,273,760

CONTAINER WITH EXPELLING MEANS FOR USE IN MANNED SPACE SHIPS

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Filed Nov. 6, 1962, Ser. No. 235,668
12 Claims. (Cl. 222—386)

This invention relates to containers with content-expelling means, particularly adapted for use in manned spaceships, space-capsules, and diverse spacecrafts whether in sub-orbital, orbital, or interplanetary flight.

An object of this invention is to provide a container having ends which are circumferentially weakened whereby the ends of the container may be opened; one open end of the container forming an access opening by way of which container-contents may be expelled through the other open end of the container.

Another object of the invention is to provide an expelling plate in a container whereby the contents of the container may be expelled through an open end of the container, and additionally, to provide an internal circumferential rib in the container to prevent accidental shifting of the expelling plate.

Another object of this invention is to provide a dispensing mouthpiece on one end of a container to facilitate expulsion of the contents of the container directly from the container to the mouth of a space traveler.

A further object of the invention is to provide an ejector plunger provided with a plurality of shear points designed to sever the ends of a container provided with an expelling plate in accordance with the foregoing objects, and force the expelling plate axially of the container to expel the contents therefrom.

Another object of the invention is to contour an external wall portion of the container for attachment to a suitable ejector-device by threading, clamping or by employing magnetic means.

Another object of this invention is to provide a container of the type having an expelling plate with a plurality of overcaps to reclose the container after the ends thereof have been removed and the contents thereof have been expelled, and additionally, to provide for the use of the container as a storage device for the severed container ends and the expelling plate.

A further object of this invention is to provide for maximum food expulsion from a container by contouring an expelling plate thereof to the shape of the expelling or dispensing end of the container.

Another object of the invention is the provision of a container having one end thereof weakened by a circumferential score line and the other end provided with an open threaded neck portion having secured thereupon a lug or screw-type cap.

Still another object of this invention is the provision of a container having duplicate open ends whereby the removal of a cap associated with each end allows access to and expulsion of the contents thereof from either end of the container.

Yet another object of this invention is the provision of a container constructed to collapse along its longitudinal axis by means of an ejector-plunger, thereby allowing the container-contents to be efficiently and rapidly expelled from the container.

Another object of the invention is to provide a container having at least one flat surface thereof available for contact with a thermostat of an associated heating device.

With the above, and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a top perspective view of a container constructed in accordance with this invention, and illustrates upper and lower overcaps secured to respective upper and lower ends of the container.

FIGURE 2 is an enlarged vertical sectional view taken along line 2—2 of FIGURE 1, and illustrates the manner in which the overcaps are removably secured upon seams of the container, a contents-expelling plate seated upon a container lower end internally of the container, and a shallow internal circumferential bead at the container lower end preventing accidental shifting of the expelling plate.

FIGURE 3 is a top perspective view of the container illustrated in FIGURE 1 but differs therefrom in that the overcaps have been removed, the container upper end has been removed, a pliable dispensing nipple is secured to the container, and an ejector is positioned in the lower end of the container.

FIGURE 4 is an enlarged vertical sectional view taken along line 4—4 of FIGURE 3 and illustrates the ejector plunger, a severed container bottom end and an expelling plate in position substantially medially of the container prior to total expulsion of the container-contents.

FIGURE 5 is a top perspective view of the container and overcaps illustrated in FIGURE 1, and illustrates in phantom lines the two container ends and the expelling plate stored within the container after the complete expulsion of the container-contents.

FIGURE 6 is an enlarged vertical sectional view through a container which is similar to the container of FIGURE 2 but differs therefrom in that an overcap is employed only on the bottom end of the container and the expelling plate is contoured to the internal configuration of an upper dispensing neck upon which is seated a screw-type cap.

FIGURE 7 is an enlarged vertical sectional view through a modified container having duplicate upper and lower open end portions each of which is closed by a respective lug-type cap.

FIGURE 8 is a transverse sectional view taken along line 8—8 of FIGURE 7, and illustrates the interlocking relationship between the lug-type cap and the upper end portion of the container.

FIGURE 9 is a fragmentary elevational view with parts broken away and shown in section of the upper portion of the container and cap illustrated in FIGURE 7, and shows a piece of tape securing the cap upon the upper end portion of the container.

