PORTABLE SEVER WEATHER SHELTER

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ABSTRACT

A portable severe weather shelter for use in connecting to an existing housing structure supported by a ground surface is disclosed. The portable severe weather shelter comprises a shell, a connector and an anchor. The shell defines an interior cavity and an entrance opening in communication with the cavity, the cavity sized and oriented to temporarily accept at least one adult substantially surrounded by the shell. The connector has a release portion and is adapted to connect the shell to the housing structure wherein the release portion is configured to tear under a severe weather event to separate the shell from the housing structure. The anchor device adapted to removably secure the shell to the ground surface.
PORTABLE SEVER WEATHER SHELTER

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to U.S. Provisional Patent Application No. 61/497,139, filed Jun. 15, 2011, which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present invention relates generally to portable shelters for use in severe weather conditions.

BACKGROUND

[0003] Almost everyday in some place of the country, news of severe weather striking a town or residential development is published. Often, non-permanent housing structures, for example mobile homes, are severely damaged and individuals are injured when tornados, hurricanes or other forms of severe weather hit. Equally in more permanent housing structures, structures without an underground basement or cellar leave few areas to take cover and remain protected from severe weather events.

[0004] There is a need for a portable severe weather shelter that is easily and securely installed with respect to mobile home structures and other housing structures without a basement to afford protection during severe weather events.

BRIEF SUMMARY

[0005] An inventive severe weather shelter is disclosed for use by humans to quickly and easily take cover during a severe weather event. In one example, the shelter is retrofitted to an existing housing structure, for example a mobile home or a house with a crawl space which is easily accessible from inside the housing structure. The shelter is secured to the ground between the interior floor of the housing structure and typically a concrete slab or other rigid secure ground surface. The shelter includes a connecting having a release portion which provides dual functions of expanding or contracting to ease installation, but also serves as a tear-away safety or release function to sever the shelter’s connection to the housing structure. In the event of a severe weather event, one or more occupants of the housing structure can enter and position themselves inside the shelter from inside the housing structure or residence. In the event that the housing structure is separated from its foundation or moorings, the release portion severs to disconnect the shelter from the structure leaving the shelter safely secured in its original installation position on the ground surface.

[0006] In one aspect, a portable severe weather shelter for use in connecting to an existing housing structure supported by a ground surface comprises a shell, a connector and an anchor. The shell defines an interior cavity and an entrance opening in communication with the cavity, the cavity sized and oriented to temporarily accept at least one adult substantially surrounded by the shell. The connector has a release portion and is adapted to connect the shell to the housing structure wherein the release portion is configured to tear under a severe weather event to separate the shell from the housing structure. The anchor device adapted to removably secure the shell to the ground surface.

[0007] In another aspect, method of using a portable severe weather shelter with a housing structure comprising the steps of: positioning a severe weather shelter shell defining an interior cavity and having an entrance opening in communication with the cavity in proximity with a housing structure having an shelter entrance opening; aligning the housing structure shelter entrance opening with the shell entrance opening; and communicatively coupling the housing structure to the cavity by connecting a connector defining a tunnel between the housing structure shelter entrance opening and the shell entrance opening, the connector having a release portion capable of tearing away under severe weather conditions to disconnect the shell from the housing structure.

[0008] These and other aspects will be described in additional detail below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The description herein makes reference to the accompanying drawings wherein like reference numerals refer to like parts throughout the several views, and wherein:

[0010] FIG. 1 is an exploded view of one example of the inventive shelter showing a connector with release and a sleeve;

[0011] FIG. 2 is a side elevational view of the example of the inventive shelter shown in FIG. 1 connected to a housing structure;

[0012] FIG. 3 is an exploded view showing one example of a shroud for circumscribing the example of the inventive shelter shown in FIG. 1; and

[0013] FIG. 4 is a perspective view showing the example of the shroud disposed the example of the inventive shelter shown in FIG. 1.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0014] Referring to FIGS. 1-3, an example of an apparatus and method of use for a portable severe weather shelter is illustrated. As further described below, the shelter is of particularly useful when used with existing mobile homes as well as more permanent housing structures without a basement or cellar. The invention has other advantageous uses and applications known by those skilled in the art.

