July 25, 1961 G. L. GRIFFITH ET AL 2,993,441

CONTAINER FOR EXPLOSIVE ARTICLE

Filed May 22, 1957

Fig. 1

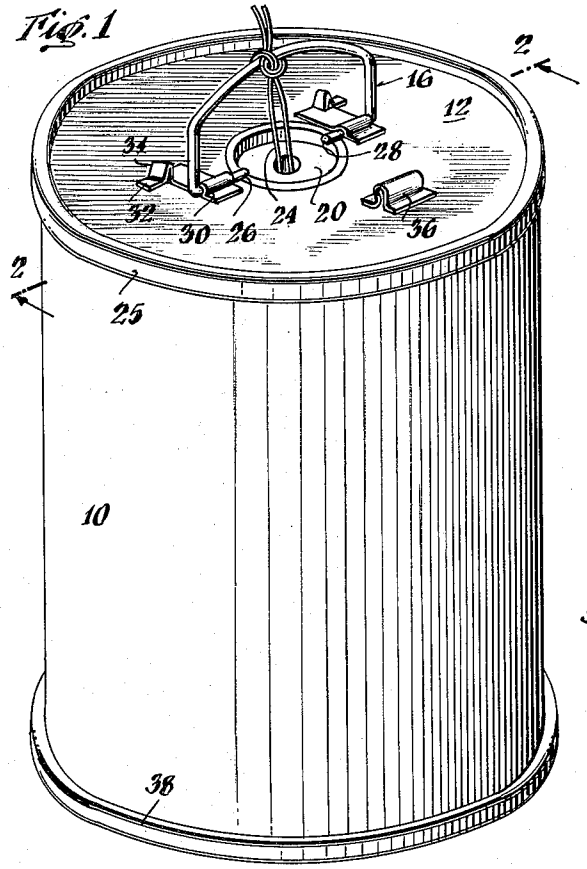


Fig. 3

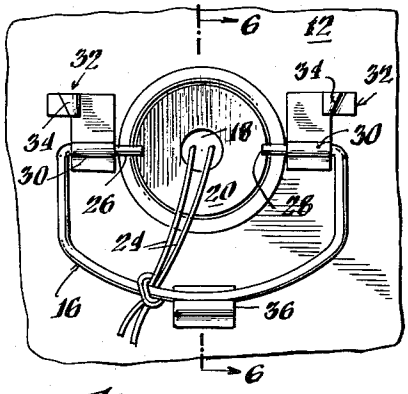


Fig. 4

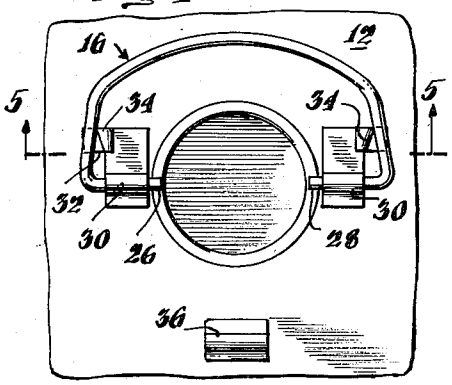


Fig. 2

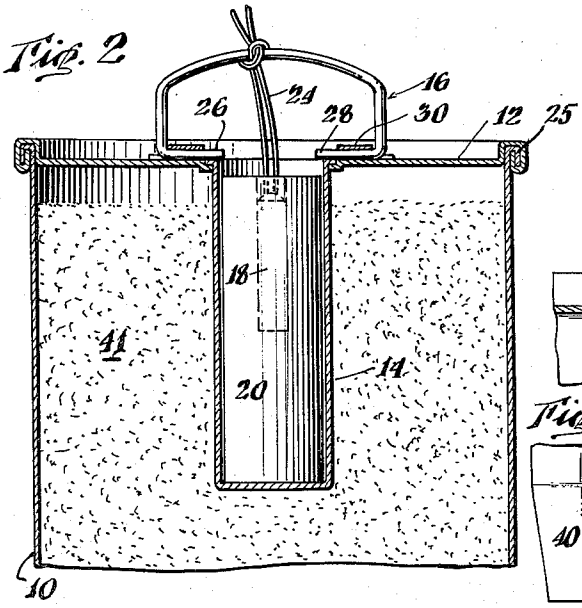


Fig. 5

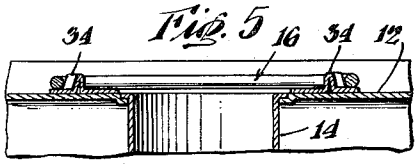


Fig. 6

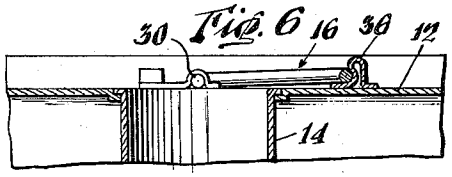


Fig. 7

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CONTAINER FOR EXPLOSIVE ARTICLE

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This invention relates to a container including means for holding a stick or cartridge of material within the well.

