

Oct. 22, 1968

W. H. ABILDGAARD

3,406,746

PACKAGE AND PACKAGING METHOD FOR FRAGILE ARTICLES

Filed April 23, 1964

4 Sheets-Sheet 1

FIG_1

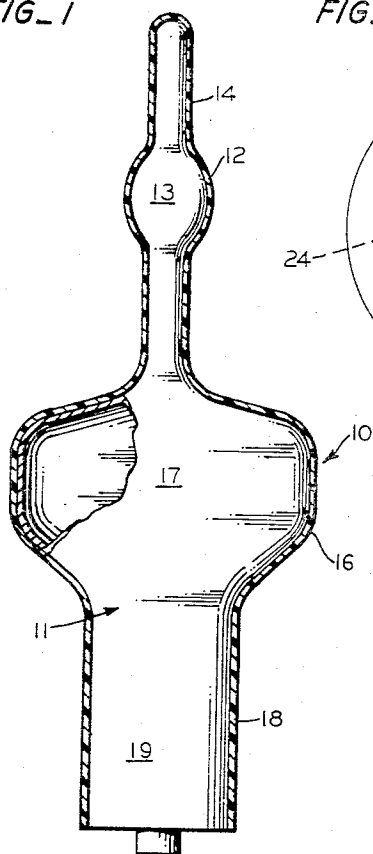


FIG_5

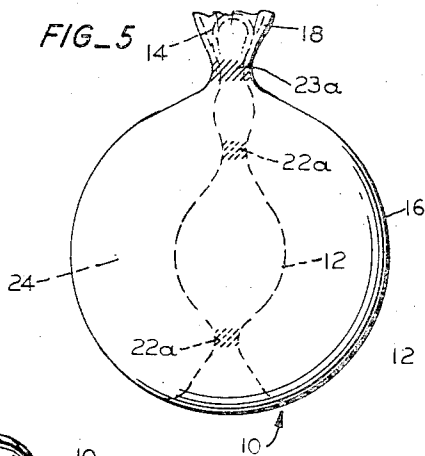


FIG_2

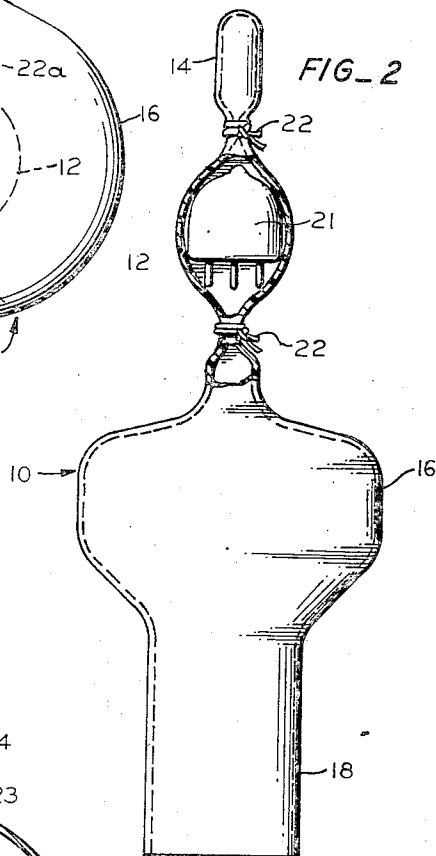


FIG_3

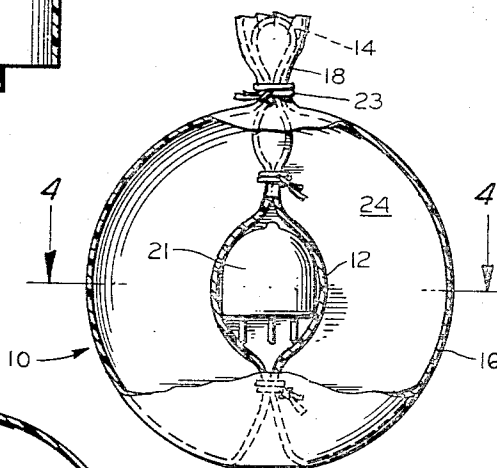
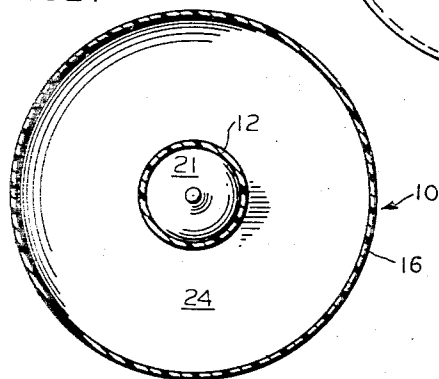


FIG_4



