Feb. 2, 1971 K. R. HARTER 3,560,043

EXPANDABLE HOUSE STRUCTURE

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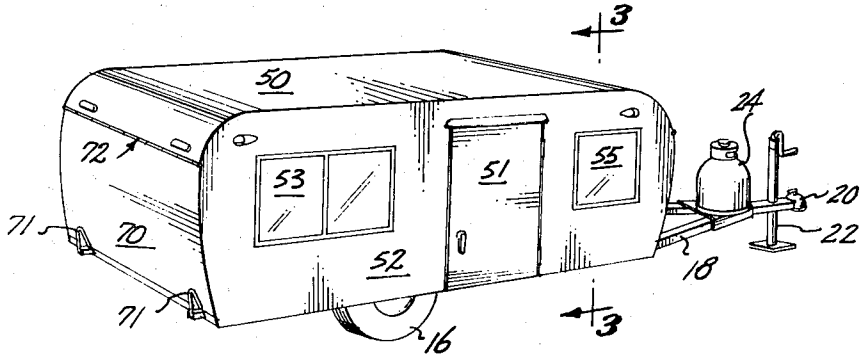
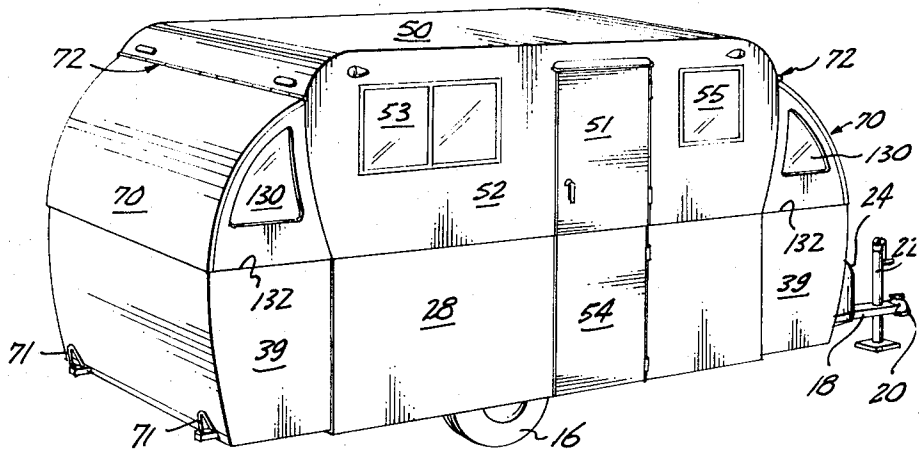


Fig. 1.

Fig. 2.



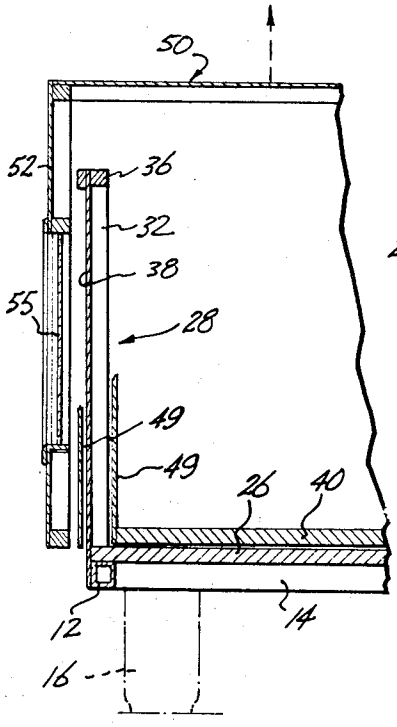


Fig. 3.

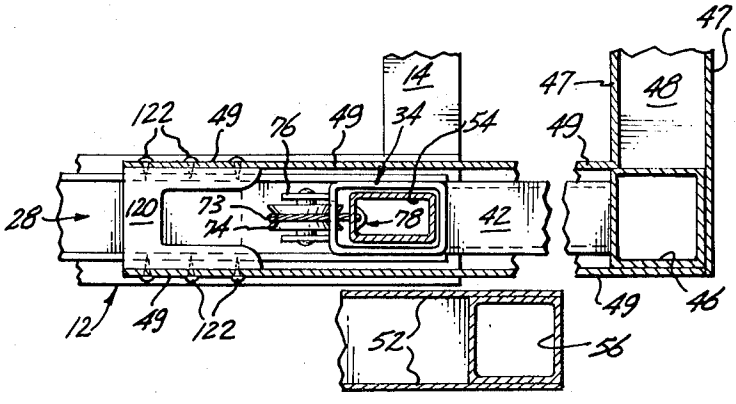


Fig. 11.

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Fig. 4.

