United States Patent [19]

Thornley et al.

[11] **3,783,787**

[45] **Jan. 8, 1974**

[54] **BLASTING CHARGE AND CONTAINER THEREFOR**

[75] Inventors: **Gary M. Thornley**, Bountiful; **Robert C. Stokes**, Sandy, both of Utah

[73] Assignee: **Ireco Chemicals**, Salt Lake City, Utah

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[52] **U.S. Cl.** ..... **102/24 R**, 150/9, 229/62.5

[51] **Int. Cl.** **F42b 3/00**

[58] **Field of Search** 102/24, 30; 150/9; 229/62.5

[56] **References Cited**

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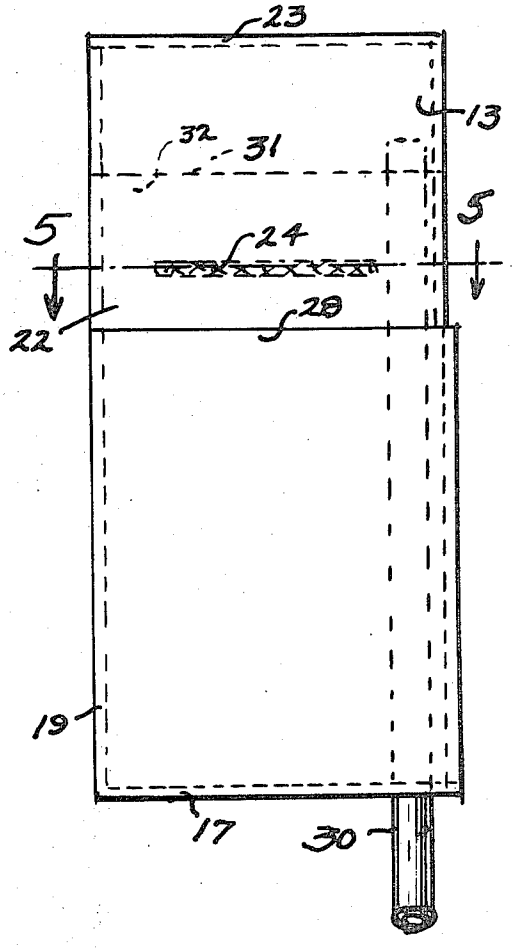
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Primary Examiner—Benjamin A. Borchelt
Assistant Examiner—H. J. Tudor
Attorney—Edwin M. Thomas

[57] **ABSTRACT**

The invention is a container especially suitable for packaged blasting charge. A particular embodiment is one of the type used in mines for support on a stick or a pole, at points where a local blast is required as for removal of hang-ups of ore, protruding rock formations, and the like. The container is a bag or envelope of internally valved type, made of preformed flat or folded flexible sheet material, preferably a tough elastic heat sealable polymeric film or sheeting material suitably inturned and sealed to form a self-closing compartment for liquid or flowable slurry explosive. A supplemental pocket may be formed at the side of the main compartment for supporting the charge on a stick or pole. The main compartment is sealed along both sides and across one end and is closed by a flat lying valve element integral with one of the main side walls but sealed to the other main side wall across part only of its width and along a line spaced from the end of the valve element. A filler opening is thus provided at one or both sides of this cross-seal.