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FIG_6

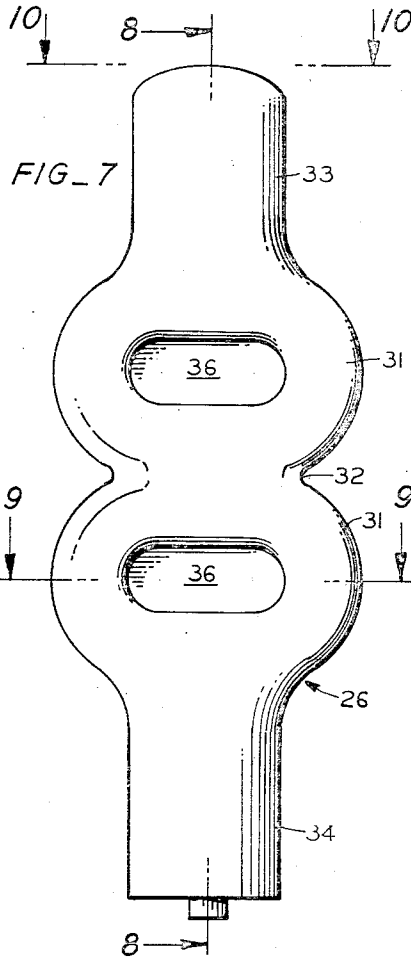
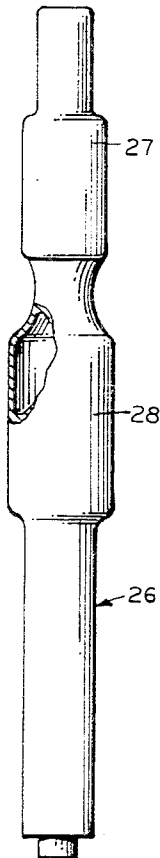
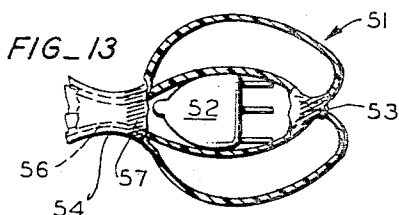
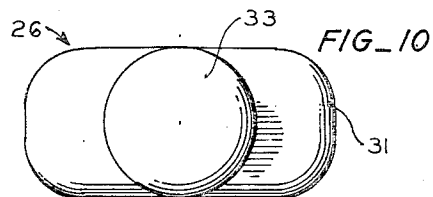
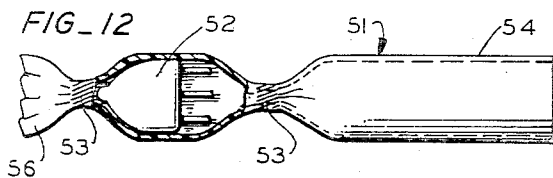
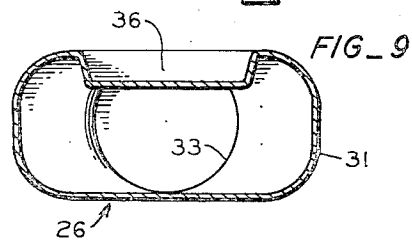
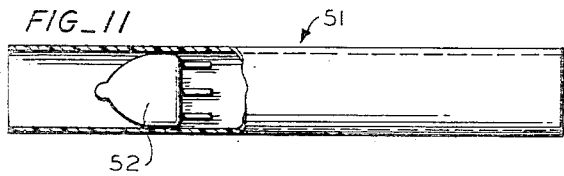
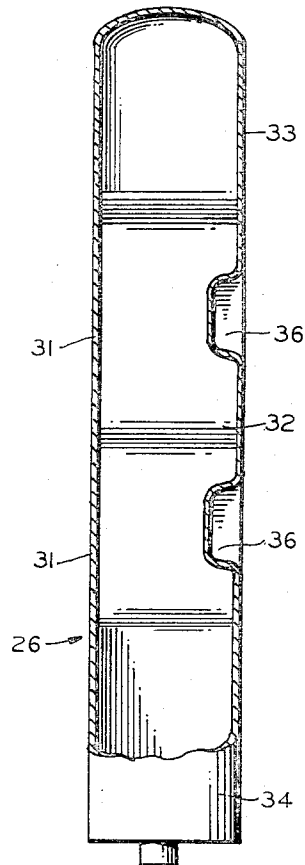