FIGURE 10 is an enlarged vertical sectional view through a modified container, which is similar to the container illustrated in FIGURE 6, but differs therefrom in that the container has a neck cooperative with a partial-turn twist-off type cap.

FIGURE 11 is an enlarged vertical sectional view through a modified container having a plurality of circumferentially extending and axially spaced beads whereby the container may be collapsed along its longitudinal axis, and an internal expelling plate contoured to the configuration of an upper container end portion.

FIGURE 12 is a vertical sectional view of the container of FIGURE 11 and shows the container in its collapsed position within an ejector device.

Prior to the initiation of project Mercury, the concept of manned orbital space flights was a fantasy. The successful orbital flights of the Mercury astronauts evidenced the fact that man in space is a reality. Projects Dynasoar and Apollo, instituted by the U.S. Air Force and N.A.S.A.,

respectively, forecast manned orbital flights of a sustained duration and interplanetary flights within the not-too-distant future. A primary concern of each of the above-mentioned projects is the proper nourishment of and the means capable of supplying the nourishment to an astronaut in orbital or interplanetary flight. Sustained weightlessness and the present limitations in the size of spacecraft renders containers and their contents, heretofore considered satisfactory, inadequate.

A container designed to overcome the present shortcomings in existing containers and specifically constructed for use during space flights is illustrated in FIGURES 1 through 5, and is generally designated by the numeral 13. The container 13 includes a body 14, constructed of aluminum or other light-weight materials, and having an internally directed, relatively shallow circumferential bead 15 adjacent one end thereof for a purpose to be discussed hereinafter. Closures 17 are secured to the body 14 at upper and lower ends thereof by conventional square-type double seams 16. The closures 17 are identical and include inwardly directed recessed ends 18. An outer surface 20 of each end 18 is provided with a circumferential score line 21 adapted to facilitate removal of the ends 18. An outwardly directed annular bead 22 is formed in each of the ends 18.

An expelling plate 23, constructed of molded plastic or like materials, is housed within and guided by the body 14 for movement therein. As is best illustrated in FIGURE 2, the expelling plate 23 is confined in abutting relationship with the lower one of the recessed ends 18 by means of the shallow bead 15. The bead 15 is of sufficient depth to preclude accidental shifting of the expelling plate 23 but is sufficiently shallow to allow upward movement of the expelling plate 23, as is shown in FIGURE 4, when a force is applied thereto. Any suitable container-contents C may be packaged in the body 14 above an upper surface 24 of the expelling plate 23.

Identical upper and lower overcaps or closure caps 25, constructed of polyethylene or like soft resilient material, are secured in liquid-tight relationship to the seam 16. Each overcap 25 includes an inwardly recessed end 26, an integral bead 27, a depending skirt portion 28 and a peripheral tapered locking lip 30.

In dispensing the contents of the container 13, both overcaps 25 are first removed from the container body 14 after which either end 18 is placed in contact with a thermostatic heating device (not shown), if it is desired to heat the container-contents C. The scored upper end 18 is punctured and pried out by a suitable tool (not shown). A pliable nipple 31, constructed of polyethylene or like pliable material, is snap-fitted upon the upper container seam in liquid-tight relationship thereto, as is best illustrated in FIGURE 4. The pliable nipple 31 includes an expelling or discharge spout 32, a top wall 33 integral therewith, a downwardly depending peripheral skirt portion 34 and an inwardly directed peripheral sealing lip 35.

The container 13 is then placed in an ejecting or ejector device similar to the ejector device 95 illustrated in FIGURE 12. A component of the ejector device is a rotatable and axially movable ejector plunger 36. The plunger 36 includes an ejector head 37 and a depending shaft 38. The shaft 38 is coupled to the ejector device by suitable means (not shown) and functions to advance, retract and rotate the ejector head 37. An annular groove 38 in an upper surface 40 of the ejector head 37 seats upon the annular bead 22. The annular bead 22 cooperates with the groove 38 to provide a guide during rotation of the ejector head 37. The ejector head 37 includes a plurality of shear points 41, arranged circumferentially about the ejector head periphery, and in axial alignment with the weakened score line 21 of the end 18.

