

[54] SAFETY PACKAGE ASSEMBLY AND DIVIDES CLAMP THEREFOR

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[51] Int. Cl. **B65d 77/08**

[58] Field of Search 206/47 A; 24/30.5 R, 24/137 R

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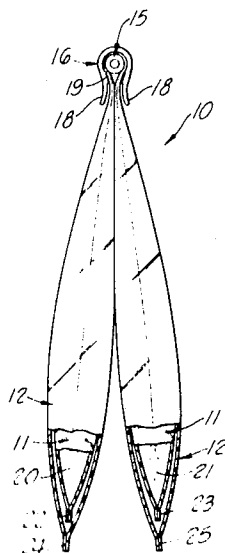
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[57] ABSTRACT

A safety package assembly for isolating chemically reactive constituents until ready for intermixing comprising inner and outer tubular containers, the opposite ends of the inner container being charged with proper quantities of the two reactive constituents and previously held isolated by a detachable divider clamp assembly applied crosswise of the collapsed midportions of said container. A wall failure at either or both ends of the inner container merely permits a constituent to escape into the contiguous compartment of the outer container. Even when both ends of the inner compartment fail the constituents are retained captive and positively isolated until removal of the clamp. The divider clamp assembly is formed of differentially resilient materials, the stiffer more resilient outer member having sharp edged ribs positioned to press the container walls against the softer inner clamping member.

10 Claims, 4 Drawing Figures



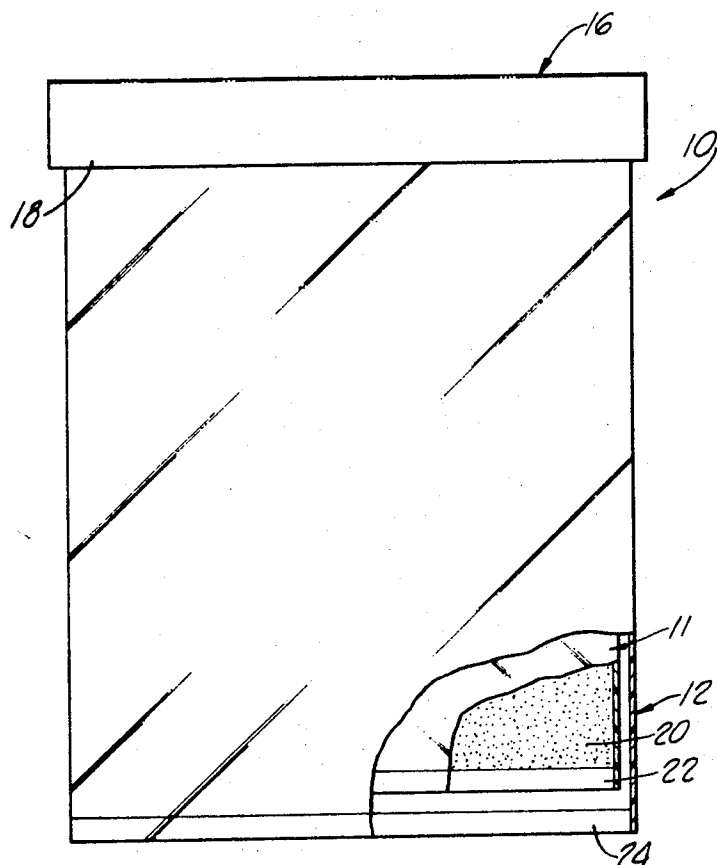


FIG. 1.

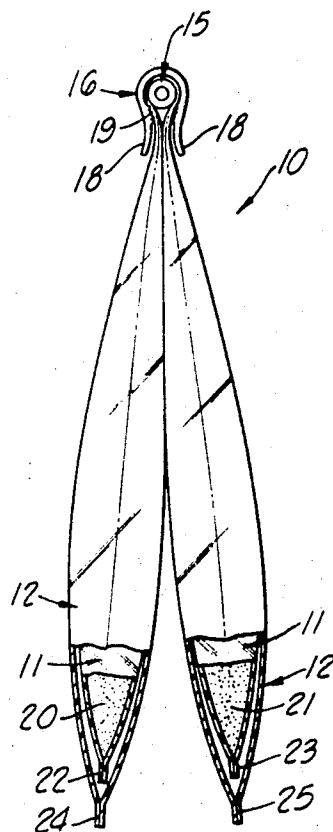


FIG. 2.