FIG_8



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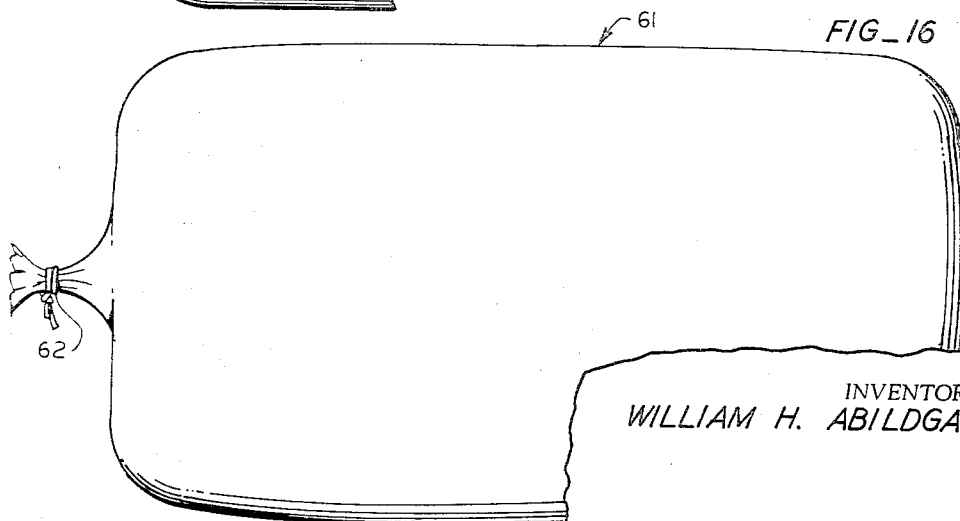
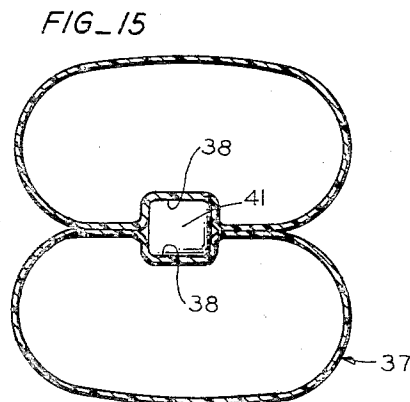
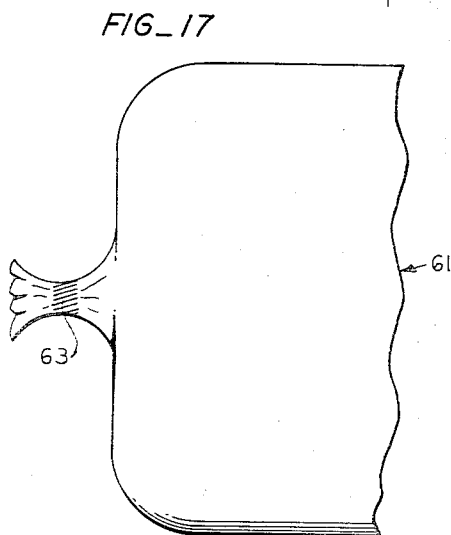
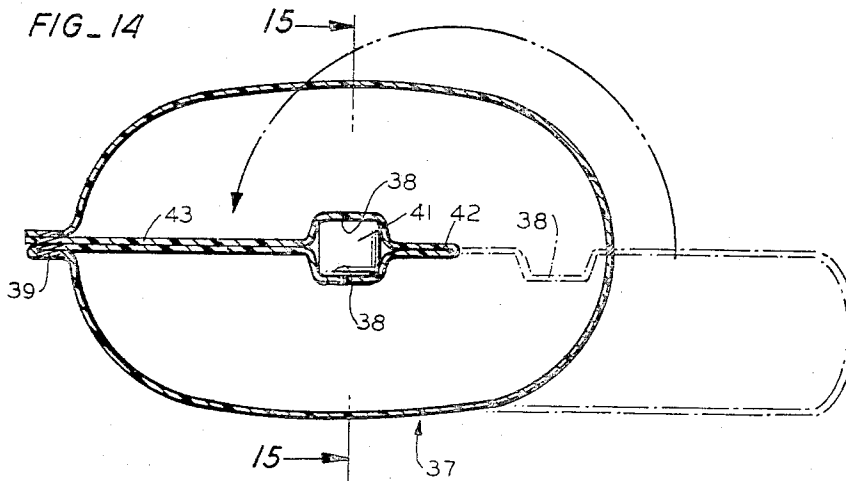
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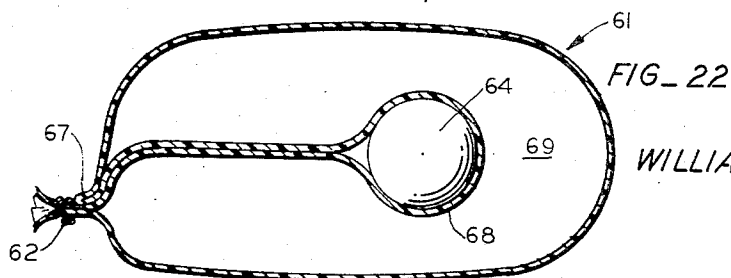
