Feb. 1, 1966 R. J. STEIN ETAL 3,232,424

PLURAL CONTAINER PACKAGE

Filed March 18, 1963

Fig. 1

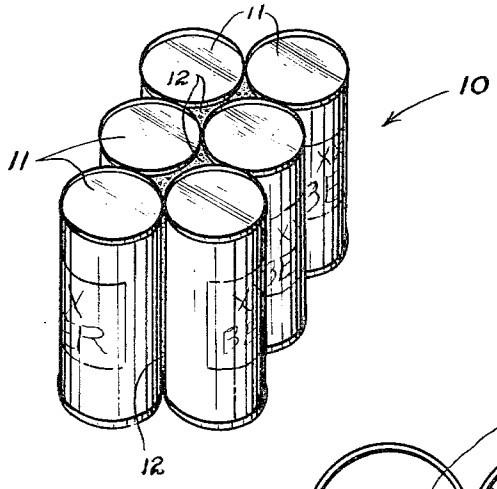



Fig. 2

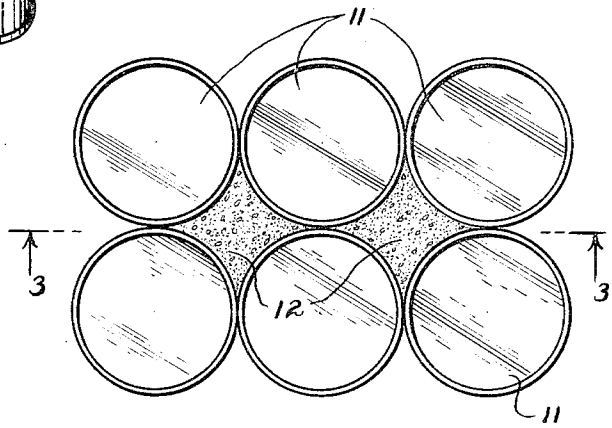



Fig. 4

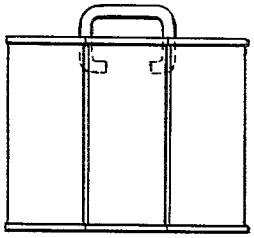


Fig. 5

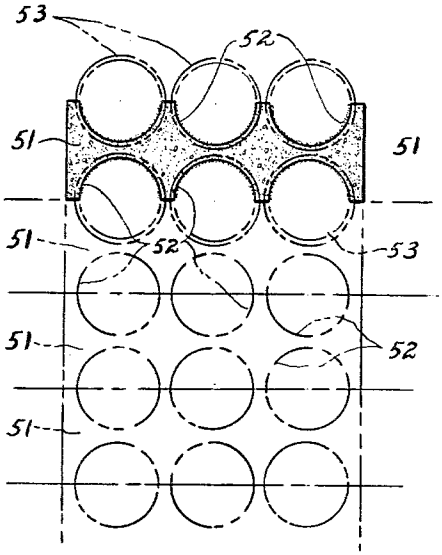
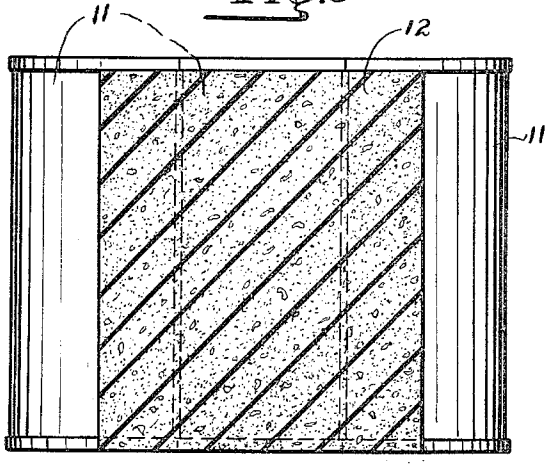



Fig. 3




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# PLURAL CONTAINER PACKAGE

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This invention relates to an improved package for cylindrical shaped articles and to the method of forming such a package.

Many containers are sold in groups or packages of individual, unit containers. Each container is primarily designed not only to protect the contents but also to provide a convenient package for multi-unit conveyance. For example, soft drinks in cans or bottles are conventionally sold in groups of six, and the six cans are grouped within a relatively expensive paper carton. Similarly, frozen juices and other beverages are often sold as packages of unit containers by enclosing the desired group in a container of paper-board, plastic, cellophane, or the like.

It is an object of this invention to provide an improved package in which a plurality of containers may be assembled into the desired multi-unit package without a covering or container.

A further object of this invention is to provide an improved method for assembling multi-unit articles.

Other objects and advantages of the invention will in part be obvious and in part appear hereinafter.

In accordance with these objects, there is provided a plurality of unit articles arranged in the desired configuration. Each article is in peripheral contact or approximate contact with at least two adjacent articles whereby the articles are in an abutting relation and define a void. Within the space and tangent to the articles there is a foam, such a polyurethane foam, which may fill the void space, and adheres to the exposed portions of the individual articles defining the void. The foam is of such nature as to bond to the articles. However, each unit is easily removed by the consumer. The foam may be preformed to receive the articles or it may be generated in place.

The resultant package consists essentially of the unit articles held in given spaced relationship with the articles being held together by means of a plaster foam. Accordingly, an amount of the foam sufficient in expanded form at least partially to fill the voids between the containers and provide adhesion is used.

To fabricate such a package, and to form the foam in place, the unit articles or containers are aligned in rows of successive pairs and voids injected with packaging foam-forming components. Reaction is induced, completed, the foam cured, and the cured foam adhering to the containers provides a rigid multi-unit package.

Foam may be generated separately in blocks, preformed to define openings to receive containers and slices of those blocks used to assemble the packages.

