July 6, 1954 P. F. GAY 2,682,903

CLOSURE FOR CONTAINERS

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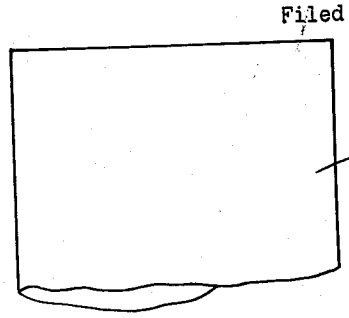


FIG. 1

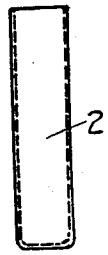


FIG. 2



FIG. 3

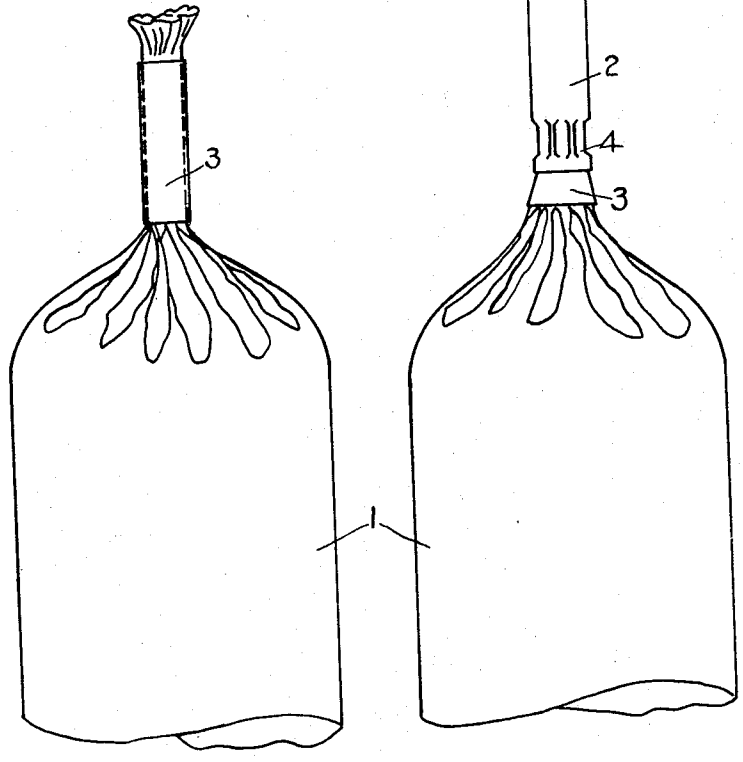


FIG. 4

FIG. 5

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CLOSURE FOR CONTAINERS

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3 Claims. (Cl. 150—3)

1

The present invention relates to improvements in or relating to closures for containers made of flexible waterproof sheet material and more particularly where a complete waterproof closure is desired.

It is necessary for such containers to be impervious to water and water vapour, for example where it is desired to pack hygroscopic materials which have to be stored under atmospheric conditions or in contact with water. This has been achieved by sealing the ends of such containers, for example, by heat sealing, cementing and the like. In many instances, however, it is either not possible or not desirable to use heat sealing or cementing, for example, because of the danger of fire or explosion due to the nature of the contents of the container, as for instance if containers have therein 25 lb. units of a powder explosive, or because of the lack of a suitable adhesive, and for such cases it is necessary to find an efficient alternative method of closing the container.

According to the present invention the method of closing a container of flexible waterproof film material to prevent the entry of water or water vapour comprises crumpling into a clump an open end portion of the container, inserting the clumped end portion into a tube of elastically deformable material and of an internal diameter closely to fit said clumped end portion, inserting the major portion of the tube of elastically deformable material into a permanently distortable metal tube closed at one end, and compressing said metal tube at a position near its open end round said tube of elastically deformable material to grip it firmly.

Preferably the said clumped open end portion of the container is passed through said tube of elastically deformable material.

A container of flexible waterproof film material closed to prevent entry of water and water vapour according to the invention comprises as a closure thereof a clumped open end portion of the container within a tube of elastically deformable material closely fitting said clumped open end portion, the major portion of said tube being within a permanently distortable metal tube closed at one end and gripped circumferentially by a permanently compressed portion near to the open end thereof.

Preferably said clumped open end portion of the container projects through said tube of elastically deformable material into said permanently distortable metal tube.

