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W. C. KIRKPATRICK

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PACKAGING

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FIG. 1.

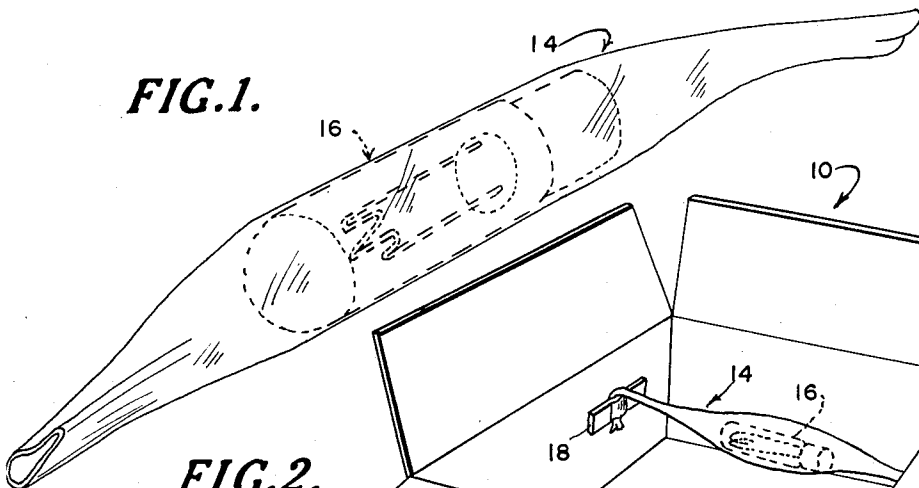


FIG. 2.

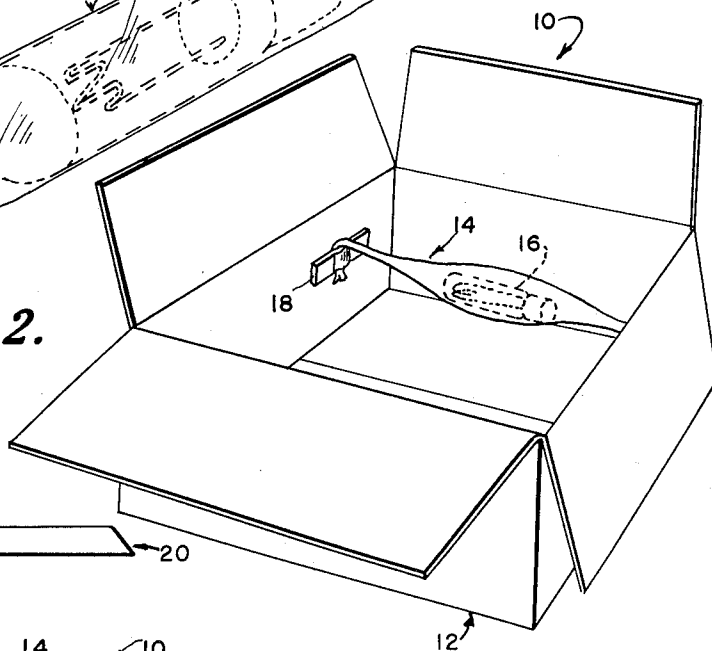


FIG. 3.

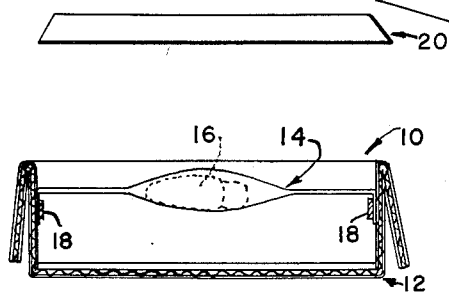
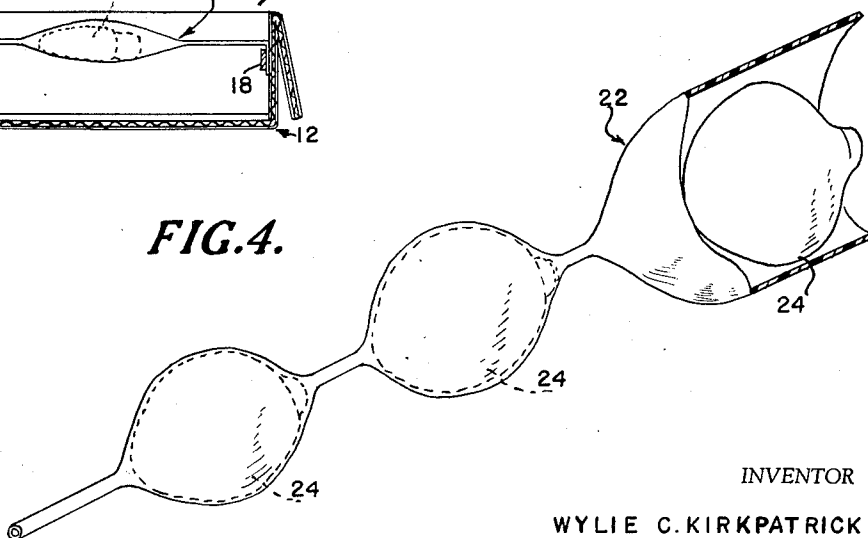