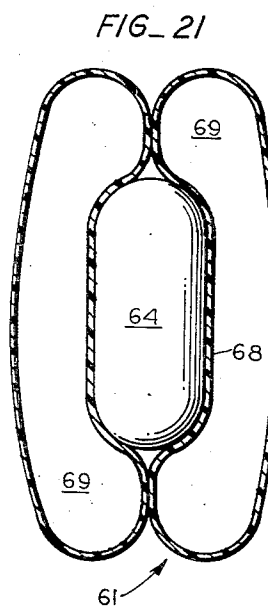
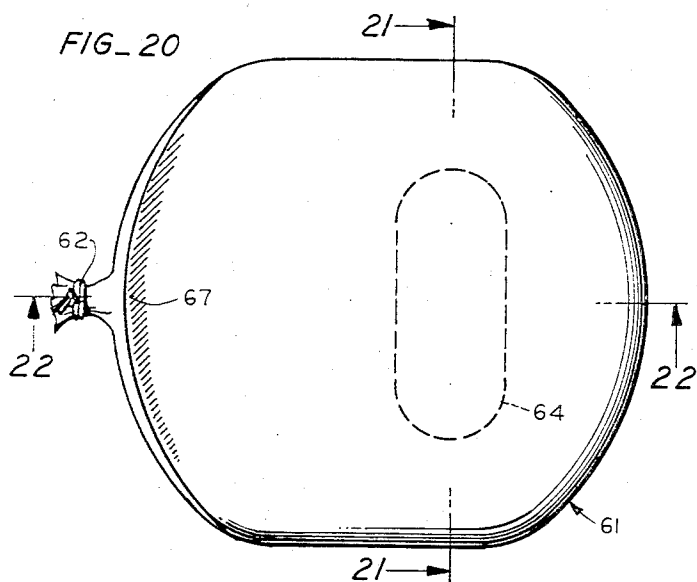
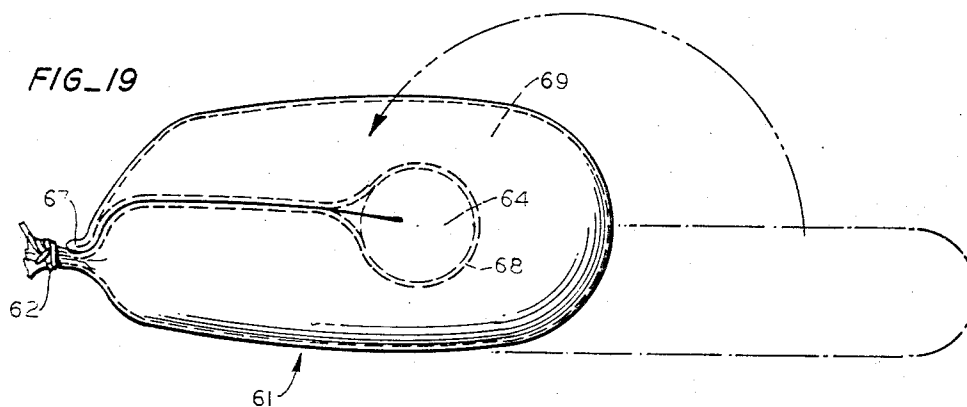
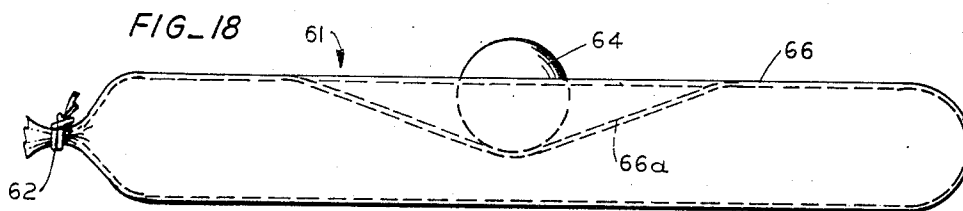
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PACKAGE AND PACKAGING METHOD FOR FRAGILE ARTICLES

