Oct. 2, 1956 H. I. PHEMISTER 2,764,939

EXPLOSIVE PACKAGE

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Fig. 1.

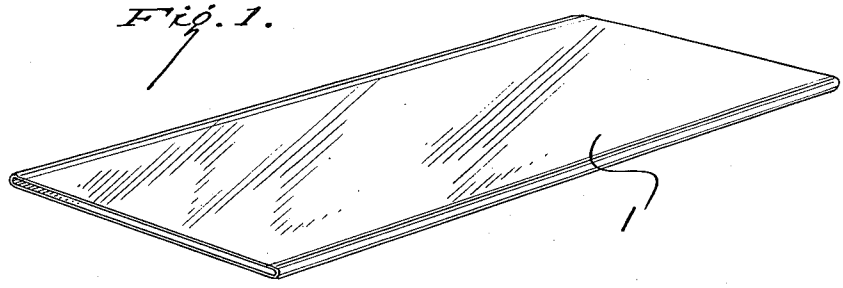


Fig. 2.

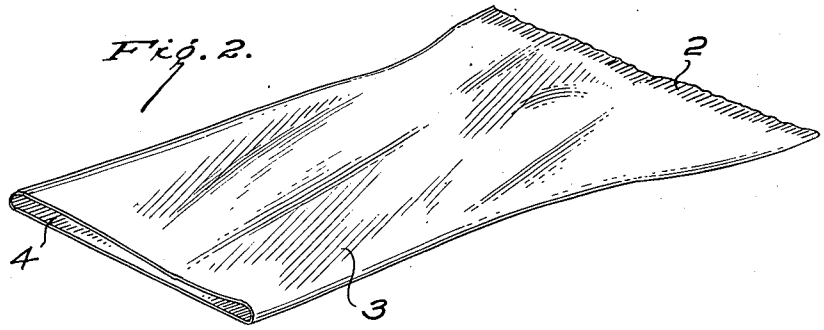
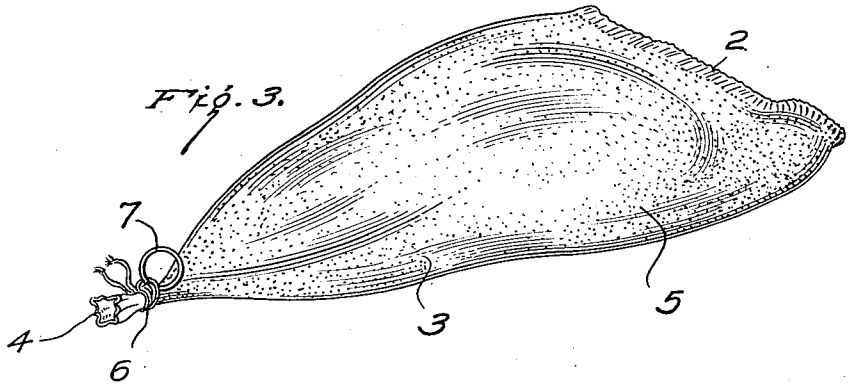


Fig. 3.



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EXPLOSIVE PACKAGE

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4 Claims. (Cl. 102—97)

This invention relates to explosive packages. More particularly, it is concerned with deformable explosive packages of varying sizes which may be molded to the desired shape without removing the explosive material from its container.

It is often desirable for the blaster to conform the shape of his explosive charge to some uneven surface or crevice. Such molding allows the explosive material to come into more intimate contact with the material being blasted in order that the charge may be effectively used. In using previously available explosive packages it is necessary to remove the explosive from its container before it can be formed to shape. Particularly is this true when the requisite charge is a large one, using the contents of several conventional packages. This practice is unsatisfactory for many reasons. The danger of spillage presented a definite hazard. When the explosive contains nitroglycerine, handling with bare hands often produces a nitro-headache.

Accordingly, it is a principal object of the present invention to present a package that eliminates the disadvantages of the prior art packages. It is a further object of the present invention to present a deformable explosive package which may be readily formed to shape without removing the explosive material from its container and which can readily be supplied containing single charges of varying size.

In general, these objects have been accomplished by presenting a deformable elastomeric envelope containing the explosive material. The content of explosive material occupies no more than about 80% and preferably not less than about 60% of the total volume of the envelope. The envelope is sealed to keep water and other contaminants from coming in contact with the charge.

A preferable form of the invention may be more easily described in conjunction with the accompanying drawing in which:

Fig. 1 is a view of a length of suitable elastomeric tube;

Fig. 2 is a view of an empty elastomeric envelope or container formed from the tube of Fig. 1; and

Fig. 3 is a view showing the sealed elastomeric container wherein the explosive material occupies about 80% of the volume of the container.

As shown in the drawing, the invention contemplates the use of a length of seamless tube 1. Thus tubing may be made of any inert elastomeric material. Since it should be moisture proof and resistant to chemical attack by the explosive, preferred materials include polyvinylidine chloride, polyvinyl butyral, or polyethylene. These materials exhibit unusual toughness and strength but at the same time they are sufficiently pliable that the container may be deformed at will. Polyethylene is extraordinarily good in these respects and, in addition, has two other valuable characteristics. Polyethylene is completely inert to the action of nitroglycerine and absorbs water to the extent of less than 0.005%. The physical characteristics of

polyethyene make it the preferred material from which to fabricate the container.