[0015] Referring to FIGS. 1 and 2, an example of a severe weather shelter 10 having a base 30 is shown in use with an exemplary connector 36 and a sleeve 40 attaching the shelter to the floor 18 of a housing structure 16. In the preferred example, base 30 includes a shell enclosure 50 having head 54, body 56 and toe box 58 portions defining an interior cavity 60 as best seen in FIG. 1. As shown, shell 50 is generally shaped in proportion to a human adult torso and suitable for short periods of time while a severe weather event, for example a severe thunderstorm, tornado warning, hurricane or other event blows over. Although different sizes and shapes may be used, shell 50 and interior cavity 60 are sized to fit at least one full size adult in a generally lying down position with the head and shoulders toward the head portion 54 and feet toward the toe box 58. In alternate examples, shell and cavity 60 could be sized to fit two adults. In other larger examples, more than two adults could be positioned in shelter 10.

[0016] As best seen in FIG. 1, in the example shown, shell head 54 includes a riser flange 64 generally extending vertically from the shell head 54. The riser flange 64 is annular and has a periphery 66 defining a shell entrance opening 70 in communication with interior cavity 60. For reasons explained below, in the preferred example shown, the periphery 66 is
square having dimensions of approximately 30 inches wide by 30 inches across. In one example, shell 50 further includes a door 72 that closes off or substantially closes entrance opening 70 to prevent water or other flying debris to enter cavity 60. When the shelter is not in use, door 70 may be used to keep out dust, insects and other objects from entering shell 50.

In the example, shell 50 further includes a bottom surface 74 having a generally planar portion in the shell body 56 and a curved or radialised portion 80 transitioning upward toward flange 64 as generally shown. On the opposite end toward toe box 58, bottom surface 74 includes an angled portion 84. Opposite the bottom surface, shell 50 includes an upper surface 90 in the shell body area, a rise 96 and a toe box upper panel 100 leading to an end 104 connecting to angled portion 84. In a preferred example, shell 50 forms an uninterrupted, water and air tight enclosure with the exception of entrance opening 70. In alternate examples, there may be perforations (not shown) through the shell into the cavity 60 for ventilation. These perforations may include screens or other barriers to keep insects and larger debris out of the interior cavity.

Door 72 may include a water tight or other seal to close off entrance opening 70 to further protect against the elements. Alternate door examples may include a strong and rigid or flexible mesh or grid preserving ventilation while keeping large debris from entering cavity 60. Other door and shell shapes and orientations known by those skilled in the art may be used. It is contemplated that door 70 may be connected to flange 64 with a hinge or other mechanical fasteners or connectors which provide a secure connection while being quickly and easily operated in the event of an emergency such as a tornado that strikes with little warning.

In a preferred example, shell 50 is made from a polymer material that is strong, impact resistant and lightweight allowing an average person to lift and manipulate shell 50 for installation to a housing structure 16 by one person. Suitable polymers may include polyethylene, polypropylene and other polymers known by those skilled in the art. Reinforced composite materials such as fiberglass, carbon fiber, elastomers, thin gauge ferrous and non-ferrous metals and other materials may also be used. In a preferred example, shell 50 is a polymer that is molded or sprayed forming a one-piece, continuous, unit shell structure as described above. Shell 50 may in alternate examples be made from multiple pieces secured together by mechanical or other means suitable for the base material used.

In the example illustrated, shell 50 is used with an exemplary connector 36. In the example, connector 36 includes an upper skirt 110 having a perimeter 112, a lower skirt 116 having a perimeter 118 and a shelter release portion 120 positioned between and connected to each skirt. The respective perimeters 112 and 118 form a through tunnel 114. When installed as illustrated and generally described below, tunnel 114 is in communication with shell internal cavity 60 allowing a person to quickly pass through tunnel 114 and into cavity 60.