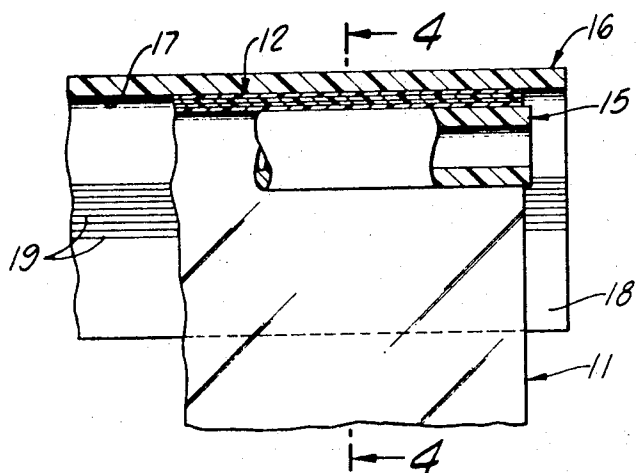


FIG. 3.

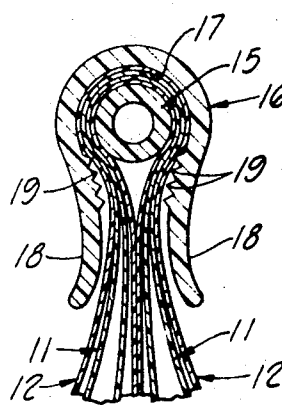


FIG. 4.

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SAFETY PACKAGE ASSEMBLY AND DIVIDES CLAMP THEREFOR

This application is a division of our copending application for United States Letters Patent Ser. No. 869,504, filed Oct. 27, 1969, and having the same title as this application.

This invention relates to packaging assemblies and more particularly to an improved safety package for isolating chemically reactive constituents at the opposite ends of a common inner storage compartment until ready for intermixing and including a surrounding container for holding the constituents captive and isolated should a failure occur in the inner compartment wall. The safety package assembly also features improved divider clamp means for holding the constituents separated until ready for use.

In a typical application for which the invention safety package is admirably suited, the principal constituents of a polymerizable thermoplastic composition are packaged, stored and shipped. When these two principal ingredients comprising resinous material and a catalytic agent are mixed, polymerization ensues to form a rigid body of a desired configuration. Various proposals have been made heretofore for a packaging container formed with partition means separating the principal constituents until ready for intermixing and use. Despite the many attempts made to provide easily destroyed frangible partitions between adjacent compartments for the constituents, these expedients have not been satisfactory for a number of reasons. To avoid these difficulties, it has been proposed to hold the constituents in the opposite ends of a unitary container by a removable clamp applied across the midportion of the container. Although such divider clamping assemblies have met with greater success than frangible partitions they are typically subject to the serious disadvantage that the clamps sometimes fail or loosen releasing some or all of the catalyst into the resin thereby allowing the contents of the package to polymerize prematurely and while packaged. Another serious disadvantage of prior packaging assemblies of this type results from rupture of one or both compartments by the application of a sharp blow or excessive pressure. Not only do the contents then escape onto other items in the immediate vicinity but the package and its contents become worthless.

According to the present invention, eminently satisfactory solutions are provided for each of the foregoing shortcomings of prior packaging assemblies. Failure of the principal container and loss of its contents has been overcome by the simple expedient of enclosing the inner container in an outer container of the same general construction but preferably of stronger material and in a size slightly larger than the main or inner container. The chemically reactive constituents are isolated from one another in the opposite ends of the main container which is then sealed within outer protective container. An improved divider clamping assembly is then employed to hold the walls of the two internested containers tightly compressed against one another to form two pairs of completely isolated compartments at the opposite ends of the containers. The outer chambers or compartments being slightly larger than the inner compartments and normally not filled, are not subject to load forces. Accordingly, applied stresses are substantially confined to the walls of the compartments at either end of the inner container with the result that

any failure first occurs in the walls of this container. The escape of the contents then takes place into the sealed surrounding compartment of the outer container and there held captive until the clamping assembly is removed. Accordingly, even through both inner compartments are ruptured the contents cannot intermingle until the clamping assembly is removed. At this time, the ingredients can be intermixed thoroughly with one another preliminary to the opening of the inner and outer containers and use of the contents.

The improved clamping and divider assembly includes a relatively soft, smooth surfaced inner member and a relatively stiff highly resilient U-shaped outer member snugly embracing the inner member and cooperating therewith to hold the two container walls flattened and compressed against one another between the two clamping members. Aiding very materially in holding the parts assembled in this manner are a plurality of sharp edged ribs projecting inwardly from the inner surface of the U-shaped clip member. Desirably, only the innermost pair of these ribs are positioned in close proximity to the inner clamping member, the other sharp edge ribs being positioned to come progressively into clamping operation if and upon any tendency of the clamping members to become disengaged. Highly superior clamping effectiveness and operating reliability has been found to result when using a relatively soft less resilient inner member in combination with a highly resilient and relatively stiff inflexible outer member particularly when the latter includes inwardly projecting sharp edged ribs. The use of a series of ribs in parallel along either leg of the outer clip member and so arranged as to become operative in sequence upon any tendency of the clamp members to become disassembled and cooperating to urge the clamp parts back into their proper assembled position has been found to add greatly to the reliability and foolproof characteristics of the divider clamp assembly.