10 Claims, 9 Drawing Figures



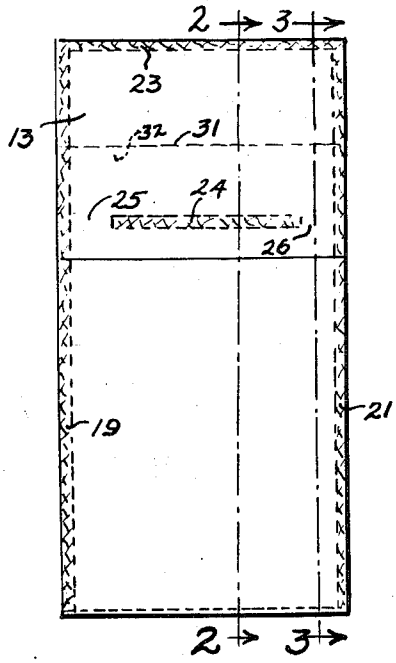


FIG. 1

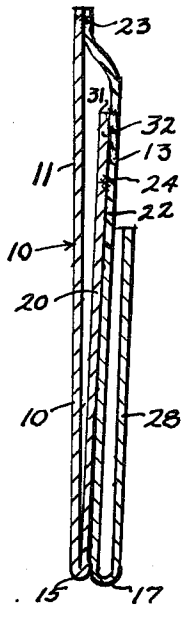


FIG. 2

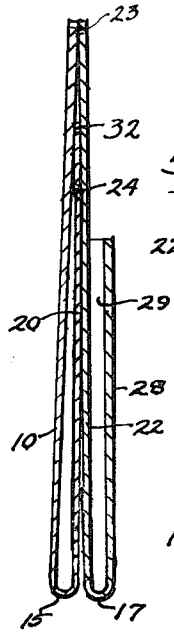


FIG. 3

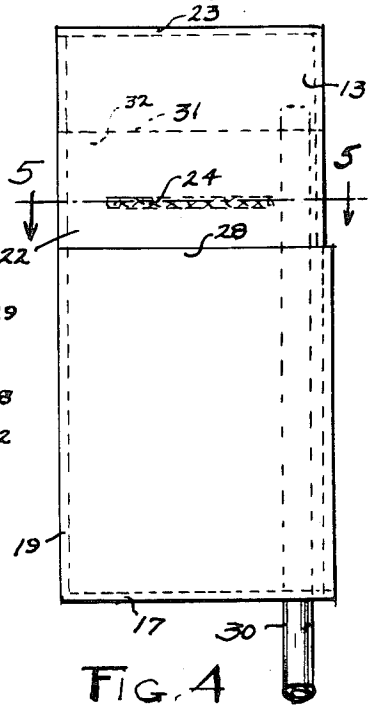


FIG. 4

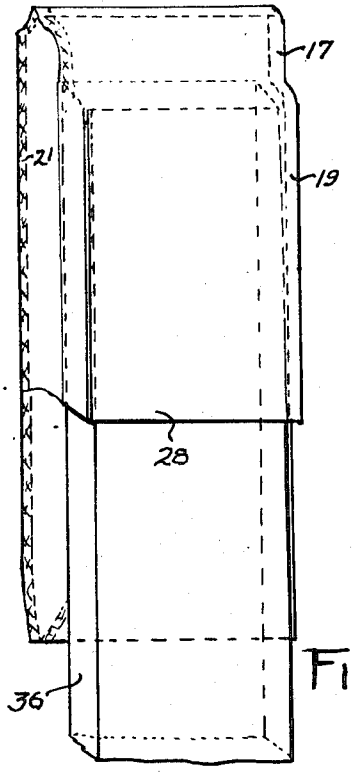


FIG. 6

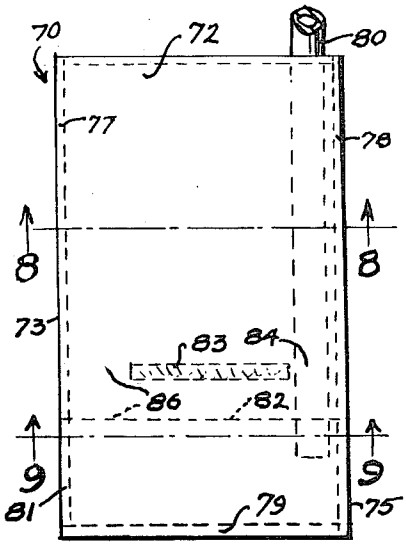


FIG. 7

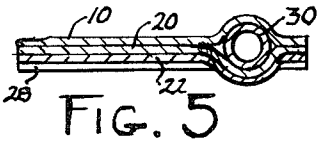


FIG. 5

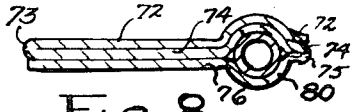


FIG. 8

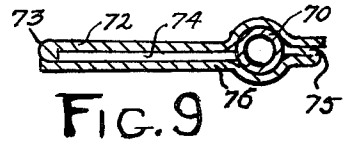


FIG. 9

BLASTING CHARGE AND CONTAINER THEREFOR

BACKGROUND AND PRIOR ART

Numerous valved bags are known in the prior art, many of them having inturned or inserted flaps or closure elements. Examples are shown in U.S. Pats. to Miller, No. 3,189,252, and Waller et al., No. 3,263,903. Some of these bags are said to be suitable for holding liquid and sealing themselves automatically after filling. The prior art bags are commonly made up of several pieces, including special valve inserts which must be fitted together and finally secured together to make up the receptacle. The Waller et al patent bag, for example, relies on special valve surfaces of high affinity adhering together, assisted by pressure from the contents of the container to hold the valve shut. The end-sealing bag of the Miller patent takes two separate sheets, forms the valve and seal between end portions of the two sheets, folds the main bodies of the sheets back over or outside of the valve element and seals them together around the three non-folded sides, securing the valve member between the main container walls along either side.

The present invention involves a valved bag suitable for holding a liquid or semi-liquid material such as an explosive gel or slurry. It is desirable to simplify bag manufacturing procedure by holding the number of steps in the process to a minimum. The present invention accomplishes this by using front and rear wall sheets sealed together along their side edges and across one end, the intermediate sheet being folded from or secured to the other end of one of the main wall sheets and sealed part way across near but not at its free end to the other wall, providing a filler opening on one or both sides of the seal.