In the example, connector upper 110 and lower 116 skirts are fairly rigid and may be made from the same or similar materials as shell 50 noted above. Lower skirt 116 is sized for alignment with and connection to the riser flange 64 such that tunnel 114 is communicatively coupled with shell internal cavity 60. As best seen in the example in FIG. 2, lower skirt perimeter 118 is sized to slightly fit over the outside of shell head periphery 66 and secured with mechanical fasteners (not shown). A seal (not shown) may be used to close any gaps to keep moisture, debris and insects from entering the tunnel 114 or shell cavity 60.

In the example connector 36, the release portion 120 is a flexible, accordion-style bellows 126 type device allowing the release portion to relatively easily expand and contract thereby increasing or decreasing the length of connector 36 to accommodate the specific application where the shelter 10 is to be installed. The release portion would further allow some flexibility and adjustment in a transverse direction for misalignment of the respective openings. In the example, bellows 126 is made from a light to medium weight textile fabric or mesh that is coated with a polymer or weather resistant coating (not shown) to keep out moisture and the elements from entering tunnel 114 and shell cavity 60. As explained below, the release portion 120 is designed to be capable of tearing under substantial force to allow separation of the upper skirt 110 connected to the housing structure and the lower skirt 116 connected to the shelter 50. One example of a suitable material is marketed under the tradename Duro-Dyne. Other materials and constructions having the noted characteristics known by those skilled in the art may be used.

In the example shown in FIG. 2, shelter 10 includes an exemplary sleeve 40 which is used to attach the connector 36 and base 50 to a housing structure 16, typically a floor structure 18. In the example, a typical application for shelter 50 is mobile home having a floor 16 and an exterior surface or skin 22 separated by floor joists 24 as generally illustrated. The exemplary sleeve for includes a flange 140 defining an upper surface 144 defining a through opening 150 to be positioned in communication with tunnel 114 and interior cavity 60.

In a typical but not exclusive application, where occupants of a mobile home desire to have a severe whether shelter 10, a skilled carpenter or tradesman would cut a through opening or entrance 166 in the floor 16 and the outer skin 22 in a location where convenient to quickly access and enter shelter 10 when severe weather strikes. With a preferred 30 inch by 30 inch opening, removal of a portion of one stud typically positioned on 16 inch centers would be required along with the removal of any insulation. In such an exemplary installation, sleeve 40 is easily positioned under opening 150 with an upper surface 144 in abutting contact with the underside of the floor 18 and between the remaining adjacent floor joists and with a lower portion 146 extending below the floor joists. Sleeve 40 is then secured to the joists 24 using mechanical fasteners (not shown). Depending on the application and surrounding housing structure, brackets, connectors, seals and other common securing and sealing devices (all not shown) may be used to provide a secure connection between sleeve 40 and the housing structure floor 18 thereby environmentally sealing the sleeve 40 to the housing structure.

Exemplary sleeve 40 is generally shown as a square ring. Other polygonal and circular shapes, configurations and constructions known by those skilled in the field may be used. Sleeve 40 may be made from the same materials as shell 50, with light gauge sheet steel or aluminum being preferred. Other placements, orientations and methods of securing sleeve 40 to housing structure 16 known by those skilled in the art may be used.

In the example described above wherein an access opening 150 is cut into an existing mobile home floor 18, a sturdy access door 170 may be installed providing a continu-
ous floor surface and easy actuation to access the shelter 10 in the case of severe weather. Other access schemes known by those skilled in the art may be used.

In the example described and illustrated, it has been shown that the general configuration for shell 50 being approximately 72 inches in length, slightly below 30 inches wide and 24 inches in total height, and having the head, 54, body 56 and toe box 58 portions shaped and angularly oriented as generally illustrated, the 30 inch by 30 inch opening in the floor 18 is sufficient to manipulate and orient shell 50 through the floor opening 166 to position the shell in the space between the housing structure outer skin 22 and the ground surface 20 as generally shown in FIG. 2. The method steps for connecting the shell 50 to the housing structure 16 are conducted sequentially as generally described above. Other orders for the steps, for example, connecting the sleeve 40 first and then the connector 36 last may also be used.