Preparation of an envelope such as the end-opening envelope 2 for containing the explosive may be carried out in ways well known in the art. For example, two sheets of elastomeric material, preferably polyethylene, may be placed one upon the other and then heat-sealed or otherwise closed on three sides. Alternatively, a single sheet may be folded and sealed along two sides. The fourth side remains open for the insertion of the explosive material. Preferably, however, an extruded seamless tube of polyethylene, or the like, is cut into some desired length as in tube 1 and one end heat-sealed as at 2, to form an envelope or container 3 having an open end 4 through which the explosive filling 5 is inserted. The end 4 may be gathered and fastened in any suitable manner as by wrapping wire 6. This procedure gives an envelope without any lateral seams. One of the advantages of the present invention is that the package may readily be made as large or as small as desired by simply varying the length and/or diameter of the cut section of tubing. Thus, the demands of mining, construction or demolition work that call for charges of unusual size easily may be met.

The explosive material contact 5 should not fill container 3. It is preferred to charge container 3 with from about 60% to about 80% of its potential capacity since it is in this range that the optimum size of charge consistent with good deformability is obtained. However, these limits may be extended somewhat if necessary. After the container 3 has been filled with the proper amount of the explosive material 5, closure 6 seals the container 1 against the possibility of contamination and leakage. If so desired, this moisture sealing may be aided by lining the open end of envelope 3 with some commercially-available self-sealing adhesive. However, one should be selected which is neither attacked by or liable to contaminate the filling.

Although any type of deformable commercial dynamite or blasting agent or military explosive may be placed inside the elastomeric container to form the package of the present invention, it is preferred to package gelatinous nitroglycerine-containing explosives. The polyethylene container is peculiarly resistant to the effects of nitroglycerine. There is no absorption or leakage or weakening of the container. Thus, a package containing a nitroglycerine explosive as contemplated by the present invention may be shaped by hand without having the hands in contact with the nitroglycerine itself.

As noted above, in order for the explosive package of the present invention to be deformable, the elastomeric container should not be filled to more than about 80% of its total capacity. This does not mean that any large air spaces or voids should remain in the final sealed package. It merely means that the elastomeric container holds no more than about 80% of the total mount of explosive material that it could hold.

This can be readily explained by referring to Fig. 2. Fig. 2 shows the empty elastomeric container. For the purposes of illustration assume that a very small amount of explosive material, say 5 grams, is placed inside such an elastomeric container which measures, say 8 by 10 inches. By means of rollers or merely by pressing with the hands, the 5 grams of explosive material may be spread into a thin film that occupies the entire interior of the container. No air or other material is present. Opposing faces of the container are either in direct contact or are separated by a solid, substantially voidless, layer of explosive. If now, the open end of the container were to be sealed, it can readily be seen that the container only contains, say, 1 percent of the total material that it

could contain; yet, at the same time, there is nothing in the container except explosive material. The resulting package is extremely flexible and can be deformed at will into any desirable shape.

It has been found that so long as the container holds no more than about 80% of fluent explosive material, the resulting package is sufficiently deformable to meet the needs of those engaged in blasting. If the container contains more than about 85% of the fluent material, the package is still deformable, but to a lesser extent. At appreciably higher content it can not be sufficiently deformed to meet the many exigencies that call for a deformable package.

The package containing no more than about 80% exposive material may be finally sealed in any of several ways. For instance, the open end may be closed with a string tie, a wire tie, a metallic clip, a lead ring, a paper-covered metallic wire or ribbon, pressure-sensitive tape, or depending upon the type of explosive contained in the polyethylene container, it may be heat-sealed. The type of closure used in closing the remaining open end of the polyethylene container after the charge has been inserted forms no part of the present invention. An insulated wire tie is convenient. Similarly a ring 7 or the like may be attached by the closing means for assistance in handling or use. When reference is made in the present specification to the total volume of the elastomeric container, it is meant to refer to the volume available up to the point where the closure seals the open end of the container.

The explosive package of the present invention is useful in mining, quarrying, demolition and submarine blasting or wherever explosives may be used. In some of these applications, it is preferred to eliminate the possibility of having fragments of the glowing container remain near the site of the explosion. That is, the container should be completely consumed in the explosion. Since materials like polyethylene contain no oxygen, it is sometimes desirable to add sufficient oxygen to the explosive charge to account for the material of which the container is made. This oxygen may be readily added to the explosive charge in the form of sodium nitrate or ammonium nitrate.

It is an outstanding advantage of the present invention that it can be used in all kinds of irregular surfaces. The package may be deformed to fit into cracks and crevices. It may be wadded to fit snugly into odd-shaped openings. At the same time, the package is well adapted to attachment to a string or other support in order that the charge may be suspended along vertical surfaces. Ring 7 is particularly helpful in such cases. The explosive package of the present invention is easy to punch for priming and can be primed either at the site of use or elsewhere as may be convenient.

It is intended to cover all changes and modifications of the embodiments of this invention herein chosen for purposes of the disclosure which do not constitute departure from the spirit and scope of the invention.

I claim:

1. A deformable, substantially voidless explosive package comprising a sealed, flexible, substantially impermeable, elastomeric container filled with a unitary deformable mass of cohesive plastic explosive material from about 60 per cent to about 80 per cent of the maximum potential capacity of said sealed container, the interior walls of said sealed container being in contact with the plastic material and otherwise with each other, whereby said explosive package is substantially voidless and capable of being deformed.

2. An explosive package according to claim 1 wherein said plastic explosive material contains nitroglycerine as an explosive ingredient thereof.

3. An explosive package according to claim 1 wherein said flexible elastomeric container consists of polyethylene in thin sheet form.

4. A deformable, substantially voidless, explosive package comprising a sealed, flexible polyethylene envelope filled with a unitary deformable mass of cohesive plastic explosive containing nitroglycerine as an explosive ingredient thereof from about 60 per cent to about 80 per cent of the maximum potential volume of said sealed polyethylene envelope, the interior walls of said sealed container being in contact with the plastic explosive material and otherwise with each other, whereby said explosive package is substantially voidless and capable of being deformed.

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