CONTAINER FOR PACKAGING A PLURALITY OF EXPLOSIVE UNITS SO AS TO PREVENT SYMPATHETIC DETONATIONS

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ABSTRACT
A container for packaging a plurality of explosive units so as to prevent sympathetic detonations comprises a box containing a plurality of hollow tubes with explosive units slidably set within the tubes. Frangible areas are carried by portions of two opposite walls of the box proximate the ends of the tubes. The frangible areas operating with the hollow tubes permit a rapid release of explosive gases generated upon a single premature detonation and isolate adjacent explosive units from a residual shock wave that would otherwise trigger sympathetic detonations.

4 Claims, 2 Drawing Figures
CONTAINER FOR PACKAGING A PLURALITY OF EXPLOSIVE UNITS SO AS TO PREVENT SYMPATHETIC DETONATIONS

BACKGROUND OF THE INVENTION

The present invention relates to that field of art dealing with special receptacles and packages, and more specifically, to those receptacles used in the shipment of explosive units.

Prior art in this field has met with little success in combating the problems involved in the transportation of a plurality of explosive units within a closed container. The foremost among these problems is that of sympathetic detonation. This problem arises when a premature detonation of one explosive unit triggers the explosion of other units within the same package, thus giving rise to the possibility of a disaster.

Methods utilized in the prior art have included the use of layers of molded polystyrene having cavities within which the explosive units are set. Extensive testing has shown this method to be of no value in the prevention of sympathetic detonations.

Another attempted method of shock isolation appears in the Shotgun Shell Box patent of W. R. Sauey, U. S. Pat. No. 2,928,530 (1960). This patent, like the polystyrene method, utilizes cavities or depressions to house the explosive units. This method, like the above polystyrene layers, has proven inadequate for shock insulation.

The use of relatively thin sheet-like separators as a packaging method is illustrated in the patent of R. H. Bode, et al., U. S. Pat. No. 2,750,028 (1956). This method also suffers from the inadequacies inherent in the above prior art methods.

SUMMARY OF THE INVENTION

An object of the present invention is to mutually isolate explosive units stored within a single package so as to prevent sympathetic detonation of the respective units.

Another object is to provide a means for shipping a plurality of explosive units within a single container without danger of sympathetic detonation.

The present invention, which surmounts the above described shortcomings in the prior art, resides in a container comprising: a plurality of hollow means for slidably supporting said explosive units and limiting the radial component of explosive propagations from said explosive units; a box, said box having set therein said plurality of hollow support means with said explosive units slidably set within said support means, said explosive units all positioned within each support means with their major axes both (a) mutually parallel and (b) parallel to the longitudinal axes of said support means; and a releasable means carried by portions of two opposite walls of said box, said walls proximate the ends of said hollow support means, said releasable means lying transverse to the direction of propagation of a premature explosion, of any of said explosive units wherein said releasable means, operating with said hollow support means, permit a rapid longitudinal release of explosive gases generated upon a premature detonation and wherein said hollow supporting means isolate adjacent explosive units from a residual shock wave that would otherwise trigger sympathetic detonations.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric perspective view of a prior art shipping container.

FIG. 2 is an isometric perspective view of an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The prior art in this field is characterized by shipping containers such as the one illustrated in FIG. 1. This type of container exhibits two polystyrene blocks 10 and 12 within which are molded a plurality of cavities 14. Each cavity is molded to permit the slidable insertion of a plurality of explosive units 16. The molded top block 10 fits over the bottom block 12.

This design suffers from the fact that in the event of a premature explosion of one unit, the resultant explosive gases and flames do not have adequate channels of escape. Hence, pressure rapidly builds up which will trigger the sympathetic detonation of other units in the container.

The present novel packaging device surmounts this problem by employing a procedure wherein an explosive unit 18 (see FIG. 2) is slidably set within a support means 20, said support means preferably taking the form of a cylinder. This housing serves to direct the explosive force of a premature detonation along a longitudinal axis. Each explosive unit is snugly set within a cylinder. This is required in order to avoid a build-up of explosive gases in the radial direction. The avoidance of such a build-up, which would normally occur upon a premature detonation, enables the explosive forces to be largely isolated to their longitudinal components. Through the diminution of the radial component of a detonation and the cylindrical protection of adjacent explosive units from this reduced radial component, it is possible to store a plurality of such units in adjacent cylinders within a single package 22 without fear of sympathetic detonation.

