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3,077,979

SAMPLE CONTAINER

Filed Feb. 29, 1960

2 Sheets-Sheet 1

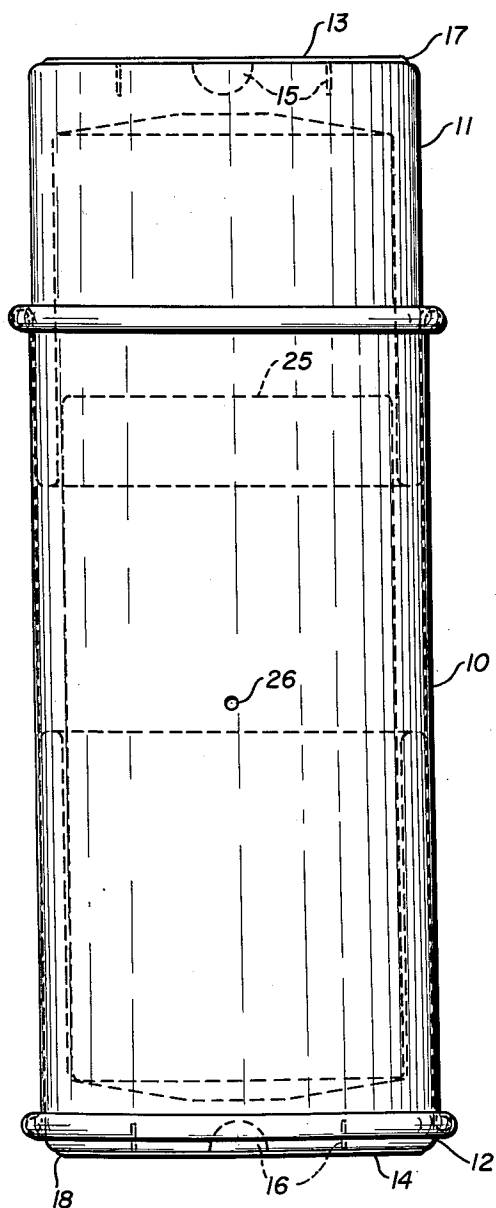


Fig.-1

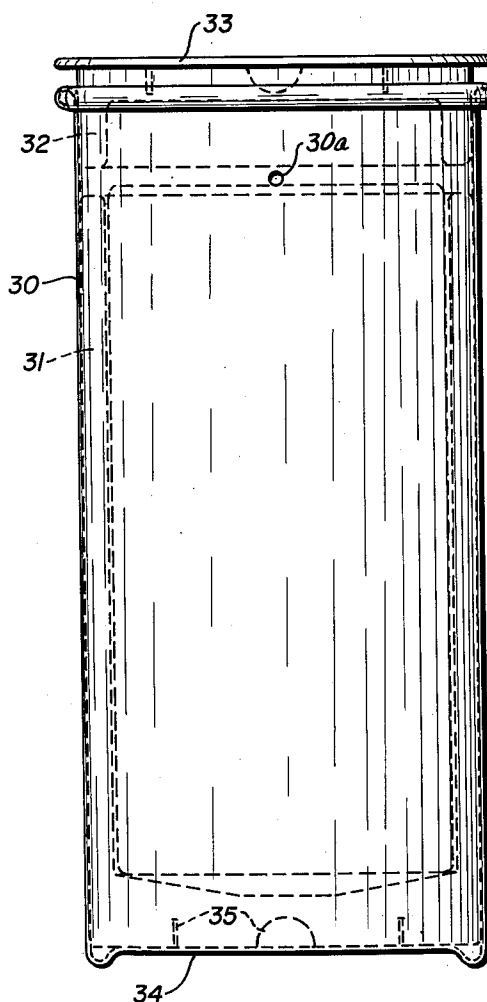


Fig.-2

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2 Sheets-Sheet 2

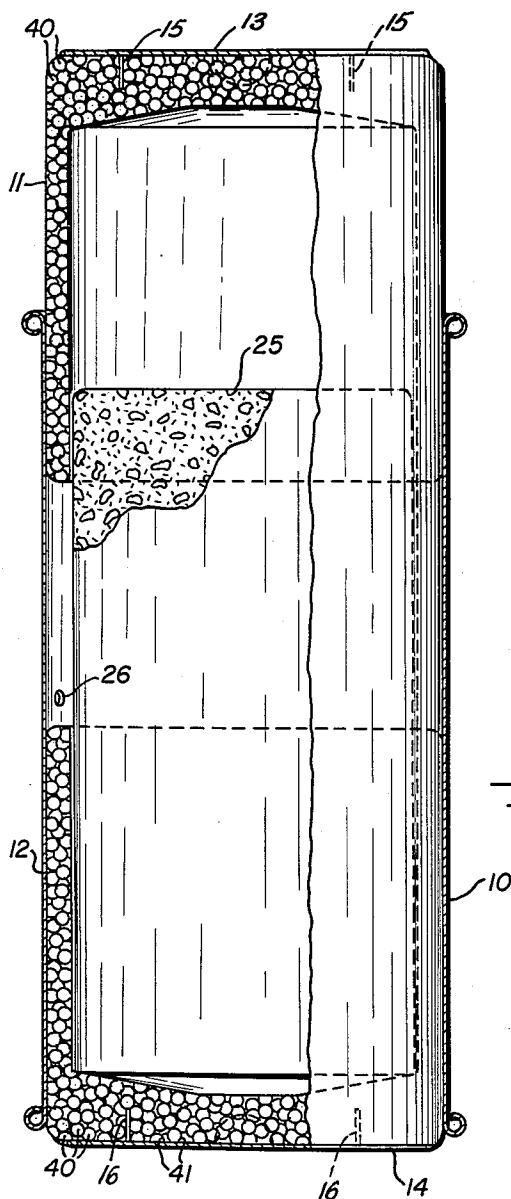


Fig. - 3

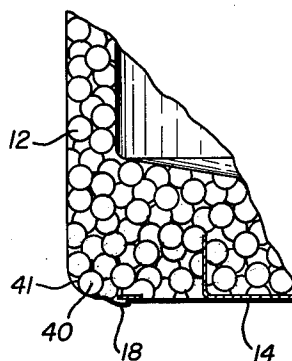


Fig. - 4

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3,077,979

SAMPLE CONTAINER

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6 Claims. (Cl. 206—46)

This invention is directed to an impact energy absorbing sample holder, and more particularly to a concrete sample shipping container inclusive of a deformable, crushable, impact energy absorbing liner.

Handling of concrete samples has posed many problems since, until it sets, concrete is very sensitive to various physical and chemical effects. During shipment from a construction site to a testing laboratory, it has been necessary that the samples be elaborately packaged to adequately protect them against shock or impact, freezing, drying too fast—the samples must cure under carefully controlled conditions of temperature and moisture—since the foregoing cause internal stresses and other physical and chemical indicia which will appear upon testing and which will not be representative of the concrete being poured at the construction site.

Further, it is necessary that the testing of the samples be accomplished as soon as possible after obtaining them since any delay will increase the number of tons of concrete poured at the construction site subsequent to the taking of the sample. Thus, if faulty or below test concrete and the like were being poured, a failure to ascertain the shortcomings in the concrete accurately and rapidly increases the amount of concrete which must be replaced whereas a rapid and accurate test would have held the replacement to a minimum.

To overcome the foregoing problems, we have invented a shipping container for concrete samples that is reusable, simple in construction, light weight, economically manufactured, substantially insulated against heat and cold, is deformable and energy absorbing, air and moisture resistance, and easy to use.

