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2,087,209

MOISTURE IMPERVIOUS PACKAGE FOR EXPLOSIVE COMPOSITIONS

Filed May 16, 1936

2 Sheets-Sheet 1

Fig. 1.

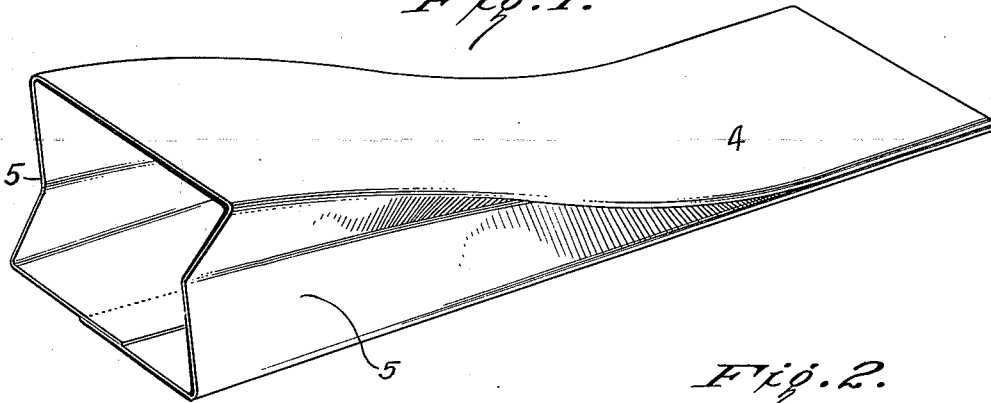


Fig. 2.

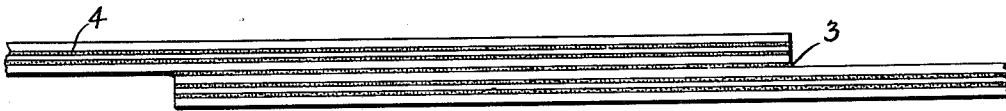
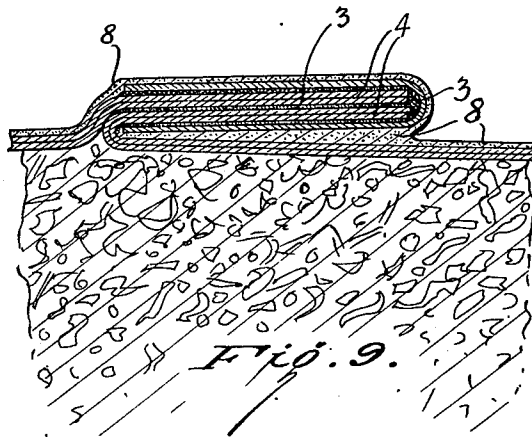
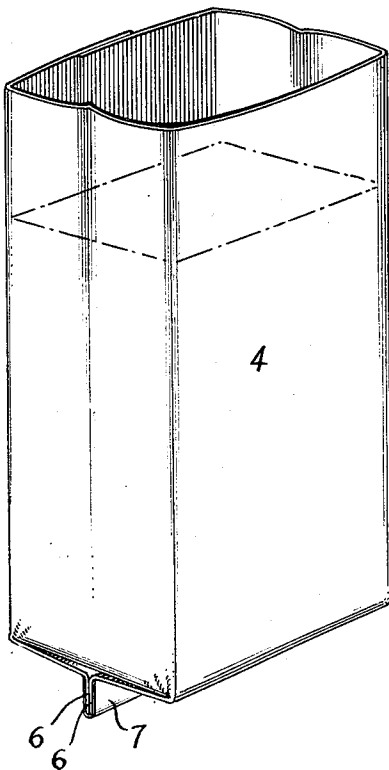


Fig. 3.



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2 Sheets-Sheet 2

Fig. 4.

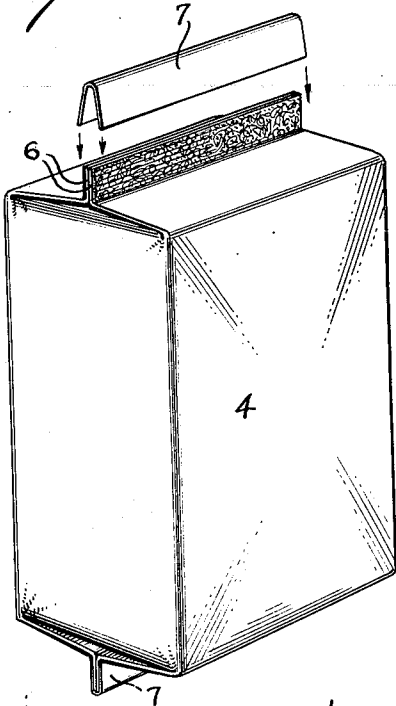


Fig. 5.