In this manner, a neat attractive package can be assembled. The advertising on the individual container is exposed to provide eye appeal and shopper attraction. The usual carton is eliminated, thus avoiding the manipulations associated with forming and filling a carton.

The details of the invention may be understood by reference to the drawing wherein:

FIGURE 1 is a perspective view of a package constructed in accordance with the present invention;

FIGURE 2 is a top view of a package constructed in accordance with the present invention;

FIGURE 3 is a sectional view along lines 3–3 of FIGURE 2; and

FIGURE 4 is a side view of a package having a handle.

FIG. 5 is a modified form of preformed unit.



In the figures there is shown a package **10** of individual unit articles **11**, which are assembled in parallel rows and held in this position by the cured foam **12** which fills the row of voids.

The cured foam **12** provides adequate adhesion for position retention of the unit articles or containers **11** and allows removal of the individual containers.

The invention in our preferred present embodiment makes use of polyurethane foam. Of course, there is much technology relating to formation and use of polyurethane foam as developed in reaction of a polyester and/or polyether with a di-isocyanate or polyisocyanate in the presence of a suitable catalyst. In general, this may be shown by the following:

$$\left.\begin{array}{l}\text{polyester or}\\ \text{polyether or}\\ \text{polyol}\end{array}\right\} + \text{di-isocyanate} = \text{polyurethane (foam)}$$

Of course, the foam is generated upon the addition of a suitable catalyst, such as an amine.

Urethane foams such as the following are suitable for use in the formation of the package. All parts are in terms of parts by weight, unless specified otherwise.

*Example*

A solvent blown rigid urethane foam is prepared by mixing stoichiometric amounts of tri-methylol propane with toluene di-isocyanate in amount of about 100 parts by weight of the tri-methylol propane to about 200 parts by weight of the toluene di-isocyanate.

The mixture of the tolene di-isocyanate and the trimethylol propane is a good prepolymer when the materials are mixed and the temperature adjusted to 100° C. and held at this level for about an hour. This mixture after a short period of ageing has viscosity at 25° C. of 3000–4000 centipoises and a free isocyanate content of 25 percent. In this molecular weight range one additional part by weight toluene di-isocyanate will be needed for each increase of seven in the hydroxyl number.

To prepare a foam the prepolymer described having about 25% isocyanate content is reacted with a polyol, a typical one being tri-methylol propane, in stoichiometric amount with about one half its weight of a blowing agent such as trichloro fluoro methane. Thus, a foam forms, and after about 10 minutes it is no longer tacky.

The chemistry of the di-isocyanate reaction with a polyol or polyester to produce foam is rather well developed. The foams may be varied in composition to suit the need of the application. The polyurethanes thus produced are naturally quite strong adhesives and, as such, are well adapted to purposes of this invention. That is, they adhere readily to the containers being assembled into the package. A development of the chemistry of urethane foams can be found in the book, Brage Goulding, "Polymers and Resins," Van Nostrand Co. (1959).

Although the use of urethane foam has been shown as a preferred embodiment, it is to be understood that it was for purposes of convenient illustration without any intention of restriction thereto. In general, foams which expand and cure at room temperature and mechanical or pour-in-place foams are suitable for use in connection with this invention. For example, mechanically blown vinyl foams may be used as packaging foams. Other foams, such as formed silicones, can be applied with a catalytic spray gun.

While FIGURE 1 has been specifically illustrated to typify a package of six cylindrical cans, it is to be understood that it may be equally applicable to packages of other shapes. Voids between and among units for formation of the foam make possible the fabrication of the package.

The assembly of packages in accordance with this invention is easily accomplished with the packaging foam. The unit articles are arranged in the desired alignment and then pour into the voids the foam reaction mixture as hereinbefore described. The foam forms in situ with the heat of reaction inducing curing and in a few minutes the finished product is taken off the line. The prefoamed unit articles may be held in position by a mold, temporary retaining band, or the like until the finished package is provided.

A handle **41**, as shown in FIGURE 4, may be embedded in the foam during curing for added ease in carrying the package.

It will also be apparent that a more complicated version of the package can be fabricated in which a unit article may be surrounded by smaller unit articles and bound to it by foam where the center article's exposed area will provide a means for carrying the package.

An alternate version of the package, as shown by FIGURE 5, can be fabricated which consists of a foamed base **51** having recesses **52** for receiving and retaining unit articles, **53**. In this version, a foam carrier of any desired height is preformed and thereafter the articles are assembled and adhered in the recesses to provide the package. Of course, for retaining the articles in position, the innermost portion of the recesses which are in contact with the articles or containers will be coated with an appropriate adhesive. In this manner, the containers will adhere to the foam carrier, but again can be easily removed by the consumer. In general, any pressure sensitive adhesive suitable for use in connection with cured foams, vinyl foams, and the like is suitable.

This invention may be variously modified and embodied within the scope of the subjoined claims.

What is claimed is:

**1.** A package which comprises a plurality of shaped rigid containers held in a predetermined overall form defining interstices among said containers, only said interstices among adjacent faces of said containers being occupied by an adhering plastic rigid foam, said foam being adhered to each container and the only means employed for holding said containers in said predetermined overall shape.

**2.** A package in accordance with claim **1** in which the adhering foam is urethane foam.

**3.** A package in accordance with claim **1** in which the adhering foam is a vinyl foam.

**4.** A package comprising a preformed plastic foam base and a plurality of rigid containers in predetermined overall form, said plastic foam base having a top, a bottom, ends, sides and a plurality of recesses along each side, a container positioned in each of said recesses with only the innermost side portion of each container snugly engaged with the corresponding recess, said foam being adherent and adhered to each container and corresponding in volume and shape to interstices among said plurality of containers and being the only means for holding said containers in said predetermined overall form.


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