

July 3, 1962

J. W. HARRISON

3,041,801

CLOSURE FOR VACUUM PACKAGE

Filed March 31, 1959

FIG. 1.

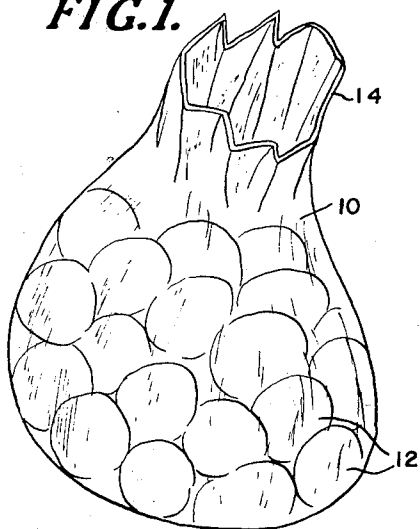


FIG. 2.

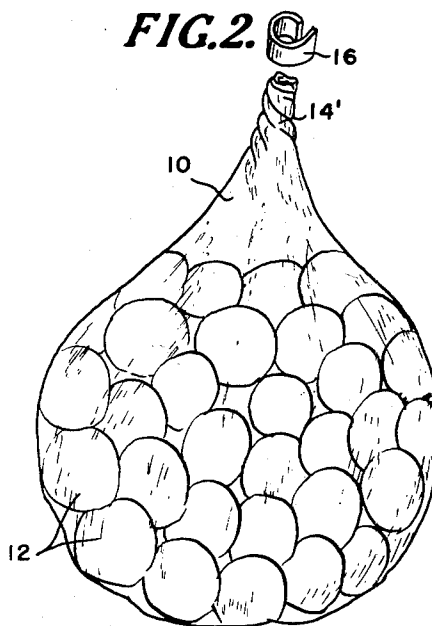


FIG. 3.

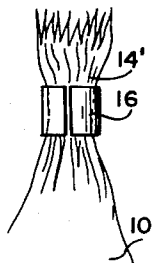
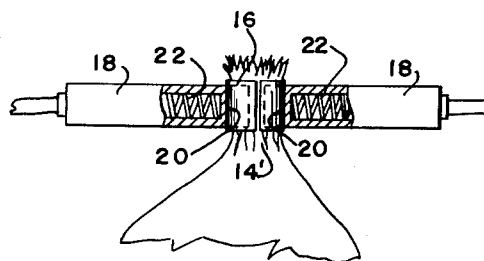


FIG. 4.



INVENTOR

JOHN W. HARRISON

BY

Cushman, Darby & Cushman
ATTORNEYS

1

3,041,801

CLOSURE FOR VACUUM PACKAGE

John W. Harrison, Winchester, Mass., assignor to W. R. Grace & Co., Cambridge, Mass., a corporation of Connecticut

Filed Mar. 31, 1959, Ser. No. 803,132

5 Claims. (Cl. 53-37)

This invention relates to packaging and more particularly to an improved method of sealing a package and the package produced thereby.

The use of polyethylene bags for packaging articles of all kinds is well-known. This type of material is particularly useful in packaging meats, such as hams or the like. In conventional practice the ham is placed in a sleeve or bag of polyethylene and subsequently metallic bands or clips are crimped about the open end or ends of the bag or sleeve to effect a sealing of the ham therein.

The present invention contemplates an improvement in the manner in which such bags are sealed as well as the package itself. More particularly, the present invention contemplates the use of a heat shrinkable material such as biaxially oriented irradiated polyethylene. A property of this material is that it will shrink in response to the application of a relatively low heat, as, for example, of the order of 400 to 500° F. The present invention utilizes this property of the material to effect a complete, air-tight closure of the package by the application of heat to the band or clip crimped on the open end thereof. It has been found that the application of heat to a heat shrinkable plastic material results in an increase in the cross-sectional area of the material. Thus, when heat is applied to the clip and this heat is conducted to the irradiated polyethylene crimped therebetween, the cross-section of the latter is increased and becomes a fused mass, thus sealing off the package in a highly efficient manner.

In the practices heretofore employed, the effectiveness of the seal was largely dependent upon the tightness with which the band or clip is applied to the open end of the polyethylene bag. This arrangement required that the crimping operation be carried out with some degree of accuracy for, unless a tight grip was effected, the seal provided is not sufficiently air-tight. With the present invention this disadvantage is overcome and the need to provide a sufficiently tight crimping action to the clip or band is reduced.

Accordingly, it is an object of the present invention to provide a method of packaging an article in which the article is placed in a heat shrinkable material having an open end, such open end being subsequently gathered in a substantially closed neck and then a heated band of heat conducting material is crimped on the substantially closed neck to effect a shrinkage of the material embraced thereby causing the material to become a fused mass presenting an efficient, air-excluding seal.

Still another object of the present invention is the provision of the method of the type described in which biaxially oriented irradiated polyethylene bags are employed to receive the article, such bags being subsequently heat shrunk to provide an effective, air-excluding seal.

Still another object of the present invention is the provision of a package embodying a container of heat shrinkable material having its open end shrunken into an air-excluding, fused mass by the application of a heated metal band thereabout.

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 an illustrative embodiment is shown.