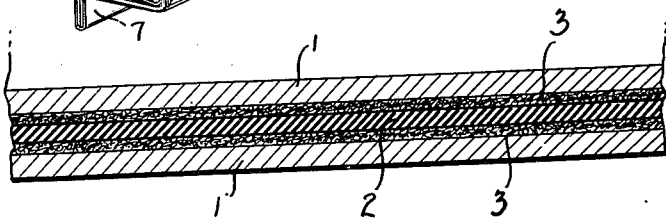
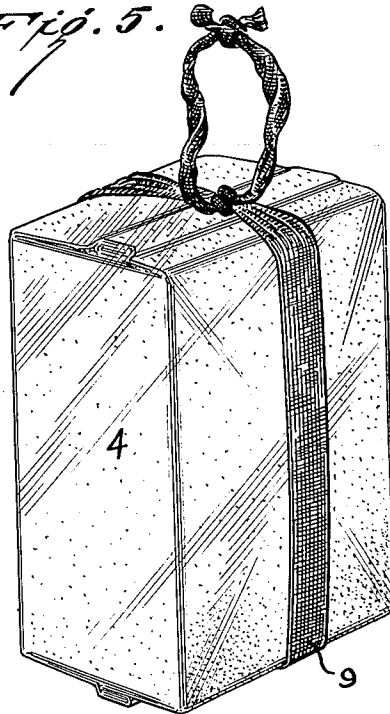


Fig. 6.

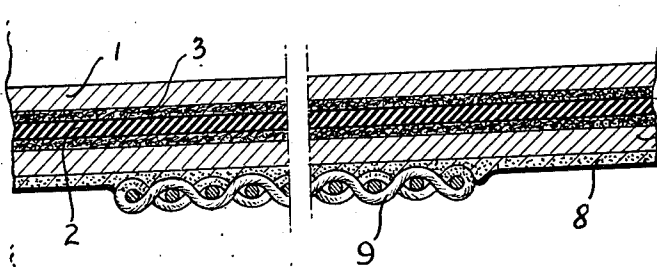


Fig. 7.

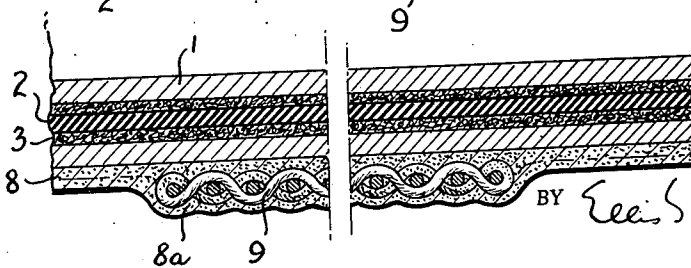


Fig. 8.

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MOISTURE IMPERVIOUS PACKAGE FOR
EXPLOSIVE COMPOSITIONS

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5 Claims. (Cl. 229—55)

The present invention relates to a waterproof or moisture impervious package for explosive compositions, being particularly adapted to contain dynamite, although not necessarily limited thereto.

In the use of explosives effected by water, particularly in underwater work where the package or wrapper containing the explosive is under considerable pressure due to a hydraulic head, it is necessary that a wrapper be used which is completely impervious to water under those conditions, for frequently there is a considerable interval of time between planting and the explosion. It is also well known that the shot hole in passing through rock has a more or less jagged surface and it frequently happens that in dropping or otherwise placing the package of explosive in the hole, it snags upon a rock or other projection with consequent destruction of its theretofore water imperviousness. This is particularly true if the package becomes lodged against such projection and has to be dislodged by force.

The principal objects of the invention, therefore, are to provide a package or wrapper for an explosive which will be impervious to moisture or water under those conditions, and resistant to tear or rupture to an optimum degree, but which, at the same time, will be relatively cheap and easy to manufacture.