The flexible waterproof film material may be for instance rubber, rubber hydrochloride, polyethylene, polytetrafluoroethylene, polyvinyl chloride, polyvinyl fluoride, synthetic linear polyamides, polyethylene terephthalate, polyvinylidene chloride and similar polymers and interpolymers in the form of water impervious films.

2

Both ends of the container may be sealed by the method of the present invention, thus the contanier may be formed by cutting continuous lengths of tubing into the desired lengths as required and sealing one end by the method of the invention prior to filling. Alternatively, the container may be formed in a more normal manner, for example, by heat sealing or cementing the bottom, if made from continuous tubing, or the bottom and side if made from sheet.

The short tube of elastically deformable material may be of any soft elastic material such as for example, rubber or neoprene and of a diameter and bore which is capable of being expanded sufficiently to allow the clumped end of the container to be inserted preferably therethrough and which on return to normal will hold the clumped neck of the container tightly in position. The length of the tube may vary from about 1 cm. to 5 cm. or longer. A very convenient length is about 1.5 cm.

The permanently distortable metal tube may be of copper or aluminum or an alloy of either of these or other similar metal which can be easily permanently deformed and should be of a length e. g. 5–10 cm. such that when the neck of the container held by the elastically deformable tube is inserted therein only a small portion of the elastically deformable tube projects beyond the entrance of the metal tube. The reason for preferably having a small portion of the elastically deformable tube projecting beyond the end of the metal is to avoid any possibility of a sharp edge at the end of the metal tube being able to cut the flexible film after the closure has been effected. The inner diameter of the metal tube should be such that the clumped neck and elastically deformable tube can be easily slipped therein but not so large that there is excessive freedom of movement between the metal tube and the elastically deformable tube prior to effecting the seal by compressing the metal tube. The completion of the seal is effected by compressing the metal tube round the elastically deformable tube by any suitable method, for example by crimping.

In a preferred manner of carrying out the invention the elastically deformable tube is fitted to an expanding jig, the jig expanded and the clumped neck of the container put through the

expanded tube after which the jig is withdrawn leaving the elastically deformable tube tightly seated on the clumped neck. The end of the clumped neck may be in line with the end of the elastically deformable tube or, if desired, may project beyond the end of the elastically deformable tube. The clumped neck and elastically deformable tube are then inserted into the metal tube until only a small length, e. g. 3 mm. of the elastically deformable tube is exposed at the entrance to the metal tube and the metal tube distorted e. g. by crimping, round the elastically deformable tube at a position near the end of the metal tube to grip the elastically deformable tube firmly.

The invention is illustrated with reference to the diagrammatic drawings accompanying the specification in which Fig. 1 shows the end of a bag, Fig. 2 shows a metal tube, Fig. 3 a rubber tube, Fig. 4 the end of the bag with the rubber tube in position and Fig. 5 the completely sealed bag.

In the drawings, 1 is a bag (only part shown) of flexible waterproof film material, 2 is a metal tube used as the outer component of the seal, 3 is a rubber tube used as the inner component of the seal and 4 is a crimp in the tube 2 to effect the completion of the seal.

Containers sealed by the process of the present invention may contain explosive compositions, food products, solvent wet inflammable materials such as spirit wet nitrocellulose, hygroscopic chemicals, liquids and pastes and any other such materials from which it is either necessary or desirable to exclude moisture or to prevent loss of solvent.

The closures obtained by the method of the invention are highly efficient for preventing the entry of water and water vapour. Containers

filled with an ammonium nitrate powder blasting explosive and closed by the method of the invention are found to be free from entry of water after 21 days of immersion in water under a pressure of 20 lbs. per square inch.

What I claim is:

1. A closed container made of flexible waterproof film material and impervious to water under pressure for prolonged periods of time comprising as a closure thereof a clumped open end portion of the container, a tube of elastomeric material fitted about said clumped open end portion, the normal diameter and bore of said tube of elastomeric material being such as to fit tightly about said clumped open end portion, and a metal tube closed at one end enclosing the major portion of said tube of elastomeric material, said metal tube being permanently compressed and distorted inwardly adjacent its open end to circumferentially grip said tube of elastomeric material, whereby a double seal is effected along the inside and outside surfaces of said tube of elastomeric material.

2. A container as defined in claim 1 wherein the clumped open end portion of the container projects through said tube of elastomeric material into said metal tube.

3. A container as defined in claim 1 wherein about 3 mm. in length of said tube of elastomeric material is exposed at the open end of said metal tube.

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