Initially, the ejector plunger 36 is in axial alignment with the container body 14 and disposed slightly below or in abutment with the lower end 18. The ejector plunger 36 is advanced and rotated by a suitable mechanism in the ejector device, although the container may be directly held and the ejector plunger 36 rotated manually. The shear edges 41 completely sever the end 18 from the body 14. Continued advancement of the ejector plunger 36 forces the expelling plate 23 over the shallow circumferential rib 15. Due to the continued advancement of the plunger 36 and the peripheral configuration of the ejector head 37, a portion 42 of the lower end 18 is flattened to the internal configuration of the container body 14, as is best illustrated in FIGURE 4. Continued advancement of the ejector plunger 36 upwardly, as viewed in FIGURE 4, causes upward advancement of the lower end 18 and the expelling plate 23, thereby expelling the contents of the container 13 outwardly through the spout 32.

When the container-contents C are completely consumed, the ejector plunger 36 is withdrawn from the can body 14. As is best illustrated in FIGURE 5, after the ejector plunger 36 is removed, the severed upper end 18 is placed within the empty body 14, in addition to the lower plate 18 and expelling plate 23 which remained in the body, after which the overcaps 25 are forced over the can seams 16, thereby closing the open container ends. The closed container 13 is then stored.

In FIGURE 6 there is shown a container 19 which includes a plain body 29 as opposed to the beaded body 13. The lower end of the body is closed by one of the aforementioned closures or covers 17 which is secured thereto by the conventional seam 16. The container 19 also includes an upper closure or end 43 and an expelling plate 44. The closure 43 includes an upstanding threaded neck 45 terminating in an internally directed flanged portion 46. A screw-type cap 47 is seated upon the neck 45. A suitable sealing compound 48 is disposed between the cap 47 and flanged portion 46.

The expelling plate 44 includes an annular plate 50 having a circular opening 51. An expelling boss 52 of frusto-conical configuration is force-fitted within the opening 51. An outwardly directed peripheral flange 53 is secured, by means of solder or the like, to the closure or end 18. The expelling boss 52 includes a tapered peripheral wall 54 and an integral circular top face 55. The expelling boss 52 is contoured for mating reception within the neck 45 of the container 19. Such configuration allows an expulsion or dispensing of an optimum quantity of the container-contents C from the container 19.

To remove the container-contents C, the screw-type cap 47 is removed from the neck 45 and a threaded dispensing type closure including a nipple or spout, similar to the dispensing type closure 91 illustrated in FIGURE 12 for example, is screwed upon the neck 45. The lower overcap 25 is removed, the end 18 completely severed and the contents expelled from the container 19 in the manner discussed with reference to container 13 and FIGURE 4. When all of the contents C are expelled from the container body 29, the top face 55 of the boss 52 is in abutment with the flanged portion 46. The dispensing type closure is removed, the screw-type cap 47 replaced and the open bottom end of the container resealed by the overcap 25 with the end 17 and expelling plate 44 within the container 19. The empty container 19 is then stored.

A container 56 having a body 57 and identical upper and lower open portions 58 and closures 60 is illustrated in FIGURE 7. Each body portion 58 includes a peripheral bead 61 adapted to retain the container 56 within an ejector device by suitable clamping means (not shown). A neck 62 extends longitudinally, outwardly of each bead 61 and terminates in an inwardly directed curl 63. Duplicate diametrically opposed threaded portions 64 are formed on the neck 62 and terminate in lug access openings 65, which are also diametrically opposed. Each closure 60 includes an end 66 having an inwardly directed annular bead 67 adapted to cooper-

ate with the curl 63 to form a guide for aligning the cap 60 upon the container body 57. A skirt 68, terminating in two inwardly radially directed diametrically opposed locking lugs 70 is joined to each end 66. A suitable compound 71 provides a seal between the closures 60 and the container body 57. A strip of pressure-sensitive or other suitable tape 69 positively secures each closure 60 upon the body 57 to preclude accidental or inadvertent removal of the closures 60 from the container, as is best illustrated in FIGURE 9. An expelling plate 72, similar to expelling plate 23, is seated upon the lower curl 63 internally of the body 57.