2

In the drawings:

FIGURE 1 is a perspective view of a package embodying the principles of the present invention, showing the same in an open condition;

FIGURE 2 is a view similar to FIGURE 1 showing the manner in which the open end of the package is gathered into a substantially closed neck and a metal band applied thereto;

FIGURE 3 is an enlarged, fragmentary elevational view showing the closed neck of the package with the band initially applied thereto; and

FIGURE 4 is a view similar to FIGURE 3 illustrating the manner in which the band is crimped onto the closed neck portion of the package.

Referring now more particularly to the drawings, there is shown in FIGURE 1 a package which comprises a container 10 made of a thin sheet of heat shrinkable material having an article or articles 12 placed therein. Preferably, the heat shrinkable material employed in the container 10 is biaxially oriented polyethylene having a shrink energy of 250 p.s.i. at 96° C. (The biaxially oriented polyethylene is prepared by irradiating Alathon 14[polyethylene, molecular weight about 20,000, density 0.916] to a dosage of 12 megarad and then stretching 350% in both directions.)

In general, however, 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 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. In addition to the use of electrons there can be employed beta rays, gamma rays, e.g. by employing cobalt 60, etc. There can be employed any of the irradiation procedures disclosed in Baird application, Serial No. 713,848, filed February 7, 1958, now U.S. Patent No. 3,022,543, for example. The entire disclosure of the Baird application is hereby incorporated by reference.

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 blowing irradiated polyethylene tubing as disclosed in the Baird application. 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 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 a place of irradiated polyethylene there can be employed similarly irradiated polypropylene.

In FIGURE 1 the container 10 comprises a bag having an open end 14. It will be understood that the container may take other shapes, as for example a tube or sleeve of irradiated polyethylene may be utilized in which event there will be two open ends which must be closed.

The open end 14 of the bag 10 is closed by gathering the open end into a substantially closed neck portion, as illustrated at 14' in FIGURE 2. Preferably this neck portion 14' is gathered by twisting the open end of the bag in one direction. With the open end 14 gathered into a substantially closed neck portion 14', a clip or band 16 of a heat conducting material, preferably material such as aluminum or the like, is placed over the neck portion until it is positioned as shown in FIGURE 3.

With the band 16 initially positioned on the substantially closed neck portion, the band is then heated and

crimped into tightened surrounding engagement with the neck portion by any suitable means. As shown in FIGURE 4, such means preferably comprises a pair of opposed jaws 18 each having an arcuate end 20 arranged to engage the band 16 and a heating element 22 mounted therein which can be energized in conventional manner by connecting the same to a suitable source of electricity. The jaws 18 illustrated in FIGURE 4 are shown somewhat schematically and it will be understood that they may be suitably connected with a linkage arrangement through which sufficient pressure may be applied.

It will be seen that the heat from the heating element 22 will be transmitted to the aluminum band 16 and then in turn to the substantially closed neck portion 14' of the bag 10. The heat thus applied to the irradiated polyethylene forming the closed neck portion of the bag results in a shrinkage of the same. It will be noted that if the irradiated polyethylene shrinks the cross-sectional area of the film increases and thus, while a shrinkage in surface area occurs, a swelling in cross-sectional area also occurs which results in the polyethylene surrounded by the band becoming a substantially fused mass which effectively prevents the passage of air therethrough.

It will be understood that other means for applying heat to the metal band may be employed. For example, the band could be heated separately and then applied by cold jaws. The method described is preferred since it is contemplated that the package of the present invention would have particular usefulness in packaging meats where it is sometimes important to maintain a refrigerated atmosphere. The amount of heat given off by the heated jaws is negligible. In fact, in operation the jaws would be maintained at a temperature less than that which would cause severe damage to the polyethylene material upon direct contact. A temperature of between 400 to 500 F. is illustrative of the operable range.

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.

What is claimed is:

1. A method of packaging an article which comprises the steps of placing the article to be packaged in a container made of a thin piece of heat-shrinkable material, having at least one open end, gathering the material forming the open end into a substantially closed neck and then crimping a heated band of heat-conducting material around said substantially closed neck whereby the material gathered into said substantially closed neck will shrink by conduction of heat into a fused mass excluding air through said open end.

2. A method as defined in claim 1 wherein said container is made of biaxially oriented irradiated polyethylene.

3. A method as defined in claim 2 wherein the open end of the container is gathered by twisting the same in one direction.

4. A method as defined in claim 1 wherein said band is made of aluminum.

5. A method of packaging an article which comprises the steps of placing the article to be packaged in a bag made of a thin piece of biaxially oriented irradiated polyethylene, twisting the open end of the polyethylene bag into a substantially closed neck portion and then crimping a heated band of metal around said substantially closed neck portion whereby the polyethylene twisted into said substantially closed neck portion will shrink by conduction of heat into a fused mass excluding air through said open end.

References Cited in the file of this patent

UNITED STATES PATENTS

1,751,275	Gammeter	Mar. 18, 1930
2,071,300	Gammeter	Feb. 16, 1937
2,087,236	Anders	July 20, 1937
2,486,762	Pfeiffer	Nov. 1, 1949
2,554,636	Pfeiffer	May 29, 1951
2,812,628	Russell et al.	Nov. 12, 1957
2,836,941	Hultkrans et al.	June 3, 1958
2,890,552	Henderson	June 16, 1959
2,898,714	Keith	Aug. 11, 1959
2,904,943	Dreyfus et al.	Sept. 22, 1959
2,924,924	Garapolo et al.	Feb. 16, 1960

FOREIGN PATENTS

683,257	Great Britain	Nov. 26, 1952
---------	---------------	---------------