Accordingly, it is a primary object of the present invention to provide a more reliable, trouble free and dependable packaging assembly for holding chemically reactive constituents isolated within a common package until ready for use.

Another object of the invention is the provision of a single use disposable packaging assembly for a plurality of constituents maintained in isolation until needed and including a surrounding safety chamber into which the contents escape upon failure of the inner container wall.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which a preferred embodiment of the invention is illustrated:

FIG. 1 is a top plan view of one preferred embodiment of the invention safety packaging assembly with portions broken away to show constructional details;

FIG. 2 is an end elevational view of the package shown in FIG. 1 with portions of the walls broken away;

FIG. 3 is a fragmentary view on an enlarged scale taken through one end of the divider clamp assembly; and

FIG. 4 is a cross sectional view taken along line 4—4 on FIG. 3.

Referring initially and more particularly to FIGS. 1 and 2, there is shown an illustrative embodiment of the

present invention designated generally 10. This packaging assembly includes an elongated inner tubular container 11 and an outer slightly larger longer tubular container 12. Desirably, both containers are formed of any suitable flexible sheet material of adequate strength and impervious to moisture and the contents to be packaged. A particularly suitable material comprises high strength polyethylene, polyvinylchloride or any of numerous other thermoplastic compositions well known to those in the packaging art. Preferably, the outer container 12 is of greater thickness and strength than the inner container to withstand impact blows and contact with abrasive and sharp edged bodies. As will be appreciated, the outer container is customarily exposed to greater hazards than the inner bag. However, the inner bag is subjected to fluid pressure if excessive weight is applied to the package assembly from its exterior.

It will be understood that the interiors of both containers are unobstructed and in full communication with one another until and unless their opposite side walls are held compressed against one another in a transverse band between their opposite ends. This is achieved using the invention divider clamp assembly comprising a first or smooth surfaced mandrel member 15 and a second generally U-shaped clip member 16 and preferably made in the configurations best shown in FIGS. 3 and 4. The elongated divider members are of equal length adequate to project beyond the opposite lateral edges of the flattened tubular containers 11, 12. Mandrel member 15 is here shown as being tubular and generally circular in cross section. Preferably it has a smooth exterior surface and a shape and size nesting snugly against the interior surface 17 along the entire bight portion of clip 16.

Clip 16 is generally U-shape in cross section and the outer ends 18, 18 of its legs flare away from one another and have rounded outer edges. The interior surfaces of legs 18 are provided with a plurality of integral sharp-edged ribs 19 extending parallel to one another and to the axis of mandrel member 15 when the latter is properly and fully seated within the bight portion of the clip.

As herein illustrated, the innermost pair of ribs 19 are positioned to apply light to moderate pressure against the compressed and flattened side walls of tubular containers 11 and 12. However, if member 15 is not fully seated then it will be apparent that the inner pair of ribs 19 to either side of member 15 will press the side walls of the bags against member 16 with greater pressure and that the adjacent pair of ribs 19 will then be in a position to press the flattened side walls of the container against member 15, and supplement the sealing action and as well as to apply pressure resisting further disassembly of member 15 from its fully seated position. It will likewise be understood that the third and fourth pairs of ribs 19 will be brought into restraining operation should member 15 continue its escape movement toward the outer ends of the legs of clip 16.

From the foregoing it will be evident that the described clamping assembly is so proportioned that the innermost pair of ribs 19 are normally effective to apply clamping pressure between their outer sharp edge and the four layers of the two containers to hold the latter firmly compressed against the relatively soft, inner member 15 thereby to hold the latter fully inter-nested under pressure against the bight portion of the

highly resilient and relatively stiff clip 16. Since the transverse spacing or air gap between the sharp edges of related pairs of ribs 19 progressively decreases toward the outer ends of legs 18, it will be readily evident that should there be any tendency for the clamping members to move out of their fully nested positions, ribs 19 become increasingly effective to cam member 15 back into its proper fully nested position.

Although members 15 and 16 may be made of either metallic or non-metallic materials, highly satisfactory results have been achieved when both members are made of elastomeric material including both rubber and thermoplastic compositions. Preferably, tubular member 15 is formed of relatively soft low resiliency elastomeric material whereas the clip member 16 is formed of relatively stiff highly resilient materials, member 15 having a durometer of Rockwell 93 ± 3 on the A scale and clip member 16 having a durometer of 78 ± 3 on the D scale.