In addition to having an effective inner liquid seal, the container may be modified to provide it with a pole pocket, i.e., so that when the bag is filled, e.g., with explosive slurry, it can be supported on a pole for a specific blasting purpose. In mining operations, for example, supplemental local or spot blasting operations are often required, where a pole-supported charge is useful. A mass of broken or partially broken rock or an unbroken obstacle may hang up the movement of rock in a shaft or a stope. Protruding rocks or ledges or particles which are not sufficiently broken or loosed from the formation may impede operations. A package charge of this type is useful to dislodge them. Similar problems may be encountered in construction projects where a moderate sized and manually placed local blasting charge of convenient size and form is useful. Blasting charges of the type just described are often difficult to secure in place. Packages or bags, wrapped or filled with conventional explosive, may rupture and spill their contents, causing inconvenience or hazards. It is desirable to have available a charge of convenient size, which can be filled and otherwise prepared in the field without requiring any particular tying or other special fastening to hold it to the support stick or pole.

According to one aspect of the present invention, therefore, the bag or envelope has a main compartment adapted to hold the desired mass of explosive and provided with a valved entrance, and a supplemental pocket is formed integrally with the bag for supporting the package on a pole or prop. This pocket is adapted

to receive a conventional supporting stick or pole without tying or other special fastening operations.

The package which is the explosive compartment per se can be made in different sizes as required. The pocket, if required, can be shaped and sized to fit any appropriate support stick. A typical container, which has teen found suitable for many purposes, is one designed to hold from about 2 to about 10 pounds of explosive slurry. The latter may be of the general type described in U.S. Reissue Pat. No. 27,695, 3,453,158, and others well known in the art. A granular explosive filler may be used in some cases.

A particular aspect of the invention is the simple valve arrangement of high self-closing reliability and efficiency.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a plan view of a length of preformed tubular material from which suitable lengths may be cut, formed and sealed to produce the package of the present invention.

FIG. 2 is a cross-section on line 2—2 of FIG. 1

FIG. 3 is a cross-section on line 3—3 of FIG. 1.

FIG. 4 is a perspective view of the bag of FIGS. 1 to 3, showing a filling operation.

FIG. 5 is a cross-sectional view taken on line 5—5 of FIG. 4.