The invention in one of its aspects contemplates a wrapper made of laminated sheets, preferably of inextensible material such as paper or the like, where the laminations are bonded together with an impervious adhesive. Inextensible material is desirable because of its lack of tendency to catch or snag on projections in the shot hole. It is preferable that in addition to this adhesive, some such moisture resistant or repellent material as a rubber compound and specifically a chlorinated rubber web be included in such a manner that the adhesive is applied to this rubber composition and used to bond the sheets to the said layer. An asphaltic adhesive is found to be particularly suitable.

With this composite laminated sheet as a basis, an envelope is made, the explosive material inserted therein and the ends of the package folded and sealed. The thus completed package may then preferably be dipped or have otherwise applied thereto a water resistant material such as paraffine, rubber, cellulose lacquers, or the like, which thus integrally and thoroughly protects the exterior from moisture or water penetration, A flexible coating is more desirable as it does

not have a tendency to crack and thus destroy its water imperviousness.

Where a tie is desired, this tie, preferably in the form of a porous tape should be applied before the above-mentioned integral waterproof coating has had time to harden, which thus serves the purpose of cementing the tie to the package. A subsequent dipping in the same or different waterproofing material over the tie assists in strengthening this bond.

The invention also contemplates a situation where maximum resistance to tear is presented. This means that the wrapper must, as a whole, be extensible and this can best be accomplished by using a creped paper as a base with an extensible web in conjunction therewith. This web may be rubber or the like applied as an integral adherent coating on either or both sides of the paper or between two or more sheets. A tie may likewise be used in this form of the invention.

The invention further consists in the novel arrangement, combination and construction of parts more fully hereinafter described and shown in the accompanying drawings.

In the drawings:

Fig. 1 is a perspective view of a tubular wrapper prior to the reception of the explosive and subsequent sealing;

Fig. 2 is a fragmentary sectional view of the longitudinal seam of the wrapper of Fig. 1;

Fig. 3 is a perspective view of the wrapper of Fig. 1, one end of which has been folded and sealed, the upper end being open for the reception of the explosive;

Fig. 4 is a perspective view of the wrapper of Fig. 3 having received the explosive and showing the manner of sealing one end;

Fig. 5 is a perspective view of a completed package constructed according to this invention;

Fig. 6 is an enlarged sectional view of a laminated wrapper;

Fig. 7 is an enlarged sectional view of a laminated wrapper showing the first water impervious coating and the manner of using this impervious coating to bond a tie thereto;

Fig. 8 is an enlarged sectional view of the wrapper of Fig. 7 with a second or additional coating of water impervious material applied after the tie has been put in place;

Fig. 9 is a fragmentary sectional view of one end of the package of Fig. 5 showing the manner of end sealing.

Referring now with particularity to the drawings, there is shown in Fig. 6 a typical wrapper consisting of two or more outer sheets 1, lami-

nated together. These sheets should preferably be of a material having requisite strength and some moisture-resisting abilities, such as a heavy kraft paper. While it is desirable that this material be of a non-extensible nature if maximum strength is desired, yet a creped paper or even a cloth or fabric may be utilized, provided an extensible water-resistant web is used therewith.

In the preferred form of the invention, an intermediate layer 2 of water-impervious material such as a rubber composition is used. It has been found that a sheet or layer of chlorinated rubber is admirably adapted for the purpose, because of its cheapness, ability to resist the passage of moisture in very thin films, and its ability to resist rupture under distortion. One of the difficulties, however, of a rubber material is that it is light deterioratable. Inasmuch, however, as some adhesive must be used in the laminating operation, where this material is utilized, it has been found that if a light impenetratable material such as asphaltic composition is used, such being both light and moisture resistant, it serves the three-fold purpose of an adhesive for the several laminations, it assists in making the whole wrapper water resistant, and it protects the rubber layer from light deterioration. The asphaltic coatings are shown in enlarged detail at 3.

The composite wrapper will be designated 4 and in Fig. 2 is shown a method of forming a longitudinal seam therein in which an asphaltic layer 3 is used to adhere the individual sheets 1 together. By dissolving the asphaltic composition in some solvent such as carbon tetrachloride, a more efficient penetration of the wrapper material results with consequent increase in water resistance.

A tube is next constructed as shown in Fig. 1 by bringing together the ends in the seam of Fig. 2. It has been found that by providing gussets 5 on each side, the making of an end fold is facilitated. This fold is shown in Figs. 3 and 9 and is made by applying an asphaltic adhesive 3 preferably in a solution of CCl_4 or the like to enhance penetration, between the end portions 6 of the wrapper 4 and also to the inner face of a folded strip 7, which latter is then applied over the juxtaposed ends 6 in somewhat the manner shown in Fig. 4. Obviously, the adhesive 3 may be applied to the inner face of the folded strip 7 or to the inner and outer faces of the juxtaposed ends 6, it being essential that these ends be effectively sealed against the entrance of moisture.