Various types of shock absorbing material may be placed between adjacent cylinders. These shock absorbing materials include polyethylene, polystyrene and fiberglass.

The housing tubes themselves may be formed of any of a number of materials including chipboard, composition board, multi-layers of Kraftpaper, and any of a number of toughened plastics.

The housing tubes would ordinarily range in thickness from one-quarter inch to one-half inch, with the greater thickness being required for use with materials of a higher explosive nature. The one-quarter inch width would be suitable to the housing of about 25 grams of an explosive such as tetryl.

As pointed out above, the snug fit possible of each explosive unit within each housing tube is essential. This is required not only for purposes of channeling any premature blast into a longitudinal direction, but also to minimize vibration and possible damage to the units during shipment.

The above-described method requires that the housing cylinders be enclosed in a package 22 in which two sides 24 and 26 (hidden from view) are proximate to the open ends of the housing cylinders. These two sides readily blow out upon the occurrence of a premature detonation. Packaging with two releasable or frangible sides proximate to the cylinder ends is essential in order to prevent the built-up of explosive gases that might
otherwise trigger a radial or horizontal propagation of the explosive shock wave, hence causing sympathetic detonation.

Any of a variety of frangible packaging means are suitable. A simple wooden or plastic box with circular areas 28 on two sides of the box, said areas partially punched out so as to be readily blown out by an explosion, constitute a suitable frangible packaging means. The circular areas 28 must of course be aligned with the open ends of the cylinders.

Also, in order to absorb a part of the explosive force of a premature detonation, shock absorption material such as polyethylene, polystyrene or fiberglass may be loosely stuffed into the housing tubes above and below the explosive unit.

In packaging the housing cylinders 20 within the shipping container 22, a firm fit of the cylinders is necessary. This is necessary both to minimize shaking of the cylinders during transit and to insure a flush fit of the mouths of the cylinders against the two frangible walls of the shipping compartment.

The above method has been used to ship explosive items such as fuzes for artillery rockets. Extensive testing has clearly demonstrated the effectiveness of the "tube method" as a means of preventing sympathetic detonations.

It is felt that various shipping compartments holding from about six to about 16 explosive units will be utilized.

Hence, it is seen that an effective means of minimizing radial propagation of an explosive shock wave is obtained. It is therein seen that the objects set forth above are among those made apparent from, and efficiently attained by, the container of the preceding description.

I wish it to be understood that I do not desire to be limited to the exact method and detail of construction described for obvious modifications will occur to persons skilled in the art.

Having described my invention, what I claim as new, useful and non-obvious, and thus desire to secure by Letters Patent of the United States is:

1. A container having a plurality of explosive units therein said container comprising
   A. a plurality of hollow housing cylinders for slidably supporting said explosive units and limiting the radial component of explosive propagations from said explosive units;
   B. a hollow box having parallel side walls and parallel top and bottom wall, said box having set therein said plurality of hollow cylinders with one of said explosive units slidably set within each of said cylinders and with the outer walls of said cylinders snugly engaging each other and said side walls, to prevent lateral movement of said cylinders in said box, said explosive units all positioned within said cylinders with their major axes both (i) mutually parallel and (ii) parallel to the longitudinal axes of cylinders; said cylinders being coextensive with said side walls and having their open ends in contact with said top and bottom walls, to isolate the interiors of said cylinders from each other,
   C. releasable means comprising a plurality of pairs of separate frangible partially punched out circular areas forming portions of said top and bottom walls of said box, each pair of said frangible areas being aligned with the open ends of one of said cylinders; and
   D. shock absorption material being loosely placed in said housing cylinders above and below each explosive unit;

wherein said frangible means, operating with said housing cylinders, permit a rapid longitudinal release of explosive gases generated upon a premature detonation of an explosive unit and wherein said housing cylinders isolate adjacent explosive units from a residual shock wave that would otherwise trigger sympathetic detonations.

2. The container of claim 1 wherein the peripheral surfaces of said explosive units abut the inner walls of said housing cylinders.

3. The container of claim 1 wherein shock absorption material is packed between adjacent housing cylinders.

4. The container as recited in claim 3 wherein the plurality of explosive units comprise artillery shells having their longitudinal axes axially centered within said plurality of housing cylinders.

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