FIG. 6 is a perspective view of the filled package supported on a pole, being inverted as compared to FIGS. 1 and 4.

FIG. 7 is a front view of a modified bag or container formed of a single sheet of material and omitting the pole pocket.

FIGS. 8 and 9 are transverse sectional views taken respectively on lines 8—8 and 9—9 of FIG. 7.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring now to the drawings, a completed package having a pole pocket is shown in FIGS. 1 to 6, which will be described in detail below. The bag or container in FIGS. 1 to 6 is made of two separate sheets of material 11 and 13, both folded at their bottom ends 15, 17, respectively, sealed along side edges 19, 21 in any suitable manner, such as heat sealing, and secured together across a full width seam 23. That is to say, there are two thicknesses (two separate sheets 11 and 13) sealed together across the top 23, four thicknesses sealed together along the side edges, most of the way but not all, and no sealing across the bottom where each of the sheets 11, 13 is folded.

Heat sealable plastic sheet material may be supplied from a roll or other supply, not showh. Sheets 11, 13 are of similar width and may be similar length if desired; as shown, the sheet 11 is slightly longer than sheet 13. Sheet 11 forms the back main wall 10 (left as seen in FIGS. 2 and 3); it is folded at the bottom 15 and its right portion 20 extends upward to form the valve and reinforce the front wall 22, being sealed to sheet 13 at line 24, across part only of its width. This leaves an unsealed opening 25, 26 on either side of the valve through which a filler tube 30, FIGS. 4, 5 may be inserted from the bottom, between folds 15 and 17. Sheet 11 terminates above partial seal 24 but below the top seal 23 which holds the upper ends of the two sheets 11, 13, together. That is, the upper end 31 of the upturned part of sheet 11 extends a distance above or be-

yond the partial seal **24** sufficient to allow it to act as an effective seal.

The sheet **13,** tightly secured to sheet **11** full width across the top, forms the main front wall (or right wall, FIGS. **2** and **3**), of the container, being joined along both side edges **19, 21,** by a liquid proof sealing or adhesive. The valve seal **24** thus fastens the main wall element **22** of sheet **13** transversely in its upper middle part across part of its width, leaving filler openings **25** and **26** on either side. If desired, one of these openings can be eliminated by sealing to the edge seam **19** or **21.**

The upturned part **28** of sheet **13,** which forms a pole-receiving pocket **29** (see FIG. **6**) is also sealed along its side edges to the main back wall **10** and to intermediate layers **20** and **22.** Thus, along the side edges there are four thickenesses **10, 20, 22** and **28** all sealed together (by heat seal or adhesive) up to the upper end of alyer **28,** three thicknesses to the end **31** of layer **20,** and thicknesses above that.

For filling, the bag may be retained in the position shown in FIGS. **1** and **4,** with filler tube inserted between layers **20** and **22** and through one of the openigs **25** or **26.** The fluid (or granular material, if desired) is injected upwardly, walls **10** and **22** separate, with layer **20** following wall **22,** except where the inserted nozzle tube **30** interferes. When the filler nozzle is withdrawn, the tension in wall **22** closes the filler opening. Thereafter, the upper flap portion **32** of layer **20** lies snugly against wall **22** and there is no leakage.

The package can be inverted for filling or laid down flat on back wall **10** if desired. After filling, if it is to be supported on a stick or pole **36,** FIG. **6,** the package is inverted, if necessary, and the pole is inserted manually in the pocket **29,** formed between layers **22** and **28,** with bottom fold **17** and side seams **19** and **21** holding the pocket snugly around the stick.

As described in U.S. Pat. No. 3,263,903, mentioned above, the inner surface of the valve layers **20** and **22** may be of a material or so coated and finished, as to have greater affinity or adhesion to each other; however, by placing the valved opening at the side rather than in the middle of the width of the package, the self-closing tendency of the valve is enhanced by the convergence of outer walls **10** and **22.** That is, the walls **20** and **22** of the valve portion tend to be squeezed together much better at the sides than if the valve were in the middle of the bag.