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PACKAGE AND PACKAGING METHOD FOR FRAGILE ARTICLES

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13 Claims. (Cl. 165—46)

ABSTRACT OF THE DISCLOSURE

A package for a fragile article including a tubular deformable hollow package blank which has an article folding chamber and an insulating chamber. Insulating means are positioned within the insulating chamber to protect an article which is positioned within the article holding chamber. The article holding chamber is positioned so that when the end portions of the package blank are sealed together and closed, the insulating chamber will surround and protect the article holding chamber and a fragile article contained therein.

The present invention relates to a package and a method for packaging a fragile article in a protected position during shipment and delivery so that the article will be capable of being delivered in proper condition even though subjected to considerable shock, as for example, being dropped in a parachute or from a low-flying helicopter or airplane.

The package and method are adapted to handling fragile articles such as medical supplies, electronic components, and fragile food articles.

It is a general object of the invention to provide an improved package for fragile articles and an improved method of forming such a package.

It is a further object of the invention to provide a package and method of the above character wherein the resultant package is capable of withstanding considerable shock with extremely fragile or bruisable articles therein.

It is a further object of the invention to provide a one-piece package for a fragile article where the article is held at a central location at one portion of the package, and another portion of the package forms an enlarged chamber, encompassing the article, and providing a space for shock-absorbing material such as a gas, a rubber or resilient filler, a foam plastic filler, or the like.

It is a still further object of the invention to provide a package for a fragile article wherein the shock-absorbing chamber not only protects the article against undue shock during shipment or delivery, but also applies pressure to the article in a gentle fashion to hold the article in its proper position in the package.

