

PROTECTED ENCLOSURE
FIELD OF THE INVENTION

The present invention relates generally to shelters for protection against blasts
5 and explosions and particularly to converting a non-protected shelter to a shelter protected
against blasts, explosions and chemical/biological warfare.

BACKGROUND OF THE INVENTION

Various types of blast protective sheltered rooms are known in the art. In
general these shelters are specially designed and constructed to meet requirements imposed by
10 local or government building codes. Generally in accordance with these building codes, the
rooms normally inhabited by the occupants, such as the living room, dining room, kitchen, play
room, etc. are not required to be blast protective, but rather a separate room is dedicated to
the purpose of providing the requisite blast protection. This sheltered room generally has a
massive construction quite different from the other rooms of the building.

15 Recent trends in the field of protective window design have been toward the
design of protective windows that on the one hand are capable of withstanding conventional
bomb attack as well as chemical and biological attack, and on the other hand function as
normal windows in daily use so as to enable conversion of shelter rooms located in private
domains into regular rooms.

20 Rooms of private domains can be converted into a protected room with heavy-
duty building materials and techniques, such as concrete castings. However, it is not known to
use thin, dry, simple building materials to convert the entire regular room of private domains
into a protected room that meets the standards set by building codes for protected shelters.
Thus, there is a need for a simple and relatively inexpensive technique for converting a regular,
25 i.e., non-protected, room into a protected room while not encroaching upon the available
volume of the room so as to maintain the room as a comfortable and enjoyable place for
everyday living.

SUMMARY OF THE INVENTION

The present invention seeks to provide apparatus and methods for converting a
30 regular, non-protected room into a shelter protected against blasts, explosions and
chemical/biological warfare and the like. The sheltered room of the present invention is
protected while at the same time comfortable and enjoyable for everyday living.

9902140-4

07 MAY 1999

The sheltered room of the present invention comprises a protective inner shell constructed inside the confines of an existing, non-protected room. The inner shell is not attached directly to the walls of the room, but rather is separated a small distance from the internal surfaces of the walls of the room. The protective shell is basically anchored to the floor and ceiling, but may also be anchored at some points to the walls of the room. The protective shell has cutouts formed therein which provide access to blast protective doors and windows with which the room itself is equipped. The sheltered room is preferably equipped with a filtration system for filtering any outside air entering therein, thereby to protect against contaminants. Additionally, the room may include pressurized air apparatus for increasing the internal pressure of the room, thereby to prevent ingress therein of lethal gases.

The skeletal walls of the room or building, which are the outer shell, serve as sacrificial walls. This means that in the event of an explosive blast, the outer shell is destroyed and thereby absorbs the brunt of the tremendous pressure exerted by the blast. In the space between the outer shell and the inner shell, there is a very large drop in pressure, such that the inner shell is exposed to a relatively low pressure. This permits building the inner shell of thin materials, such as 1 mm thick sheet metal.

It is noted that throughout the specification and the claims, a non-protected room is defined as a room which does not meet the standards of applicable building codes for protecting occupants of the room from any or all of the effects of explosive blasts and warfare substances such as chemical and biological agents. Conversely, a protected room is defined as a room which does meet the standards of applicable building codes for protecting occupants of the room from any or all of the effects of explosive blasts and warfare substances such as chemical and biological agents.

It is noted that throughout the specification and claims the terms room and enclosure are used interchangeably.

There is thus provided in accordance with a preferred embodiment of the present invention a protected enclosure including a protective inner shell constructed inside an existing, non-protected room, the inner shell being separated a distance from internal surfaces of walls of the room, the inner shell being anchored to at least one of a floor and a ceiling of the room, wherein the inner shell is constructed in accordance with requirements of an applicable building code for protecting occupants of the room from effects of at least one of explosive blasts and warfare substances.

In accordance with a preferred embodiment of the present invention the inner shell is also anchored to one of the walls of the room.

Further in accordance with a preferred embodiment of the present invention the inner shell has cutouts formed therein which provide access to a user-actuated access element, such as a door, a window, or window curtain cords, with which the room itself is equipped. One of the cutouts may have a blast protective window installed therein.

Still further in accordance with a preferred embodiment of the present invention a filtration system is provided for filtering any outside air entering into the enclosure.

Additionally in accordance with a preferred embodiment of the present invention pressurized air apparatus is provided for increasing an internal pressure of the enclosure.

In accordance with a preferred embodiment of the present invention the inner shell is pre-manufactured with a decorative covering.

Further in accordance with a preferred embodiment of the present invention any fasteners used to attach the inner shell are substantially sealed against ingress therethrough of warfare substances.

Still further in accordance with a preferred embodiment of the present invention at least one electrical outlet is provided which is substantially sealed against ingress therethrough of warfare substances.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be understood and appreciated more fully from the following detailed description, taken in conjunction with the drawings in which:

Fig. 1 is a simplified pictorial illustration of part of a protected enclosure constructed and operative in accordance with a preferred embodiment of the present invention;

Fig. 2 is a simplified sectional, elevational illustration of the protected enclosure of Fig. 1, taken along lines II-II in Fig. 1; and

Fig. 3 is a simplified sectional, top-view illustration of the protected enclosure of Fig. 1, taken along lines III-III in Fig. 1.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Reference is now made to Figs. 1-3 which illustrate a protected enclosure constructed and operative in accordance with a preferred embodiment of the present invention.

Protected enclosure 10 preferably includes a protective inner shell 12 constructed of a material flexible enough to withstand and absorb the energy of explosive

blasts as defined in the applicable building codes, and as such has sufficient structural integrity to prevent flying debris from penetrating shell 12 and causing possible harm to the occupants of enclosure 10. Suitable materials for shell 12 include sheet metal and polyurethane sheet, for example. Inner shell 12 is installed inside the confines of an existing, non-protected room 14.