The invention is particularly useful in connection with containers for explosives such as those used for underwater seismographic exploration and will, therefore, be first illustrated by description in connection with such use.

In such use the container, in the form of a large can with tight cover, contains an explosive charge that is ordinarily ammonium nitrate dynamite or the like. The exact composition of the charge is variable in manner known in seismographic shooting. Extending into the can of explosives is a booster well containing, at the time of use, a booster in stick form with detonator cap in the top thereof having means for firing the cap. The firing means include ordinarily either a fuse or two arcing conductor wires joined at a safe distance to an electrical detonating device.

The present invention provides means for facilitating insertion of the booster into the well in advance of firing and then preventing the booster from falling out when the container is inverted, as in being tossed overside in underwater use, all without requiring that the booster fit so exactly in the well as to be held in position by friction fit inside the well and, therefore, as to be difficult to insert initially.

Briefly stated, the invention comprises retractable elements normally extending above a well for stick material and means for retracting the said elements to facilitate introduction of the said stick. In the commercial embodiment the retaining elements, which are a part of the bail by which the container is handled, normally extend above and a moderate distance inside the rim of the well, are retractable on the application of force so as to clear the entire width of the well for convenient introduction of the stick into the well, and returnable to normal position so as to serve as retaining elements for the stick when the retracting force is released.

The word stick is used herein to include a cartridge or other container such as one of the form in which a booster or primer (priming element) is sometimes contained.

The invention will be illustrated by description in connection with the attached drawings to which reference is made.

FIG. 1 is a perspective view of the container;

FIG. 2 is a sectional view on line 2—2 of FIG. 1;

FIG. 3 is a fragmentary top view showing the bail or handle in locked position;

FIG. 4 is a fragmentary top view with the bail spread in direction away from the well;

FIG. 5 is a detailed sectional view taken on line 5—5 of FIG. 4;

FIG. 6 is a fragmentary or detached sectional view taken on line 6—6 of FIG. 3; and

FIG. 7 is a longitudinal sectional view of a modified form of booster stick.

There is shown a container including the vessel 10, top 12 thereof, booster well 14, bail 16, explosive charge 41, booster 20, and cap or detonator 18 with lead in conductor wires 24 from a conventional electric firing device (not shown).

The top of the vessel is closed by the said top 12 that is in effect a flange extending around and engaged near

the mid-portion to the rim of the well and at its outer edge crimped to the top edge of vessel 10 as shown at 25.

The bail 16 may be in the form of a modified rectangle as shown in FIG. 2 with the base of the handle adjacent to the lid cut out so as to provide the stub ends 26 and 28. These stubs form the retaining elements for the booster 20. Mounting means, such as the metal clips 30, hold the retaining elements 26 and 28 pivotally and also longitudinally movably, i.e. retractably, on the lid 12 of the vessel. The retaining elements 26 and 28 are so positioned and of such dimensions that they extend normally above and just over the rim at the top of the well 14. In so doing they prevent the booster from falling from position as may be the case, for example, when the container is thrown from a boat.

Each spreader 32 includes an upstanding portion such as the bead 34. This portion has, on the side thereof away from the well, a surface that slopes outwardly (away from the well) in the downward direction. These spreaders are so placed that, when the bail is forced manually against the sloping sides and in direction towards the lid to the position shown in FIG. 4, the sides of the bail contact the slopes. The slopes cause the sides of the bail to spread apart as the bail is forced down, as in the said FIG. 4. As a result of this spreading action upon the springy material of the bail, particularly of the sides thereof, the retaining elements 26 and 28 are retracted from over the well, so as to leave the entrance to the well substantially unobstructed. When, however, the booster stick 20 has been inserted, the bail is then allowed to rise. The spreading force is thus released by disengagement of the bail from the spreaders, so that the springiness of the bail now returns the retaining elements 26 and 28 to the normal positions in which they project inwardly over the rim of the well, as shown in FIG. 2.

A clip 36 is mounted on the lid, as shown at a position to engage and hold the bail releasably as shown in FIG. 5, for convenience in shipping and storing the container.

In the embodiment shown, the clips 30 and the spreaders 32 are integral.

The exact shape of the bail is not important so long as it includes the straight base portion cut out to provide the retaining elements 26 and 28; it is springy, and it is so positioned with respect to the spreaders 32 as to be engaged thereby and be forced outwardly at the two sides of the bail as to the position shown in FIG. 4.