Referring to the example in FIGS. 1 and 2, an anchor device 180 is used to rigidly secure the shelter shell 50 to a ground surface 20, preferably an existing cement slab or pad often used under existing homes and mobile homes as a foundation. In the example, anchor 180 includes two independent straps 186 which are positioned around selected portions of the outside of shell 50 and extend toward the ground surface 20. Mounting plates 190 are formed in the straps 186 or connected thereto to provide a mounting surface generally parallel to the ground surface 20. One or more anchor bolts 196 is used for each mounting plate 190 to rigidly secure the strap around the shell and to the ground surface 20. Where the ground surface is concrete, heavy duty anchor bolts are secured in pilot holes (not shown) drilled into the concrete. Suitable examples of anchor bolts 196 manufactured under the brand name Hilti. Other fasteners, such as lag bolts with lead anchors, as well as other fasteners known by those skilled in the art may be used. Where no concrete slab is available, other fastening methods and devices suitable for the particular application known by those skilled in the art may be used. Although described as illustrated as two straps 186, more or less straps may be used as well as other anchoring devices and methods known by those skilled in the art. For example structural members (not shown) and mounting plates (not shown) could be integrally manufactured or molded into shell 50 negating the need for straps 186.

As noted, the shelter 10 and shell 50 are designed of strong lightweight materials and is configured and constructed to be easily transported and installed by an average person in an existing housing structure with minimal effort. Further, the shelter 10 can be removed and relocated to another housing structure should the owner move or it is desirable to transport the shelter 10 to a different location.

In operation, on the onset of severe weather, at least one resident can seek shelter in shelter 10 through door 170. The individual would pass through entrance 166, tunnel 114 and enter shell cavity 60 through entrance opening 70. The individual would then manipulate him/herself to a generally lying down position in cavity 60. Optionally, shelf door 72 would be positioned and/or closed to at least prevent large debris from entering the shell.

In the event that severe weather, for example a tornado strikes, and the housing structure 16 is dislodged from its moorings, rolled over or blown away, connector release portion 20, being made from a flexible textile material, would tear away allowing the sleeve 40 and upper portion of the bellows 120 to travel with the dislodged housing structure leaving the shell 50 and occupant(s) safe and secure in the shell 50 rigidly connected to the ground surface 20 as generally described above. Other release mechanisms allowing emergency detachment of shell 50 from the housing structure 16 known by those skilled in the art may be used.

In the event that the owner changes residences or the shelter 10 needs to be removed, the described and illustrated construction and features render the shelter 10 easily removed and transported for installation at a new location in a similar manner as described.

Additional features can be included to supplement the protection afforded by the shelter 10 while severe weather blows over. Referring to FIGS. 3 and 4, an example shroud 200 is shown generally disposed about the shell 50. Shroud 200 defines a chamber 202 sized for housing shell 50, and is composed of one or more panels disposed about shell 50 and collectively provided to deflect any debris that may be directed towards shell 50 during exposure to a severe weather event.

The example shroud 200 is generally configured as a square frustum formed from complementary mating side panels 204 and 206 and end panels 208 and 210. An exemplary side panel 202 has a planar main body 212 that is generally shaped as a trapezoid. Side panel 204 has an upper lip 214 extending from an upper distal edge of the main body 212. A lower lip 216 extends from a lower distal edge of the main body 212 opposite the upper distal edge. Main body 212 is configured to be operatively oriented with respect to shell 50 such that main body 212 extends from the ground surface 20 at an angle towards shell 50 to deflect any debris directed towards shell 50 up and over shell 50. The upper lip 214 and the lower lip 216 are each angled with respect to the main body 212, such that the lower lip 216 rests on the ground surface 20 to serve as a foundation for the main body 212, and the upper lip 214 extends from an upper distal edge of the main body 212 to resist against riser flange 64.