FIG. 4.



INVENTOR

WYLIE C. KIRKPATRICK

BY

Cushman, Darby & Cushman
ATTORNEYS

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PACKAGING

Wylie C. Kirkpatrick, Wayland, Mass., assignor to W. R. Grace & Co., Cambridge, Mass., a corporation of Connecticut

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This invention relates to packaging, and more particularly to a novel method and device for packaging articles of a fragile nature.

The use of the so-called hammock pack in packaging fragile articles such as electronic tubes, delicate instruments and the like is well-known. In brief, the hammock pack embodies a container such as a corrugated carton or box within which the article is suspended by a hammock of plastic film surrounding the article and having its ends fixed to opposite sides of the carton. While this packaging arrangement has proven quite satisfactory in safety protecting fragile articles, the securing of the hammock within the cardboard container has presented some difficulty and constitutes a substantial expense in the formation of the entire package.

More specifically, the difficulty resides in securing the ends of the hammock to the carton so that the hammock is relatively taut and therefore carries the article in suspension without any substantial movement.

An object of the present invention is the provision of a package of the type described having improved means for effecting a taut suspension of the article carrying hammock within a carton in a manner which overcomes the disadvantages noted above.

It has been found that a taut suspension of the article can be readily secured where a heat shrinkable material is utilized to form the hammock. In this way the ends of the hammock can be secured within the carton without too much regard to the stretch and subsequently, by the mere addition of heat after the securing of the ends has been accomplished, the hammock will shrink to a highly satisfactory taut condition.

Accordingly it is another object of the present invention to provide a method of forming a package of the type described which is simple and economical.

These and other objects of the present invention will become more apparent during the course of the following detailed description and appended claims.

The invention may best be understood with reference to the accompanying drawings wherein illustrative embodiments are shown.

In the drawings:

Figure 1 is a perspective view of a hammock embodying the principles of the present invention, showing the manner in which an article is carried therein;

Figure 2 is a perspective view illustrating the manner in which the hammock is secured within a container;

Figure 3 is a vertical, sectional view of the package shown in Figure 2, showing the manner in which heat is applied to the hammock to shrink the same into a taut condition; and

Figure 4 is a fragmentary, perspective view partly in section showing a modified form of article carrying hammock.

Referring now more particularly to the drawings, there is shown in Figure 2 a package, generally indicated at 10, embodying the principles of the present invention. In general, the package includes a container 12 which may

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be of any suitable construction and, as shown, embodies a corrugated cardboard box of conventional construction. Suspended between opposite side panels of the carton 12 is a hammock, generally indicated at 14. The hammock 5 is formed of a piece of heat shrinkable material. While any suitable heat shrinkable material may be utilized in general there is employed in the invention polyethylene film or tubing which has been irradiated to an extent of 2 to 100 megarad, preferably 6 to 20 megarad. The 10 irradiation can be accomplished in conventional fashion, e.g., by the use of a high voltage resonant transformer, such as the 2,000,000 volt General Electric resonant transformer, or high energy particle generators of 50,000 to 50,000,000 volts or a Van de Graaff electron generator. 15 In addition to the use of electrons, there can be employed beta rays, gamma rays, e.g., by employing cobalt 60, etc.