In its finished form, ready for filling, the container lies flat, as seen in FIGS. **1** and **4.** The filling nozzle or tube **30** is connected to a supply of the filling material, not shown,, being inserted in one of the valve openings, such as **26,** of which there are two, one on either side, as mentioned above. The bag may be completely filled and at least is filled to a level well above the partial seal **24,** spreading walls **10** and **22** apart but pressing the valve portions **20** and **22** together. The filler material occupies the full space between the main front and rear walls **10** and **22 (20).**

The receptacle of FIGS. **1** to **6** is formed of two sheets, sealed together across the top and along both side edges, However, as compared with the prior art containers mentioned above, this receptacle also can be formed of a single piece of folded sheet material. The simple procedure of cutting off a length of sheet material is shown in the example of FIGS. **7** to **9.** The sheet may be zig-zag folded to form three superposed layers, if no pole pocket is to be made, or four layers if the pocket is needed. FIGS. **8** and **9** show this three-layer arrangement.

A length of sheet material **70** is folded to make three layers of equal width, superimposed on one another. These layers **72, 74, 76,** FIGS. **8** and **9,** correspond respectively to layers **10, 20** and **22** of FIGS. **1** to **5.** If a pole pocket is desired, an additional layer is provided; compare FIG. **5** with FIG. **9.** The sheet starts at top right, FIG. **8,** which is layer **72;** it is folded under at edge seam **73** at the left to provide intermediate layer **74** and folded under again at the right, see **75,** to provide the layer **76.** The three layers are all secured together, as by heat sealing along both vertical edges **77** and **78;** see FIG. **7.** At the bottom end, as seen in FIG. **7,** the two outer layers **72** and **76** are sealed together at **79,** similar to the top seal **23,** FIG. **1.** Note that the bag of FIG. **7** is upside down as compared with the bag of FIGS. **1** and **4,** and the filler tube **80** is inserted from the top rather than from the bottom. The intermediate layer **74** is cut off or cut out in a rectangular notch at **81,** leaving its lower terminal end **82** free and unattached to either outer wall.

The layer **76,** which is the back wall as seen in FIG. **7,** is sealed part way across its width at **83** to the intermediate layer **74** above the end **82,** to leave a sealing flap hanging somewhat below the partial seal **83** as seen in FIG. **7.** This makes it possible to insert the filler tube or spout **80** between the back layer **76** and the intermediate layer **74** and through the filler opening **84** (or **86**) at the side of the partial seal **83.** Layers **72** and **74** are either sealed together across the top or are integral with each other and folded here, whereas layer **76** is free across the top.

The end of the filler tube thus projects beyond the end or edge **82** of intermediate layer **74** and lies between the outer wall layers **72** and **76,** as shown in FIG. **9.** Higher up, this filler tube **80** is between layers **74** and **76** until it passes through the opening **84** and beyond the margin of layer **74;** se FIG. **8.**

If it is desired to have a pole pocket, as in FIGS. **1, 4** and **6,** the layer **76,** as seen in FIGS. **8** and **9,** would be reverse folded instead of being terminated at the left; that is, there would be four layers instead of three. Compare FIG. **5.**

The lower edge **82** of the intermediate sheet or layer **74,** FIGS. **7** to **9,** should terminate far enough above the bottom seam **79** that the filler nozzle can project beyond edge **82** and between the two main outer walls **72** and **76;** otherwise the margin between the partial seal **83** and this edge **82** can vary in width, according to choice. The valve layer or sheet **74** can be integral with a main wall such as rear wall **72,** or with both main walls **72, 76** or with the front wall **76** only, or with neither.

