ABSTRACT
The invention encompasses an entirely automated room extension intended for larger wheeled structures such as a Recreational Vehicle or a semi-trailer that has been modified to form an office or semi-permanent emergency shelter. The extension, having substantially hinged, folding, rigid panels that in the collapsed state are stacked flush forming the exterior surface and with a simple push button will automatically deploy a supporting structure and then automatically expand the panels to form a solid enclosure of usable interior space. A programmable logic controller will activate the extension and contraction of several actuators in such order as to deploy and collapse the enclosure by push button with no manual intervention.
Fig. 8

Base Trailer

Extended Floor Panel

Track with Gearing on one edge

Side wall
MOBILE, EXPANDABLE, INHABITABLE STRUCTURE
CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not Applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable

REFERENCE TO SEQUENCE LISTING, A TABLE, OR A COMPUTER PROGRAM LISTING COMPACT DISC APPENDIX

[0003] Not Applicable

BACKGROUND OF THE INVENTION

[0004] The present invention relates to a mobile, expandable, inhabitable structure that could be utilized in the recreational vehicle industry or serve as medium-term housing for victims of a disaster.

[0005] Recreational vehicles are popular because they provide the owner with many of the comforts they enjoy at home. The most obvious limitation however, is their relatively small size resulting from the width restrictions of a normal road or highway. There have been many variations of slide-out room extensions but none of those provide the increased space benefits of this new invention.

[0006] U.S. Pat. No. 5,800,002 to Tedge increases the size of a recreational vehicle by use of an expandable room. While this invention does expand the usable space, it does not increase it enough to dramatically enhance perceived living space.

[0007] U.S. Pat. No. 6,354,471 to Gyllenhammar describes a system for expanding the interior of a central structure consisting of plural hinged and interconnected panel members movable by means of a hydraulic cylinder, from a flat juxtaposed position within the structure, to an extended unit supported by a support element. The major drawback to this design is it requires manual intervention to deploy the end walls and was intended for “smaller units”. Moreover, the support is a stand-alone piece of equipment and not integral with the structure. Recreational vehicle owners will require a fully automated expansion system with larger panels.

[0008] U.S. 2002/0149220 A1 to Wishart shows a system for increasing the interior space of a mobile vehicle, either retrofitted to an existing structure or manufactured with a new vehicle. The system includes an array of pivotally interconnected panels that in a collapsed state are reduced to a thin flat stack but are expandable to provide a room extension. Again this design requires manual intervention to deploy the end walls. Furthermore, there is no identified support to keep the vehicle stable in the expanded configuration.

BRIEF SUMMARY OF THE INVENTION

[0009] An objective of the present invention is to provide a room extension system intended for use with large wheeled structures such as a recreational vehicle or semi-trailer that is fully automated during the deployment process. This system will also automatically deploy a support/stability device. The unique feature of the system is that it requires no manual intervention for deployment or retraction. The system features a deployable/expandable and retractable structure, the movement of which is controlled by the use of a Programmable Logic Controller (PLC) that coordinates the hydraulic, pneumatic and or electric actuation devices. The system includes an integrated and interconnected array of panels and plural hydraulic, pneumatic and or electric actuators. The actuators transform a series of vertically disposed panels in to a laterally expanded elongated enclosure, attached to and extending from the base vehicle. Because of the geometric configuration of the panels and their respective hinged interconnections, and under the influence of the actuators, the panels pivot upwardly, unfold, extend, and move downwardly as a unit to form the final structure. An extending support structure will position itself prior to the deployment of the panels for support thereof in the unfolded and deployed state.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0010] FIGS. 1-6 are rear views of the structure depicting different stages of the deployment process from the non-expanded to the expanded state. FIG. 7 shows a side view of the end-walls in the non-expanded state. FIG. 8 is a plan view showing the automated deployment process for the end-walls. FIG. 9 is a cross-sectional view showing the actuators in the end wall. FIGS. 10-13 are cross-sectional views showing the deployment of the support structure.

DETAILED DESCRIPTION OF THE INVENTION

[0011] FIG. 1 is a cross-sectional view showing the collapsed state of the base trailer. The panel 1 forms the exterior wall in the collapsed state and will form the roof panel in the expanded state. Panels 2 and 3 are interior in the collapsed state and form the side and floor panels respectively in the expanded state. In the Expanded state panel 4 will pivot to form the end walls of the expansion.

[0012] Deployment to the expanded state, beginning with the support structure, will only require a push of a button on the PLC. FIG. 2 shows the extending support structure 7 that will be further described in FIGS. 10-13. It also shows the beginning of the deployment process, which is accomplished with the use of hydraulic, pneumatic or electric driven actuators 5 and 6. As previously noted, the entire expansion process is automated and would begin with a simple push-button devise.

[0013] FIG. 3 depicts the structure in a further state of expansion. Note that while actuator 6 continues to extend, actuator 5 is just pivoting with panel 3. FIG. 4 illustrates the critical point when panel 1 is at its vertical peak, actuator 6 is fully extended and panels 2 and 3 become linear. It is at this point that actuator 5 begins to exert pressure on panel 3 and actuator 6 starts to retract. This combination of actuators 5 pushing and 6 pulling will slowly lower the expanded unit into a horizontal position as shown in FIGS. 5 and 6.

[0014] After panels 1, 2 and 3 are fully deployed forming the roof, side and floor of the expanded structure, the side wall panels 4 will pivot into place. FIG. 7 portrays a side-view of the base structure with panels 4 in the collapsed position.

[0015] FIG. 8 shows a plan view of the base trailer and panels 1, 2 and 3 in their expanded state. Panel 3 has a semi-circular groove cut in it with gearing on one edge. The left side of the figure shows panel 4 in the collapsed position. The right side of the FIG. 8 depicts panel 4 in its final expanded position.
FIG. 9 illustrates a cross-sectional view of the expanded structure. An electric motor mounted below the base structure will turn a gear 8 connected to the supporting beam inside panel 4. Gear 8 has a chain internal to panel 4, connecting it to gear 9 on the bottom of panel 4. This will allow panel 4 to traverse along the groove in panel 3 until panel 4 is in place.

The extending support structure 7 in FIG. 1 will deploy prior to the expansion of panels 1, 2 and 3. FIG. 10 is a cross-sectional view of the extending support structure showing hydraulic, pneumatic or electric actuators 10, 11 and 12 in the collapsed state. FIG. 11 details actuator 10 in its extended position. FIG. 12 shows actuator 11 contracting to pull the leg into a vertical position while FIG. 13 portrays actuator 12 extending to the ground.

What I claim as my invention is:

1. A mobile, expandable, inhabitable structure having substantially hinged, folding, rigid panels that in the collapsed state are stacked flush forming the exterior surface and with a simple push button will automatically deploy a supporting structure and then automatically expand the panels to form a solid enclosure of usable interior space wherein the extension comprises:
a) rigid floor and roof panels that are connected by hinges to the base structure and the longitudinal wall of the extension and;
b) rigid side walls that are hinged to the base structure that contain chain driven geared devises that automatically pivot the panels outwards to enclose the expanded space and;
c) an actuating rod attached to the base structure and the roof panel that can exert both a lifting and lowering force to deploy and collapse the extension and;
d) an actuating rod attached to the base structure and the floor panel that can exert both a pushing and pulling force to deploy and collapse the extension and;
e) a series of actuating rods that exert both a pushing and pulling force to deploy and collapse a structure that will support the extension and;
f) a programmable logic controller that will activate the actuators extension contraction in such order as to deploy and collapse the expanded enclosure by push button with no manual intervention.

* * * * *