The side panel 206 and end panels 208 and 210 are generally configured similarly to side panel 204. As shown in FIG. 4, main body 212 of side panel 204, a planar main body 218 of side panel 206, a planar main body 220 of end panel 208 and a planar main body 222 of end panel 210 are operatively oriented with respect to shell 50 to form a generally continuous shroud 200 defining chamber 202 sized for housing shell 50. The side panel 206 is a substantial mirror image of side panel 204, with an upper lip 224 extending from an upper distal edge of the main body 218 and a lower lip 226 extending from a lower distal edge of the main body 218 opposite the upper distal edge. The end panel 208 includes an upper lip 228 extending from an upper distal edge of the main body 220 and a lower lip 230 extending from a lower distal edge of the main body 220 opposite the upper distal edge. Similarly, end panel 210 includes an upper lip 232 extending from an upper distal edge of the main body 222 and a lower lip 234 extending from a lower distal edge of the main body 222 opposite the upper distal edge.

It will be understood that each of the described and illustrated main bodies is geometrically defined to include edges mateable to respective edges of adjacent main bodies to form a continuous shroud 200. The panels 204, 206, 208 and 210 can be interconnected using any mechanical fasteners or connectors known by those skilled in the art. In the example, panels 204, 206, 208 and 210 are rigid and may be made from the same or similar strong lightweight materials as shell 50 noted above. Although the example shroud 200 is shown as
composed of a plurality of connected planar panels together forming a square frustum, other examples could be alternatively constructed or shaped. [0037] Once positioned about shell 50, shroud 200 can be attached to the ground surface 20 and/or shell 50. As shown, the lower lips 216, 234, 226 and 230 of respective adjacent panels rest flush with the ground surface 20 in a square pattern around shell 50. The lower lips 216, 234, 226 and 230 can generally be attached to the ground surface in a similar fashion as that described above with respect to anchor device 180. Portions of upper lips 214, 232, 224 and 228 resting against riser flange 64 can be attached thereto using any mechanical fasteners or connectors known by those skilled in the art. [0038] The example shell 50 has the general configuration of being approximately 72 inches in length, slightly below 30 inches wide and 24 inches in total height, with riser flange 64 extending approximately 6 inches therefrom. [0039] The side panel 204 has a length at an upper distal corresponding to the length of shell 50, that is, approximately 72 inches in length. At a lower distal edge, side panel 204 is approximately 90 inches in length, such that a trapezoidal main body 212 is formed suitable for angling towards shell 50 to form one side of shroud 200. In an operative orientation with respect to shell 50, side panel 204 is sized such that main body 212 reaches a height of approximately 24 inches. Each of the upper lip 214 and lower lip 216 extend outward from main body 212 at an angle approximately 2 inches. As described above, side panel 206 is a substantial mirror image of side panel 204, and has similar dimensions. The example shroud 200 can further includes gussets 240 and 242 for reinforcing side panels 204 and 206, respectively, at a midpoint of their length, although other support structures known by those skilled in the art could be used. [0040] The end panel 208 has a length at an upper distal corresponding to the width of shell 50, that is, approximately 30 inches in length. At a lower distal edge, end panel 208 is approximately 48 inches in length, such that a trapezoidal main body 220 is formed suitable for angling towards shell 50 to form one side of shroud 200. In an operative orientation with respect to shell 50, similar to side panels 204 and 206, end panel 208 is sized such that main body 220 reaches a height of approximately 24 inches. Each of the upper lip 228 and lower lip 230 extend outward from main body 220 at an angle approximately 2 inches. End panel 210 is a substantial mirror image of end panel 208, and has similar dimensions. [0041] Like the shelter 10, in the event that the owner changes residences or shroud 200 needs to be removed, the described and illustrated construction and features render the shroud 200 easily removed and transported for installation at a new location in a similar manner as described. [0042] While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not to be limited to the disclosed embodiments but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims, which scope is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures as is permitted under the law. 

What is claimed is:

1. A portable severe weather shelter for use in connecting to an existing housing structure supported by a ground surface, the shelter comprising:

   a. A shroud defining an interior cavity and an entrance opening in communication with the cavity, the cavity sized and oriented to temporarily accept at least one adult substantially surrounded by the shell;
   b. A connector having a release portion, the connector adapted to connect the shell to the housing structure wherein the release portion is configured to tear under a severe weather event to separate the shell from the housing structure; and
   c. An anchor device adapted to removably secure the shell to the ground surface.

2. The portable severe weather shelter of claim 1, further comprising:

   the connector defining a tunnel for communicatively coupling the cavity to the housing structure.