To dispense the contents of the container illustrated in FIGURE 7, the tape 69 is first removed, the container heated if desired, and thereafter both closures 60 are removed. A suitable dispensing type closure having a spout, such as the dispensing type closure 91 illustrated in FIGURE 12, but modified to cooperate with the threads 64 and access openings 65, is then secured to the top portion 58 of the container 56. The container 56 is then placed in an ejection device similar to that discussed in connection with FIGURES 3 and 4, and the container-contents C of the container 56 may, in a similar fashion, be dispensed. It should be particularly noted that no severence of the body 57 or the closures 60 occurs when the structure illustrated in FIGURE 7 is employed to expel or dispense the container-contents C. The plunger head (not shown) used in conjunction with the container 56 does not have the shear points 41 of the ejector plunger 36. The plunger head for the container 56 is merely designed for access through either open end of the body 57.

In FIGURE 10 there is illustrated a container 73 which is, in effect, a composite of the containers illustrated in FIGURES 6 and 7. That is, the container 73 includes the identical expelling boss 52, annular plate 50, container closures 18 and overcap or closure cap 25 as are illustrated in FIGURE 6. Container 73 includes the identical neck 62, curl 63, diametrically opposed threaded portions and lug recesses, 64 and 65 respectively, as are illustrated in FIGURE 7. A closure 74 is substantially a duplicate of the closure 60 illustrated in FIGURE 7, differing thereupon only in the absence of the inwardly directed annular guide bead 67 of the closure 60. A suitable sealing compound 75 is placed within the cap 74 between the cap 74 and the curl 63. The method of dispensing the contents of the container illustrated in FIGURE 10 is identical to the method employed in dispensing the contents of the container illustrated in FIGURE 6.

A container 76 including a body 77 and an integral closure or end 78 of concave configuration is illustrated in FIGURE 11. An end wall 80 the closure 78 is thicker than the body 77 for a purpose to be hereinafter discussed. A plurality of beads 81 are formed in the container body 77 to facilitate collapsing thereof. The body 77 is closed at an upper end 82 by an upper closure 83, substantially identical to the upper closure illustrated in FIGURE 10. A cap 84, similar in structure and operation to the twist-cap 74 illustrated in FIGURE 10, is seated upon the neck 62 of the end portion 83.

A one-piece expelling plate 85 is located internally of the container body 77 and includes a lower concave portion 86 contoured to the configuration of the integral closure 78. The expelling plate 85 has a top circular face 87, a depending peripheral side wall 88, and an outwardly directed flange portion 90. The expelling plate 85 is contoured to the general configuration of the neck 62 to facilitate expulsion of an optimum quantity of the container contents C.

To remove the contents C from within the body 77, the twist-type closure or cap 84 is first removed and a closure 91 is secured upon the neck 62 in the same manner as is the cap 84, as is best illustrated in FIGURE 12. The closure 91 includes a pliable expelling spout 92 made of polyethylene or like pliable material. The spout 92 extends through an opening 94 in the closure 91 and an integral radial flange 96 of the spout 92 is suitably secured to an upper end panel 97 of the closure 91.

The container 76 is placed within a housing of an ejecting device 95 with the upper end portion 83 of the container 76 in partial abutment with a face 99 of an annular housing flange 100. An ejector plunger 101 is a component of the ejecting device and includes a reciprocal shaft 102. An ejector head 103 having an upper convex surface 104, contoured to the general configurations of the end wall 80 and the concave portion 86 of the expelling plate 85 is secured to the shaft 102. As the expelling plate 85 is moved upwardly from the position illustrated in FIGURE 11 to the position illustrated in FIGURE 12, the body 77 thereof collapses endwise and the container-contents C are expelled through the pliable spout 92. The ejector plunger 101 may be moved in the direction of the arrow in FIGURE 12, either manually or by appropriate mechanical mechanisms. The thickened end wall 80 assures accurate alignment of the ejector head 103 against the concave closure or end 78, and precludes distortion of the closure 78 from the force created by the ejector plunger 101.

It is within the scope of this invention to dispense both food and non-food products of a semi-solid, paste-type or fluid consistency from within containers constructed in accordance with this disclosure. Such non-food products as liquid or paste-type vitamins as well as distilled water can comprise the contents C of the disclosed container. Additionally, stimulants such as coffee may form the contents C of the disclosed container.