5 Inner shell 12 preferably is not attached directly to walls 16 of room 14, but rather is separated a small distance from the internal surfaces of walls 16. One preferred method of installing inner shell 12 includes anchoring metal structural bars 18, such as by means of bolts or molly bolts 19, to a floor 20 and/or a ceiling 22, and firmly attaching inner shell 12 to structural bars 18, such as by means of screws or bolts with large-size washers to
10 provide high bearing strength against explosive forces. In addition to attachment to the floor or ceiling, inner shell 12 may also be anchored via the structural bars 18 to some points along walls 16, such as at a concrete structural member 24 (Fig. 2) usually located above a window in room 14. Preferably a sealant such as RTV is used to seal critical points where lethal gases could possibly seep in, such as at all attachment points and mechanical fasteners.

15 Inner shell 12 preferably encompasses all of the inner perimeter of room 14, but in certain circumstances, it may be sufficient to place inner shell 12 opposite only some of walls 16 of room 14.

 Inner shell 12 preferably has one or more cutouts 28 formed therein which provide access to various user-actuated access elements, such as a door 30 (preferably a blast
20 protective door), a window 32, window curtain cords 34 and the like, with which room 14 itself is equipped. Any or all of these cutouts 28 may be provided with a removable sealing plug 36 (Fig. 1), which seals the particular cutout 28 against ingress of chemical/biological contaminants.

 As seen in Fig. 2, a cutout 29, opposite window 32, is fitted with a blast
25 protective window 31. Blast protective window 31 is designed to withstand and absorb the energy of explosive blasts as defined in the applicable building codes. A protective board 37, constructed from a material such as PVC, may optionally be placed between regular window 32 and blast protective window 31. As mentioned above, the walls of room 14 or the building in which room 14 is located, which are the outer shell, serve as sacrificial walls. This means
30 that in the event of an explosive blast, the outer shell is destroyed and thereby absorbs the brunt of the tremendous pressure exerted by the blast. In the space between the outer shell and the inner shell, there is a very large drop in pressure, such that the inner shell is exposed to a relatively low pressure. This permits building the inner shell of thin materials, such as 1 mm

thick sheet metal. The protective board 37 serves as an additional sacrificial board in the space between windows 31 and 32. A shutter 33 may be provided on the outside of regular window 32. Similarly, a cutout for a door may be provided with a blast protective door.

5 Inner shell 12 is preferably provided with one or more electrical outlets 38 which are in electrical communication with the electrical mains supply to room 14. Outlets 38 are preferably sealed, such as by means of epoxy sealant or RTV, against ingress of chemical/biological contaminants.

10 Inner shell 12 may comprise any number of panels 40 and may be of modular design, if desired. Inner shell 12 may be pre-manufactured with a decorative covering 42 of any suitable material such as decorative wood panels, gypsum panels or PVC covering.

The now-sheltered room 14 is preferably equipped with a filtration system 44 for filtering any outside air entering therein, thereby to protect against contaminants. Additionally, room 14 may include pressurized air apparatus 46, such as a tank and/or compressor, for increasing the internal pressure of room 14, thereby to prevent ingress therein
15 of lethal gases. If filtration system 44 and/or pressurized air apparatus 46 are electrically powered, then preferably they can be powered by alternative means as well, such as human power (pedaled machines), in the event of electrical power outages.

20 It will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and described hereinabove. Rather the scope of the present invention includes both combinations and subcombinations of the features described hereinabove as well as modifications and variations thereof which would occur to a person of skill in the art upon reading the foregoing description and which are not in the prior art.



CLAIMS

What is claimed is:

1. A protected enclosure (10) comprising:
a protective inner shell (12) constructed inside an existing, non-protected room
5 (14), said inner shell (12) being separated a distance from internal surfaces of walls (16) of said
room (14), said inner shell (12) being anchored to at least one of a floor (20) and a ceiling (22)
of said room (14), wherein said inner shell (12) is constructed in accordance with requirements
of an applicable building code for protecting occupants of the room (14) from effects of at
least one of explosive blasts and warfare substances.
- 10 2. The protected enclosure (10) according to claim 1 wherein said inner shell (12)
is also anchored to one of said walls (16) of said room (14).
3. The protected enclosure (10) according to claim 1 or claim 2 wherein said inner
shell (12) has a cutout (28, 29) formed therein which provides access to a user-actuated access
element with which said room (14) itself is equipped.
- 15 4. The protected enclosure (10) according to claim 1 or claim 2 wherein said inner
shell (12) has a cutout (28) formed therein which provides access to at least one of a door
(30), a window (32), and window curtain cords (34) with which said room (14) itself is
equipped.
5. The protected enclosure (10) according to claim 3 or claim 4 wherein said
20 cutout (29) has a blast protective window (31) installed therein.
6. The protected enclosure (10) according to claim 1 and further comprising a
filtration system (44) for filtering any outside air entering into said enclosure (10).
7. The protected enclosure (10) according to claim 1 and further comprising
pressurized air apparatus (46) for increasing an internal pressure of said enclosure (10).
- 25 8. The protected enclosure (10) according to claim 1 wherein said inner shell (12)
is pre-manufactured with a decorative covering (42).
9. The protected enclosure (10) according to claim 1 wherein any fasteners used
to attach said inner shell (12) are substantially sealed against ingress therethrough of warfare
substances.
- 30 10. The protected enclosure (10) according to claim 1 and further comprising at
least one electrical outlet (38) which is substantially sealed against ingress therethrough of
warfare substances.