Parts not illustrated in detail are conventional. An example of this is the welding, brazing, soldering, or other usual means (not shown) securing parts 30 to the lid and also the means holding the rim of the well 14 to the lid 12 and the bottom 38 and the lid 12 to can 10, in each case in water tight manner.

The materials of the construction are those that are usual in containers of the present general class. All parts may be made of iron or steel except for the bail, which must be somewhat resilient or springy. Plastic or bronze are also satisfactory although not as economical for the present purpose. The bail is ordinarily made of spring steel such as heavy steel wire or light rodding. There may be used for the bail also either spring bronze or a springy plastic of such resistance to deformation as to make it sufficiently strong for lifting and handling the filled container. Thus there may be used, for instance, glass-fiber-reinforced styrene, polyvinylchloride, or the like.

While the exact composition of the materials filled into our container forms no part of the invention, it is noted that a suitable explosive charge 41 is a granular ammonium nitrate base explosive. For the booster 20 any usual booster is satisfactory, as, for example, a high explosive material such as trinitrotoluene, dynamite, or

Pentolite. The cap **18** may be and ordinarily is the usual detonator cap either of the electric type or the fuse ignited type. The particular explosive, booster or composition in the cap will be that which is conventional in the use to which the container is to be put.

The operation of the invention will be largely evident from the description of it that has been given. The can **10** is formed initially with the bottom left open. The well **14** is attached to the lid **12**, as by soldering, welding or brazing. The bail is suitably shaped and then placed in position in such a manner that the retaining elements **26** and **28** are rotatable and also retractable lengthwise within the clips **30**. Then the lid is attached to the top of the can **10** at **25** by usual can-making technique.

With the container upside down, the vessel **10** is then filled with explosive such as any granular, pressed, cast or other explosive conventionally used in seismographic exploration.

The bottom **38** is then sealed in position in a manner usual in applying ends to cans.

The assembly thus partially effected is suitably shipped in this form to the place of use.

Just before use, the booster **20**, with cap **18** and wires **24** in position, is inserted into the well. To do this, force is applied manually to the sides of the bail, to force it against and outside the beads on the spreaders **32** (FIG. 4) and cause retraction of the retaining elements **26** and **28** outwardly. The booster is then lowered into the well. Then the retracting force is released by lifting the bail. The elements **26** and **28** now return to their normal positions so as to terminate not only above but also a short distance inside the rim of the well. They will extend inside the rim to positions such that the distance apart of their ends is somewhat less than the diameter of the booster stick within the well. For this reason, inversion of the container will not cause the booster to fall from the well.

Various absolute dimensions may be used, these being not critical but those that are usual in the industries in which the containers are used.

The explosive **41** is any explosive such as one suitable for use in seismographic exploration.

The booster stick must be of width at the top less than the diameter of the well, so as to be insertable therewithin, but greater than the normal distance between the elements **26** and **28** (FIGS. 1, 2, and 3).

In a modification of the invention the booster **40** is tapered somewhat at its lower end, as shown in FIG. 7, so that it may be forced by wedge action between the retaining elements **26** and **28**. For booster sticks of some materials, particularly those that are hard and relatively non-sensitive, this is a satisfactory means of causing retraction of the spreader elements, permitting the insertion of the booster **40** followed by the return of the retaining elements to the position shown in FIG. 2.

The container described is relatively simple and inexpensive in construction and convenient and dependable in use.

It is to be understood that it is intended to cover all changes and modifications of the invention herein chosen for the purpose of illustration which do not constitute departures from the spirit and scope of the invention.

What is claimed is:

1. A container for explosives comprising an explosive charge compartment, an explosive charge therein, top and bottom walls closing both ends of the compartment, a portion of the top wall being depressed to form an open well extending down into the compartment and shaped and constructed to receive a booster therein, bail mounting means positioned on the top wall adjacent the opening of the well, a bail of spring material mounted in the mounting means and movable from a substantially flat position on one side of the top wall to a corresponding position on the opposite side of the top wall, the ends of the bail being bent towards each other and extending through the mounting means normally to overlie at least a portion of the opening of the well, cam members mounted on the top wall and disposed in the path of the bail when the bail travels to a flat position on one side of the top wall, such cam members being adapted when engaged by the bail to spread the ends of the bail apart and withdraw them from over the opening of the well thereby permitting insertion and removal of the booster in the well.

2. A container in accordance with claim 1 in which the cam members are carried by the mounting means.

3. A container in accordance with claim 1 which further includes a retaining friction catch mounted on one side of the top wall to hold the bail flat over the top wall away from the spreading means to maintain the ends of the bail in overlying position over the opening of the well.

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