Briefly, our novel concrete sample shipping container consists of a light weight outer shell, which may be of tubular aluminum, magnesium or the like, and a snugly fitting, two-piece liner section formed of a foamed synthetic condensation product of synthetic resins, polymers, co-polymers and the like which are foamed by an inert gas, steam or the like to form a deformable, crushable, energy absorbing liner which will not transmit stress inducing impact energy to a sample, but will absorb such energy. The detailed description set forth hereafter will more clearly set forth the novel interaction of the foregoing elements.

It is, therefore, among the objects and advantages of this invention to provide a simple, lightweight, inexpensive, easily usable, insulated, non-impact energy transmitting concrete sample shipping container.

Other objects and advantages will become obvious to those skilled in the art from a study of the following description with reference to the appended drawings, in which:

FIG. 1 is a side elevation of a sample shipping container according to our invention;

FIG. 2 is an elevated side view of an alternative design;

FIG. 3 is a view of the device of FIG. 1 in partial section; and

FIG. 4 is an enlarged fragmentary detail in partial section of the device of FIG. 1.

FIG. 1 shows a lightweight tubular outer shell 10 having a smooth interior surface and encompassing a substantial portion of a two part liner section, the sections

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being indicated by reference numerals 11 and 12, respectively, both of which sections are substantially duplicates. The diameter of the liner sections is such as to fit substantially in an air and moisture tight friction fit with the shell and of such a length as to have the open ends thereof in spaced but proximate relation when the shell and liner sections are assembled. Each of the liner sections 11 and 12 carries wear or butt plates 13 and 14, respectively, which are firmly held in place by such as punch-outs 15 and 16, respectively. Of course, other than the punch-outs may be used within the scope of our invention to hold the butt plate in fixed relation with the liner sections.