While example disclosures of containers with expelling means for use in manned spacecraft are shown herein, it is to be understood that changes in the disclosed containers and their components may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A container comprising an imperforate cylindrical metallic body having an upper end and a lower end, a metallic closure at each of said ends, interlocking means securing said closures to the body, at least said closure at said upper end being openable, an expelling plate located internally of said body, said expelling plate being movable toward said upper openable closure whereby the contents of said container may be expelled through the upper end of the body originally closed by said openable closure, an imperforate overcap removably secured to one of said ends in overlying relationship with one of said closures, and said lower closure being provided with a score line to facilitate severance of a portion of the closure from the container body.

2. The container as defined in claim 1 wherein the imperforate overcap includes interlocking means securing said imperforate overcap to said first mentioned interlocking means.

3. The container as defined in claim 2 wherein the lower closure portion and expelling plate are simultaneously movable toward said spout whereby container-contents may be readily expelled from the container through the pliable expelling spout.

4. The container as defined in claim 2 wherein the lower closure includes an annular depending bead adapted to guide and center the head of an ejecting and severing plunger whereby the lower closure portion is completely severed from the container.

5. The container as defined in claim 1 wherein the upper closure is provided with a score line to facilitate severance of a portion of the upper closure from the container body.

6. A container comprising an imperforate cylindrical body and including identical upper and lower inwardly recessed closures, each closure being provided with an outwardly directed annular guide bead and a circular score

line, a peripheral seam securing each closure to said cylindrical body, an inwardly recessed overcap overlying each closure, each said overcap including an inwardly directed annular lip whereby said overcaps are snap-secured to said seams in liquid-tight engagement, an expelling plate within and movable longitudinally of said body, said plate being initially seated internally upon a portion of said lower closure, and means precluding accidental shifting of said expelling plate with respect to said body.

7. A container as defined in claim 6 wherein said means precluding accidental shifting of said expelling plate includes an internal bead in said cylindrical body.

8. A container as defined in claim 7 wherein said internal bead is of a relatively shallow construction and said expelling plate is arranged between said bead and said lower closure.

9. The combination of a housing having an ejector plunger and the container within said housing; said container including a body having upper and lower closures, an expelling plate located internally of said body and seated upon said lower closure, said plate being adapted for longitudinal movement relative to said upper closure; an ejector plunger, said ejector plunger including an ejector head contoured to the configuration of said lower closure, the shaft secured to said ejector head and being movable relative to said upper closure, said upper closure including a removable portion whereby container-contents may be expelled from the body upon removal of the upper closure portion, the configuration of the lower closure and the ejector head being complementary whereby the ejector head is guided for positive seating against the lower closure, the lower closure, the ejector plunger and the expelling plate being simultaneously movable longitudinally toward said upper closure, and the lower closure including a circular score line and the ejector head having a plurality of shear points in alignment with said score line to facilitate severance of a portion of the lower closure.

10. The combination as defined in claim 9 wherein the lower closure includes an outwardly directed annular bead and the ejector head is provided with an annular recess in mating alignment with said bead whereby the ejector plunger is accurately aligned upon the said lower closure.

11. A container comprising an imperforate cylindrical metallic body having an upper end and a lower end, a metallic closure at each of said ends, interlocking means securing said closures to the body, at least said closure at said upper end being openable, an expelling plate located internally of said body, said expelling plate being movable toward said upper openable closure whereby the contents of said container may be expelled through the upper end of the body originally closed by said openable closure, an imperforate overcap removably secured to one of said ends in overlying relationship with one of said closures, and one of said closures being provided with a weakening line defining a removable panel to facilitate the severance of said removable panel from said last mentioned closure.

12. A container comprising an imperforate substantially cylindrical metallic body having upper and lower imperforate closures, each of said closures having end panels, a peripheral double seam securing each imperforate closure to said cylindrical body, one of said imperforate closures having an openable portion in the end panel thereof, said openable portion being defined by a score line to facilitate the removal of said openable portion from the remainder of said one closure without destroying the integrity of the associated peripheral seam, said score line being located wholly in said one closure radially inwardly of said double seam, an imperforate overcap overlying at least one of said closures, said overcap having an end wall and a peripheral skirt portion, said peripheral skirt portion including a peripheral locking lip adapted for snap-securement of the overcap to one of said seams whereby the container is recloseable by the overcap after the openable portion has been at least once removed, and said one imperforate closure being reinforced by a reinforcing bead adjacent said score line.

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