It will be understood that the containers 11, 12 may be assembled one within the other with their flattened mid portions placed crosswise of the outer edges of legs 18 of clip 16. Member 15 is then placed against the exterior of the outer container opposite and between the legs 18 and then forcibly pressed between the legs until fully seated in the position shown in FIGS. 2 - 4. For clarity of illustration, it will be recognized that the thickness of the container walls is shown greatly exaggerated. In actual practice the walls are only a few mils thick with the result that the outer radius of member 15 is substantially identical with the inner radius of the bight portion 17 prior to assembly of the parts; in fact, the radius of member 15 may be slightly greater than the relaxed inner radius of surface 17. It follows that when the parts are properly assembled, the juxtaposed surfaces of member 15 and of surface 17 will be highly effective in pressing the flattened surfaces of the containers against one another and against relatively soft surface of mandrel member 15 as well as against the sharp edges of the innermost pair of ribs 19.

The divider clamping assembly 15, 16 having been applied as described, the open outer ends of the inner container 11 may be charged such as with the chemically reactive constituents. For example, one of the chambers may be charged with resinous material 20 and the other with a suitable polymerizing and catalytic material 21. The transverse ends 22, 23 of the inner container are then sealed closed, as by heat sealing or any other suitable mode. Thereafter, the outer ends 24, 25 of outer container 12 are similarly sealed closed.

The completed package assembly is now ready for shipment or storage until the packaged materials 20, 21 are required for use. If in the meantime, excessive pressure or a sharp blow is delivered against the package assembly the somewhat weaker inner container will fail first and the contents thereof will escape into the associated enclosing chamber provided by the outer protective container 12. However, the material escaping into one end of the outer container cannot pass into the opposite end of this container owing to the powerful and highly reliable clamping action provided by clamping members 15, 16. For this reason, even though both chambers of container 11 should fail or rupture, chemically reactive constituents 20, 21 cannot intermingle until or unless clip 16 is removed. The removal operation is most readily accomplished by grasping the opposite ends of the two containers and abruptly pulling

them taut thereby spreading the legs of the clip and ejecting member 15. The clamping assembly having been removed, the reactive materials 20,21 are thoroughly intermixed and then released for use by cutting off one adjacent pair of ends of the two containers.

While the particular safety package assembly and divider clamp therefor herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of the invention.

We claim:

1. A safety package assembly for retaining chemically reactive constituents isolated until ready for intermixing comprising elongated inner and outer non-compartmented tubular containers of impervious thermoplastic sheet material, said inner container being generally as long as but smaller than and enclosed within said outer container and the opposite ends of both containers being sealed closed, a divider assembly detachably embracing said containers crosswise of their compactly flattened midportions effective to divide each container into separate fluid-tight compartments at the opposite ends thereof, said separate compartments of said inner container being charged one with one constituent and one with a different constituent reactive with one another upon removal of said divider assembly, the separate compartments of said outer container outwardly of said inner container being normally free of either of said constituents, and said divider assembly being effective to maintain said chemically reactive constituents isolated from one another within the respective contiguous ends of said inner and outer containers despite a failure in the wall of said inner container.

2. A safety package assembly as defined in claim 1 characterized in that said inner container is separate from said outer container.

3. A safety package assembly as defined in claim 1 characterized in that said inner and outer containers are sealed closed at their opposite ends independently of one another.

4. A safety package assembly as defined in claim 1 characterized in that said inner container is enclosed

within said outer container with its walls and opposite ends in close proximity to but disconnected from the juxtaposed walls of said outer container.

5. A safety package assembly as defined in claim 1 characterized in that said divider assembly comprises a pair of interlocking differentially resilient first and second members each having a length greater than the flattened width of said containers, said first member being relatively soft and said second member being relatively stiff and U-shaped in cross section with the inner surface shaped to embrace and press said first member and the flattened sides of said inner and outer containers snugly opposite a major portion of the girth and length of said first member, and the inner surface of said second member being formed with a plurality of sharp edged nonresilient ribs extending lengthwise thereof in position to compress the juxtaposed walls of said containers forcibly against one another and against the underlying relatively soft surface of said first member.

6. A safety package assembly as defined in claim 5 characterized in that said sharp edged ribs are integral with a respective leg of said U-shaped second member.

7. A safety package assembly as defined in claim 5 characterized in that said U-shaped member is formed of nonmetallic elastomeric material having a durometer of approximately Rockwell 78 on the D Scale.

8. A safety package assembly as defined in claim 5 characterized in that said first member is tubular and having a cross-sectional shape generally conforming to the juxtaposed interior contour of that portion of said second member free of said sharp edged ribs.

9. A safety package as defined in claim 1 characterized in that the wall strength of said outer container is greater than the wall strength of said inner container.

10. A safety package as defined in claim 1 characterized in that said inner and outer containers are sealed closed independently of one another whereby a sealing failure at either end of said inner container merely releases the contents of the adjacent end half of said inner container into the associated surrounding end half of said outer container.

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