3. The portable severe weather shelter of claim 2, further comprising:

   a. A riser flange extending from the shell to define the entrance opening.

4. The portable severe weather shelter of claim 3, further comprising:

   the connector having the release portion connected between a first and second rigid skirt, the tunnel defined through the first skirt, the release portion and the second skirt;
   a. The first skirt having a perimeter sized for coupling to the housing structure to communicatively couple the tunnel to the housing structure; and
   b. The second skirt having a perimeter sized for connection to the riser flange to communicatively couple the tunnel to the cavity.

5. The portable severe weather shelter of claim 4, further comprising:

   the perimeter of the first skirt sized for connecting to a sleeve connected to and extending downward from one or more flooring joists of the housing structure.

6. The portable severe weather shelter of claim 1, further comprising:

   a. A riser flange extending from the shell to define the entrance opening and having a generally square periphery with dimensions of approximately 30 inches by 30 inches.

7. The portable severe weather shelter of claim 1, wherein the connector is adjustable to permit longitudinal expansion and contraction.

8. The portable severe weather shelter of claim 7, wherein the release portion is a bellows-type device.

9. The portable severe weather shelter of claim 1, further comprising:

   a. A shroud substantially circumscribing the shell, the shroud resting on the ground surface and having an outer surface extending at an angle from the ground surface toward the shell.

10. The portable severe weather shelter of claim 9, further comprising:

    a. The shroud composed of a plurality of panels forming a square frustum having a chamber sized for receiving the shell.

11. The portable severe weather shelter of claim 1, further comprising:

    a. The shell composed of an impact resistant and lightweight polymeric material.

12. A method of using a portable severe weather shelter with a housing structure, the method comprising the steps of:
positioning a severe weather shelter shell defining an interior cavity and having an entrance opening in communication with the cavity in proximity with a housing structure having an shelter entrance opening;
aligning the housing structure shelter entrance opening with the shell entrance opening; and
communicatively coupling the housing structure to the cavity by connecting a connector defining a tunnel between the housing structure shelter entrance opening and the shell entrance opening, the connector having a release portion capable of tearing away under severe weather conditions to disconnect the shell from the housing structure.

13. The method of using a portable severe weather shelter according to claim 12, further comprising:
adjusting a length of the connector by flexing the release portion to span a distance between the housing structure shelter entrance opening and the shell entrance opening.

14. The method of using a portable severe weather shelter according to claim 12, further comprising:
anchoring the shell to the ground surface.

15. The method of using a portable severe weather shelter according to claim 12, wherein the release portion is connected between first and second rigid skirts, further comprising:
securing the second skirt to a riser flange extending from the shell to define the entrance opening;
coupling the first skirt to the housing structure.

16. The method of using a portable severe weather shelter according to claim 15, further comprising:
securing the second skirt to a sleeve connected to and extending downward from one or more joists forming a floor of the housing structure.

17. The method of using a portable severe weather shelter according to claim 12, further comprising:
forming the shelter entrance opening through a floor of the housing structure; and
inserting the shell through shelter entrance opening.

18. The method of using a portable severe weather shelter according to claim 17, further comprising:
positioning the shell to rest on a ground surface in a space between the ground surface and the floor of the housing structure.

19. The portable severe weather shelter of claim 12, further comprising:
positioning a shroud having a chamber sized for receiving the shell on the ground surface about the shell such that the shroud substantially circumscribes the shell and an outer surface of the shroud extends at an angle from the ground surface toward the shell.

20. A portable severe weather shelter for use in connecting to an existing housing structure supported by a ground surface, the shelter comprising:
means for positioning a severe weather shelter shell defining an interior cavity and having an entrance opening in communication with the cavity in proximity with a housing structure having an shelter entrance opening;
means for aligning the housing structure shelter entrance opening with the shell entrance opening; and
means for communicatively coupling the housing structure to the cavity by connecting a connector defining a tunnel between the housing structure shelter entrance opening and the shell entrance opening, the connector having a release portion capable of tearing away under severe weather conditions to disconnect the shell from the housing structure.

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