The biaxial orientation is normally carried out to an extent of 100 to 700% longitudinally and 100 to 900% laterally. The biaxial stretching can be carried out by 20 blowing irradiated polyethylene tubing. The irradiated, biaxially oriented polyethylene prepared by such a procedure has a high shrink energy, e.g. 100 to 500 p.s.i. at 96° C.

There can be employed as the starting polyethylene for the irradiation procedure high, low or medium density 25 polyethylene prepared by low or high pressure technique. The starting polyethylene can have a molecular weight of 7,000 or 12,000 or 19,000 or 21,000 or 24,000 or 35,000 or even higher.

In place of irradiated polyethylene, there can be employed similarly irradiated polypropylene.

A preferred example of the material utilized is Alathon 14 (polyethylene, molecular weight about 20,000, density 0.916) which has been irradiated to an extent of 12 35 megarad and has then been stretched 350% longitudinally and 350% laterally and has a shrink energy of 250 p.s.i. at 96° C.

The hammock may be formed of the above-mentioned material in any suitable manner and, as shown, it comprises an elongated tube or sheath. Of course, the hammock could be constructed of a rolled up sheet or the like, if desired.

The central portion of the hammock is arranged to receive a fragile article to be packaged as, for example, an electronic tube 16 such as shown in Figures 1, 2 and 3. The ends of the hammock on opposite sides of the article are secured to the carton 12, so as to suspend the article 45 within the carton. Any suitable means may be employed in this regard and, as shown, a strip of cardboard or like material 18 is suitably secured to each end of the hammock and an associated side panel of the cardboard as by adhesive, staples or the like.

In forming the present package the electronic tube 16 or other fragile article to be packaged is inserted within 55 the tube of heat shrinkable material into the central portion thereof as illustrated in Figure 1. Next, the ends of the hammock are initially secured within the carton 12 as by the strips of material 18 in as taut a condition as can be conveniently obtained without the use of expensive equipment or excessive hand labor. After the hammock is thus secured within the carton, the hammock is subjected to a source of heat, such as a lamp 20, as schematically illustrated in Figure 3. This has the effect of shrinking the hammock between its fixed ends, thus 65 insuring that the article will be suspended within the hammock in a taut condition. It will also be noted that the effect of the application of heat will also result in the central portion of the hammock shrinking into close engagement with the outer periphery of the electronic tube or other article placed therein, so that the article can not move within the hammock.

While Figures 1-3 illustrate the packaging of a single

article, it will be understood that the present invention is also readily applicable in the packaging of a plurality of similar or different articles. For example, in Figure 4 there is shown a portion of a hammock generally indicated at 22 which has a plurality of fragile articles, such as bulbs 24, mounted within the central portion thereof in spaced relation. It will be understood that after the hammock has been suspended within the carton and heat is applied, the shrinking of the material of the hammock causes the same to move into closely surrounding engagement with the periphery of each of the articles so that they are firmly held out of contact with each other.

It thus will be seen that the objects of this invention have been fully and effectively accomplished. It will be realized, however, that the foregoing specific embodiment has been shown and described only for the purpose of illustrating the principles of this invention and is subject to extensive change without departure from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.

I claim:

1. A package comprising a container, a hammock formed of a thin piece of a heat shrinkable material, and a fragile article carried by said hammock, said hammock having its ends on opposite sides of said article fixed to said container and being heat shrunk to a taut condition between its ends so as to suspend said article within said container.

2. A package as defined in claim 1 wherein said hammock is made of biaxially oriented, irradiated polyethylene.

3. A package comprising a container, a hammock formed of a thin tube of heat shrinkable material, and an article disposed within said tube between the ends thereof, said hammock having its ends fixed to said container and being heat shrunk to a taut condition between its ends and to a closely embracing condition around said article so as to suspend the article within said container and prevent movement of said article within said tube.

4. A package as defined in claim 3 including a plurality of such articles disposed within said tube in spaced relation.

5. A method of packaging an article which comprises the steps of placing the article within a hammock of heat shrinkable material, securing the ends of the hammock on opposite sides of the article to a container to initially suspend the article therein, and then applying heat to the hammock to cause the same to shrink and thus suspend the article within the container in a taut condition.

6. A method as defined in claim 5 wherein the hammock is made of biaxially oriented, irradiated polyethylene.

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