In general, it will be seen that the package or container of the present invention comprises at least three superimposed layers of sheet material, two of which constitute main walls of the bag or container. These two main wall portions are secured to each other completely across one end and along two side edges. In between these main wall layers is interposed a layer of sheet material, which may be integral with one of the main wall portions, or with both, or with neither. If integral with one only, as in FIGS. **1** to **6,** it is also sealed to and between both main wall sheets along its side edges. If integral with both, as in FIGS. **7** to **9,** it is also sealed across one end to one only of the main side

walls. In either case, the valve layer is sealed across part only of its width to the other wall (the one opposite to that to which the valve layer is end sealed or is continuous at the end). That is, the intermediate layer is fixed to, i.e., integral with or sealed to, one outer wall full width across one end but it is free from the other wall at said end. At or near its opposite or valve end, the valve layer is secured to the other side wall only across part of its width. This provides a valved opening on one or both sides of the partial seal.

In any case, the intermediate layer must be free from one main or rear wall and attached full width to the other at one of its ends. Such attachment may be by adhesive or seal, as in FIG. **7**, or by being integral and folded from one of the main walls, as at **15**, FIGS. **2, 3.** At this same end it is free from the opposite or other main wall, but it is partially sealed thereto near its other end to form the valve closure.

The bag of FIGS. **7** to **9** is formed in exactly the same manner as in FIGS. **1** to **6**, except that the blank is a single piece of material and has no cuff portion designed to receive a support pole such as **36.**

When the pole pocket is used, it should be wide enough or deep enough for stable support. The sheet material is normally elastic enough to accommodate insertion of a slat or pole between the cuff **28** and the main package wall without rupturing either. When used as a pole-supporting charge, of course, the assembly will include or be equipped with suitable detonating devices and/or boosters, according to standard practice and will therefore be propped in appropriate position for firing, as is well understood in the art.

It will be obvious that variations and modifications other than those described above may be made within the scope and spirit of the invention, both with respect to the package or container, as a product, and with respect to the method of its manufacture. It is intended by the claims which follow to cover such modifications and alternatives as have been described and also to cover such equivalents and variations as will suggest themselves to those skilled in the art, as broadly as the state of the prior art properly permits.

What is claimed is:

1. A valved container for liquid or granular materials such as slurry type explosive compositions and the like, which consists of at least three layers of sheet material sealed together along opposite side edges, a single middle layer between two main wall layers being a valve layer, said value layer being sealed across part only of its width to one of said main wall layers to form at least one valve opening at a side of said partial seal, said opening being disposed to receive a filling tube or nozzle, the two main walls being secured completely across their width at one end to close the container at said end, the intermediate or valve layer disposed between said main walls being fixed across its full width to the other of said main wall layers to close the other end of said container.

2. A container according to claim **1** formed of a single folded sheet, the three layers comprising the main walls and the valve layer being continuous portions of said sheet.

3. A container according to claim **1**, formed of at least two separate sheets secured together along said side edges to form at least three layers sealed together along each of said side edges.

4. A container according to claim **1** which comprises a fourth layer secured tothe other layers along the side edges and secured also at one end to said main side walls to form a pocket outside of said main walls.

5. A container according to claim **1** in which the valve layer is a folded continuation of one of said main walls.

6. A container according to claim **1** in which the main side walls of the container are fixed to each other continuously along both side edges and across the opposite end, the valve layer being secured at one end across its full width to a first one of said side walls and across its partial width and near but not at its opposite end to the other of said side walls.

7. A container according to claim **1** in which the vlave layer is a continuous folded part of one of said main side walls and is sealed across part of its width to the other side wall, also said other side wall comprising a continuing and folded sheet portion upturned and sealed to the side edges of both said main walls to form a pole-receiving pocket.

8. A container according to claim **1** having a single valve opening at one side only of the partial seal outside of the bag.

9. A container according to claim **1** formed of a single three-part folded sheet of which a terminal part forms one main side wall, the other terminal part forms the other main side wall, and the intermediate part forms the valve layer, said valve layer being cut short of one end of said container to permit insertion of a filler tube beside the partial seal.

10. A container according to claim **9** which has a pole-receiving pocket formed by a layer of sheet material of rectangular form secured around three of its edges to one of said main wall layers.

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