Still another object of the invention is to provide a package in which an article which is adversely affected by an atmosphere including oxygen can be packaged in an atmosphere of inert gas.

Another object of the invention is to provide a package for a fragile article having a shock-absorbing chamber wherein the shock-absorbing chamber provides a thermal barrier against undue heating or cooling of the article being packed.

Other objects and advantages of the invention will be apparent from the following description of certain preferred embodiments thereof and certain preferred methods, as illustrated in the accompanying drawings, in which:

FIG. 1 is an elevational view partially broken away and partially in section illustrating a package blank on the mold on which it is formed;

FIG. 2 illustrates the package blank as shown in FIG. 1 but without its mold, and with the article placed therein;

FIG. 3 is an elevational view partially in section showing the completed package;

FIG. 4 is a sectional view taken in the plane indicated by lines 4—4 of FIG. 3;

FIG. 5 is a fragmentary elevational view showing the package and illustrating portions at which the plastic of the package is heat-sealed;

FIG. 6 is an elevational view partially in section illustrating a modified mold of the same character as shown in FIG. 1, for example, but having different dimensions in its various parts to accommodate a different type of article;

FIG. 7 is an elevational view of still another mold for forming a package blank by dip-molding;

FIG. 8 is a transverse sectional view taken in the plane indicated by the line 8—8 in FIG. 7;

FIG. 9 is a transverse sectional view taken as indicated by the line 9—9 in FIG. 7;

FIG. 10 is an end elevational view taken as indicated by the line 10—10 of FIG. 7;

FIG. 11 is an elevational view of a package blank comprising a tubular member;

FIG. 12 is an elevational view illustrating the step in which the article is installed in the blank of FIG. 11;

FIG. 13 is a sectional view showing the completed package with the article installed therein;

FIG. 14 is a sectional view in partially dotted lines illustrating the forming of a package molded on the form shown in FIG. 7;

FIG. 15 is a transverse sectional view taken as indicated by the line 15—15 in FIG. 14;

FIG. 16 is a plan view of still another form of package having a tied end to close it;

FIG. 17 is the same package illustrating a heat-sealed closure of the wadded type;

FIG. 18 is a view illustrating the article such as a piece of fruit or an egg in place on a package ready for closing;

FIG. 19 illustrates a further step in the closing of the package;

FIG. 20 is a plan view of the closed package;

FIG. 21 is a view taken in a plane indicated by the line 21—21 in FIG. 20; and

FIG. 22 is a sectional view of the package taken in a plane indicated by the line 22—22 in FIG. 20.

Referring first to FIGS. 1 through 5 there is illustrated a package comprising in its unfolded condition a thermoplastic blank 10 of a suitable plastic material such as vinyl which is preferably formed by dip-molding on a hollow metal mold 11. This blank 10 is generally tubular in form and has adjacent its upper portion small enlarged article-receiving portion or pocket 12 formed on an enlarged portion 13 of the mold. In this embodiment the tubular end portion 14 is closed at the end. Spaced from the article receiving portion 12 is an enlarged chamber forming portion 16 molded about an enlarged portion 17 of the mold, and the open end of the tube is formed by a tubular portion 18 of the blank molded on a similarly formed portion 19 of the mold.

Referring to FIG. 2, a fragile article, for example, an electronic tube 21, is inserted into the article receiving portion or pocket 12 of the blank 10, and adjacent this electronic tube 21 the tubular portion 14 is closed as by ties 22 at either side; however, this closure can be effected by making a heat seal at this portion. Thereafter, the blank is folded back on itself so as to place the article receiving pocket 12 substantially centrally with respect to the enlarged chamber portion 16, and in this case the folding is performed by turning the blank partially inside out to bring the enlarged tubular portion