Further, by molding the sections 11 and 12 in association with the butt plates 13 and 14, a small portion of the material from which the sections are made peripherally encompasses a small portion of the edges of the wear plates, thereby embedding the plates in the section and further holding them firmly in place. The overlap on the plates 13 and 14 is indicated by reference characters 17 and 18, respectively.

The dotted line 25 is generally indicative of a concrete sample—normally 12 inches in height and six inches in diameter—as it would be when the container is assembled.

A relief orifice 26 is spaced in close proximity to the end of the liner section 12, which section is substantially entirely encompassed through its length by the outer shell 10 when these two parts are assembled. The other section 11 serves the double purpose of completing the lining and acting as a closure member. The function of the relief orifice 26 is to allow compressed air or the like to be forced into the container between the liner sections for rapid separation thereof to accomplish easy access for removal of a concrete sample. Further, the relief orifice serves to allow easier insertion of the closure member by allowing escape of enclosed air. It is anticipated that other means of separation may be used within the scope of our invention. Also, it is anticipated that the device may be used without means of separation, although greater difficulty is encountered in separating the sections without such.

FIG. 2 is an alternative arrangement of parts according to our invention wherein an outer shell 30 encompasses liner sections 31 and 32. Section 32 additionally serves as a cap or closure means and has a wear or butt plate 33 similar in function to the butt plates 13 and 14. The shell 30 has butt plate 34 and securing means 35 integral therewith for holding the liner section 31 in place. The internal dimensions of the liners of FIG. 2 and the total length thereof are substantially the same as those of the liners of FIG. 1. A relief orifice 30a is spaced slightly above the liner section 31 and functions similar to the orifice 26 of FIG. 1.

When assembled, the ends of the liner section 31 and 32 will be in spaced but proximate relation, similar to the liner sections of the container of FIG. 1, and in a substantially air and moisture tight friction fit with the smooth interior surface of the outer shell.

The sectional view of FIG. 3 shows a concrete sample 25 in place and the liner section 11 before it has been entirely moved into proximate relation with the section 12. FIG. 3 also shows each of the liner sections as composed of an integral body having a smooth exterior surface and composed of a series of substantially spherical, air and moisture tight chambers or cells 40. The walls 41 of the cells 40 are deformable but are sufficiently brittle, rigid and substantially non-elastic enough that stress inducing impact energy and the like will break or crush some of the chambers and the energy will not be transmitted to a concrete sample carried in the container. Because of the relative thickness of the walls

and the myriad of separate cells which adhere to each other, the liners comprise a rigid block of material which may be reused many times without requiring replacement.

The detail of FIG. 4 is intended to more clearly show the bonded arrangement of the cells 40 and the relationship of the butt plates to the liner sections.

In our preferred embodiment, expanded polystyrene beads are used to form the liner sections which have the desired physical properties set forth above and have been found to be superior to other materials listed above.

Not only does the arrangement of air and moisture-tight cells prevent unwanted and undesired moisture from entering the device, they also serve to retain moisture in a concrete sample carried in the container, thereby offering the necessary control for the proper curing time of the sample carried therein.

In operation, therefore, a concrete sample is poured at a construction site and allowed to cure until it has a substantially contiguous form without the aid of the forming device. Thereafter, the sample is placed in a sample container according to our invention, being encompassed in the lower liner section and by the outer shell. Thereafter, the upper section is moved into a tight relation with the outer shell and down into the shell over the concrete sample until the ends of the upper and lower liner sections are in close proximity, but sufficiently spaced to allow access to the interior of the container through the relief orifice. The sample may then be easily transported to the testing site without danger of undesirable physical and chemical changes before testing. Upon arrival at the testing station, by the application of compressed air or the like through the relief orifice 26, it is possible to rapidly and easily force the sections apart for rapid access and removal of a concrete sample carried therebetween.

Having thus described our invention and set forth exemplary manners of practicing it, it is desired that it be understood that we do not wish to be limited to the specific embodiments set forth herein, but rather by the scope of the appended claims.

We claim:

1. A shipping container for concrete samples, comprising an elongated tubular member of stiff metal open at least one end and forming an outer shell portion, a liner for one end and an adjoining intermediate portion of the shell comprising a rigid block of expanded polystyrene beads bonded together with its inner surfaces substantially parallel to the sides and said end of the shell and its exterior surfaces held in tight friction fit with the inner surface of the adjoining portion of the shell, and a second liner member of similar composition closed at one end and having a tubular portion corresponding in cross-section to said first liner so as to provide a tight friction fit when its open end is inserted in the shell, the inner open ends of said liners being disposed in spaced relation at the point of maximum penetration of said second liner member in the shell, and there being an opening through an unlined portion of the shell for separation of the inserted liner by fluid under pressure when a concrete sample is enclosed by said liners.