At the stage shown in Fig. 3, the explosive is then loaded into the wrapper to the desired height and the upper end folded in the manner described for the lower end. This then produces a package somewhat as shown in Fig. 4.

At this state of assembly, the entire package is dipped into a water-proofing material such as molten paraffine, a bath of rubber in a volatile solvent, or a cellulose lacquer applied, or these compositions may be sprayed, painted or otherwise applied to the exterior. Before this waterproof coating becomes solidified, the folded ends of the package are pressed down against the main body of the package as shown in Fig. 9 and there permitted to set so that the waterproof coating 8 forms an adhesive between the folded ends and the main body of the wrapper.

Where a tie is desired, either for lowering purposes or to assist in holding the folded ends in place, this may take the form of a porous tape or the like 9 and is preferably applied around the package as shown in Fig. 5 before the coating 8

has completely hardened or solidified. In this event, it has a tendency to impregnate the tie 9 and serves to bond the tie to the wrapper as shown in Fig. 7. It is preferable, though not essential, that a second and additional application of waterproof material be applied over the thus assembled package including the tie 9 and this additional coating is shown at 8a of Fig. 8, although it will be understood that there is practically no line of demarcation between coating 8 and coating 8a as they merge and become integrally one.

Where maximum extensibility is desired in the package, the paper may be of the creped variety, which in combination with a rubber adherent and integral coating on one or both sides thereof or in between sheets where more than one is used, both the wrapper material and the water resistant coating are concurrently extensible.

As thus assembled, it has been found that a particularly efficient waterproof wrapping for dynamite or other explosives is provided which will stand the ordinary abuse of handling and being dropped into a shot hole.

While the invention has been shown and described with particular reference to specific embodiments, it is to be understood that it is not to be limited thereto, but is to be construed broadly and limited only by the scope of the claims.

We claim:

1. In a waterproof package adapted to contain an explosive, a container consisting of at least two sheets of material laminated with a layer of a moisture impervious substance therebetween, each end of said container being folded on itself and sealed against the entrance of moisture in which the first-mentioned layer of moisture impervious material is a chlorinated rubber product with a water impervious non-elastic adhesive applied between the layer and the sheets, in which the adhesive is light impenetrable.
2. In a waterproof package adapted to contain an explosive, a container consisting of at least two sheets of material laminated with a layer of a moisture impervious substance therebetween, each end of said container being folded on itself and sealed against the entrance of moisture in which the first-mentioned layer of moisture impervious material is a chlorinated rubber product with a water impervious non-elastic adhesive applied between the layer and the sheets, in which the adhesive is an asphaltic composition.
3. In a waterproof package adapted to contain an explosive, a container consisting of at least two sheets of paper with an intermediate layer of rubber composition, the intermediate layer and the paper sheets being bonded together with an asphaltic composition, the ends of the container being bonded together by an asphaltic composition with a folded strip bonded to the juxtaposed ends of the paper container and sealed against the entrance of moisture, a coating of moisture-impervious material over the whole package, the ends of the package being folded down against the package body and bonded to the package by the said impervious coating, a tie arranged around the package and bonded thereto by means of the said coating, and a second coating applied over the package and the tie.
4. In a waterproof package adapted to contain an explosive, a container including at least two sheets of paper with an intermediate layer of moisture-impervious material, the intermediate layer and the paper sheets being bonded together,

the ends of the container being bonded together with a water-impervious adhesive, with a folded strip bonded to the juxtaposed ends of the paper container and sealed against the entrance of
5 moisture, the ends of the package being folded down against the package body and bonded thereto by a water-impervious adhesive, and a tie arranged around the package and holding the folded ends against the body, and a coating of
10 moisture-impervious material over the whole package and tie, said tie being bonded to the package by means of said moisture impervious material.

5. In a waterproof package adapted to contain
15 an explosive, a container including at least two

sheets of paper with an intermediate layer of moisture-impervious material, the intermediate layer and the paper sheets being bonded together, the ends of the container being bonded together and folded down against the package body and
5 bonded thereto by a water-impervious adhesive, and a tie arranged around the package and holding the folded ends against the body, and a coating of moisture-impervious material over the
10 whole package and tie, said tie being bonded to the package by means of said moisture-impervious material.

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