18 at one end into coincidence with the smaller tubular portion 14 at the other end. Then the tubular portion 18 is gathered and twisted into a wad around the tubular portion 14 and is tied at 23, for example, to form a complete enclosure. Alternatively, the closure may be made by forming a wad-type heat seal, as indicated at 23a in FIG. 5. The chamber portion 16 preferably is inflated with a suitable gas which may be air or some inert gas such as nitrogen to form a desired insulating and shock-absorbing chamber 24 about the article receiving chamber or pocket 12. The chamber 24 in this case of course is pressured and so exerts a corresponding pressure on the inner chamber or pocket 12 and maintains this in a slightly pressurized condition. This chamber 24 forms both a shock-insulating and a heat-insulating portion of the package to maintain the article against undue changes in temperature, either low or high. Alternatively, the shock-absorbing material within the chamber 24 may be formed by a resilient filler such as chopped rubber, a foam plastic filler, or other suitable shock-absorbing and heat-insulating medium.

The wadded or twisted heat seals 22a and 23a in FIG. 5 may be effected by dielectric heat to form the seal, and provides a secure fastening at the desired points in the package without allowing undue strains at the edge portion of the heat seal as would be, for example, the case with a linear heat seal.

The mold 26, shown in FIG. 6, is somewhat similar to the mold in FIG. 1 but provides an enlargement at 27 to form the article containing chamber, and another enlargement of greater size at 28 to form the shock absorbing chamber when inflated. The article in this mold would be filled and packed in the same manner as described in connection with the blank provided by the mold in FIG. 1, the difference in shape of the mold being solely to accommodate a more elongated article in this case.

FIGS. 7, 8, 9 and 10 illustrate a third form of mold wherein the mold itself is provided with two enlarged portions 31 which are similar, and are joined by a reduced neck 32 and have similar tubular end extensions 33 and 34, pockets 36 being provided in the portions 31 shaped to provide a blank to fit a desired article of elongated shape. For example, these pockets can be made to fit the shape of an egg, an electronic tube, or various rare tropical fruits that it is desired to import from one country to another.

FIGS. 14 and 15 illustrate the method of filling and closing the blank from the mold shown in FIG. 7, and in this case, the blank 37 has the pockets 38 formed so as to register with each other when the blank is folded from its dotted line position at the right end of FIG. 14 to its closed full line position, and a wadded twisted heat seal is formed on the overlapped ends at 39. In this form of the invention, the shape of the mold itself provides for enclosing the article 41 within the article retaining pocket formed by the portion 38, and as the blank 37 is inflated, the overlapped portions are pressed together as indicated at 42 and 43. The inflation of these blanks may be performed either just prior to the forming of the heat seal, or at the time of the heat seal by leaving a hollow needle or pipe in place, and then withdrawing the needle and closing the package by further heat sealing operation.

FIGS. 11 through 13 illustrate a package formed from an extruded sleeve as the blank. This extruded vinyl sleeve may be approximately of a size to fit an electronic tube 52, for example, which is placed in position at a location spaced but close to one end thereof, then the end of the blank is twisted to form a wad and heat sealed at 53 on either side of the article pocket. Thereafter, the remaining long end portion 54 of the blank is folded over to engage the short end portion 56, as illustrated in FIG. 13, and a wadded heat seal 57 is provided on these overlapped or folded end portions.

FIGS. 16 through 22 illustrate another form of the invention in which the package blank is simply a bag 61, which may be closed at its end by tying, as indicated at 62, or by heat sealing as indicated at 63, in FIG. 17. As illustrated in FIG. 18, an article 64 may be placed on one outside surface of the bag so that the depression of this surface 66 forms a half article receiving pocket 66a, then the bag is folded to bring the two end portions together at 67 for heat sealing or tying, as desired, so that the article 64 is completely encompassed by a layer 68 forming the article receiving pocket, and an article protecting chamber 69 is provided entirely about the article so as to form shock-insulating and/or heat-insulating chamber means about the article 64.