2. A shipping container for concrete samples, comprising an elongated tubular member of stiff metal closed at one end and open at the opposite end and forming an outer shell portion, a liner for the closed end and an adjoining intermediate portion of the shell comprising a rigid block of expanded polystyrene beads bonded together with its inner surfaces substantially parallel to the sides and said closed end of the shell and its exterior surfaces held in tight friction fit with the inner surface of the adjoining portion of the shell, and a second liner member of similar composition closed at one end and having a tubular portion corresponding in cross-section to said first liner so as to provide a tight friction fit when its open end is inserted in the shell, the

inner open ends of said liners being disposed in spaced relation at the point of maximum penetration of said second liner member in the shell, and a relatively rigid butt plate molded in the outer end surface of the second liner with its peripheral edges contained in the rigid block, and there being an opening through an unlined portion of the shell for separation of the inserted liner by fluid under pressure when a concrete sample is enclosed by said liners.

3. A shipping container for concrete samples, comprising an elongated tubular member of stiff metal closed at one end and open at the opposite end and forming an outer shell portion, a liner for the closed end and an adjoining intermediate portion of the shell comprising a rigid block of expanded polystyrene beads bonded together with its inner surfaces substantially parallel to the sides and said closed end of the shell and its exterior surfaces held in tight friction fit with the inner surface of the adjoining portion of the shell, and a second liner member of similar composition closed at one end and having a tubular portion corresponding in cross-section to said first liner so as to provide a tight friction fit when its open end is inserted in the shell, the inner open ends of said liners being disposed in spaced relation at the point of maximum penetration of said second liner member in the shell, and a relatively rigid butt plate having a flanged portion of greater diameter than the shell and having portions embedded in and bonded to the rigid block, and there being an opening through an unlined portion of the shell for separation of the inserted liner by fluid under pressure when a concrete sample is enclosed by said liners.

4. A shipping container for concrete samples, comprising an elongated tubular member of stiff metal open at least one end and forming an outer shell portion, a liner for one end and an adjoining intermediate portion of the shell comprising a rigid block of expanded polystyrene beads bonded together with its inner surfaces substantially parallel to the sides and said end of the shell and its exterior surfaces held in tight friction fit with the inner surface of the adjoining portion of the shell, and a second liner member of similar composition closed at one end and having a tubular portion corresponding in cross-section to said first liner so as to provide a tight friction fit when its open end is inserted in the shell, the second liner being shorter than said first liner and the inner open ends of said liners being disposed in spaced relation at the point of maximum penetration of said second liner member in the shell, and there being an opening through an unlined portion of the shell for separation of the inserted liner by fluid under pressure when a concrete sample is enclosed by said liners.

5. A shipping container for concrete samples, comprising an elongated tubular member of stiff metal open at its ends and forming an outer shell portion, a pair of corresponding liner members for the interior of the shell closed at one end and open at the opposite end, each said liner comprising a rigid block of expanded polystyrene beads bonded together and forming a rigid block, inclusive of an end portion and a tubular portion disposed generally perpendicular thereto, the exterior surface of the tubular portions being held in tight friction fit with the internal surface of the shell and the open ends of said liners being held in spaced relation within the interior of the shell intermediate its ends, and there being an opening through an unlined portion of the shell for separation of the inserted liner members by the fluid under pressure when a concrete sample is enclosed by said liners.

6. A shipping container for concrete samples, comprising an elongated tubular member of stiff metal open at at least one end and forming an outer shell portion, a liner for one end and an adjoining intermediate portion of the shell comprising a rigid block of expanded beads comprising a synthetic condensation product se-

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lected from the group consisting of resins, polymers, copolymers and mixtures thereof and bonded together with its inner surfaces substantially parallel to the sides and said end of the shell and its exterior surfaces held in tight friction fit with the inner surface of the adjoining portion of the shell, and a second liner member of similar composition closed at one end and having a tubular portion corresponding in cross-section to said first liner so as to provide a tight friction fit when its open end is inserted in the shell, the inner open ends of said liners being disposed in spaced relation at the point of maximum penetration of said second liner member in the shell, and there being an opening through an unlined portion of the shell for separation of the inserted liner by fluid under pressure when a concrete sample is enclosed by said liners.

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