In all the modifications it will be noted that a one-piece formed plastic part is provided either by means of dip molding or by extrusion. In each form of the invention, there is provided a means for applying pressure to the article-containing pocket about the article so it is held securely but gently in place and means providing an insulating chamber, both as to shock and as to heat, extending about the article. Thus the article in this package can be handled somewhat roughly as, for example, by dropping from an airplane or with a parachute, and still prevent injury to the article.

It will be noted that in each case the pressure chamber is positively separated from the article receiving chamber or pocket by a plastic or rubber wall so that the contents to be shipped are not subjected to any deleterious effects from the atmosphere employed. Also, in certain forms of the invention, for example in FIGS. 3 and 13, the article-containing pocket is positively sealed from the exterior so that the desired environment such as an inert gas can be placed around the article in this chamber or pocket, and it could be protected from the harmful effects if present of the atmosphere used in the protective chamber about the article. Thus, for example, in the case of a food article which would be harmed by oxygen, although oxygen can be employed to inflate the protecting or shock-absorbing chamber, the inner chamber can be made to contain an oxygen-free atmosphere. Also, where the article to be shipped must be refrigerated or maintained cool, as for example with certain medicines, it is possible to provide in the outer shock-absorbing chamber an endothermic chemical with a certain amount of water with which it reacts to provide a cooling solution.

While I have shown and described certain preferred methods of forming the package, and certain preferred packages, it will be apparent that the invention is capable of variation and modification from the forms shown so that the scope thereof should be limited only by the scope of the claims appended hereto.

What I claim is:

1. A package for a fragile article comprising a tubular deformable hollow package blank having an article holding chamber adjacent one end portion and an insulating chamber adjacent opposite end portion with said chambers spaced from one another, insulating means within said insulating chamber to protect an article within said article holding chamber, said article holding chamber positioned so that when said package is folded and the end portions of said package blank are sealed together and closed said insulating chamber will surround and protect said article holding chamber and a fragile article contained therein.

2. A package for a fragile article comprising a tubular deformable hollow package blank having an article holding chamber adjacent one end portion and an insulating chamber adjacent opposite end portion with said chambers spaced from one another, said article holding chamber being sealed at both ends, insulating means within said insulating chamber to protect an article within said article holding chamber, said insulating chamber and adjacent end portion of the package blank being turned inside out and the end portions of said blank being sealed

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together and closed thereby forming a sealed package for a fragile article contained therein.

3. The invention in accordance with claim 2 wherein said chambers are spaced with the insulating chamber having a larger diameter than the article holding chamber and the article holding chamber having a larger diameter than the adjacent end portion and intermediate portion of the package blank, the end portion of the package blank adjacent the insulating chamber having a larger diameter than said article holding chamber and smaller than said insulating chamber to facilitate the formation of said package.

4. The invention in accordance with claim 1 wherein the insulating means in said insulating chamber is a gas under pressure.

5. The invention in accordance with claim 1 wherein a fluid material for cooperating in protecting said fragile article is contained in said sealed article holding chamber.

6. The invention in accordance with claim 1 wherein a sterilizing medium is contained within said sealed article holding chamber to maintain sterile conditions therein.

7. The invention in accordance with claim 1 wherein an oxygen-free gas is included as an atmosphere within said sealed article holding chamber.

8. The invention in accordance with claim 1 wherein a refrigerating medium is provided in said insulating chamber.

9. The invention in accordance with claim 1 wherein said package blank is a bag.

10. A package blank for use in packaging a fragile article comprising a resilient tube of material, said tube

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having an article holding chamber adjacent one end and an insulating chamber adjacent opposite end, said tube being deformable so that when a fragile article is placed within said article holding chamber and sealed therein said insulating chamber may be deformed and sealed to surround and protect said article holding chamber when said ends are folded and sealed to one another.

11. The invention in accordance with claim 10 wherein said package blank is of a plastic material.

12. The invention in accordance with claim 10 wherein said package blank is a bag.

13. The invention in accordance with claim 10 wherein said article holding chamber is two half pockets in the outer surface of said package blank intermediate its ends whereby when an article is placed therein and the package blank folded said half pockets will meet to form a complete article holding chamber.

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