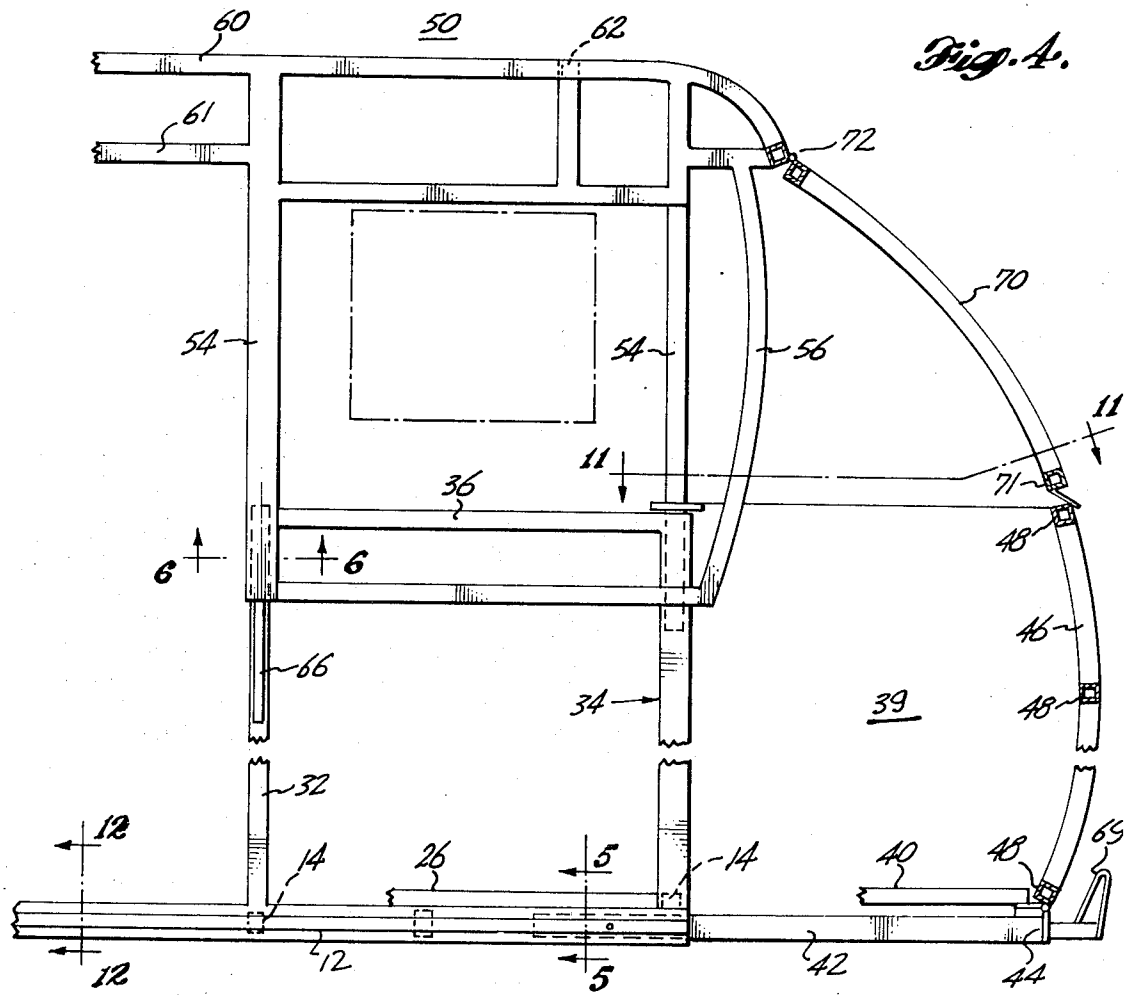


Fig. 5.

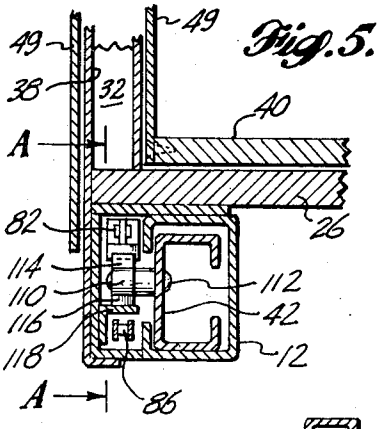
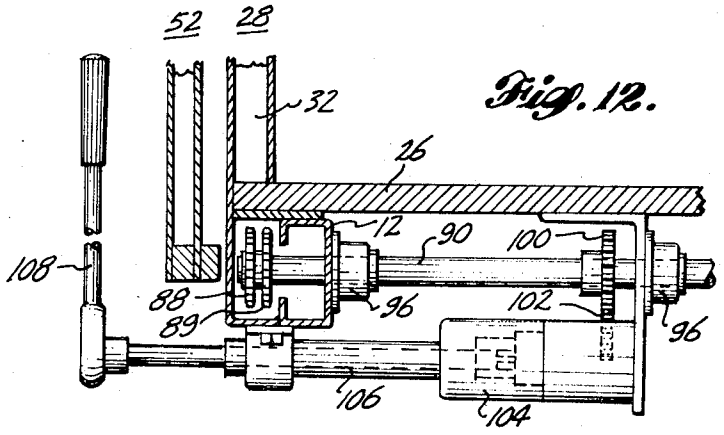


Fig. 12.



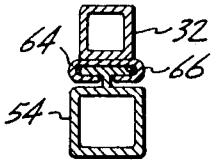


Fig. 6.

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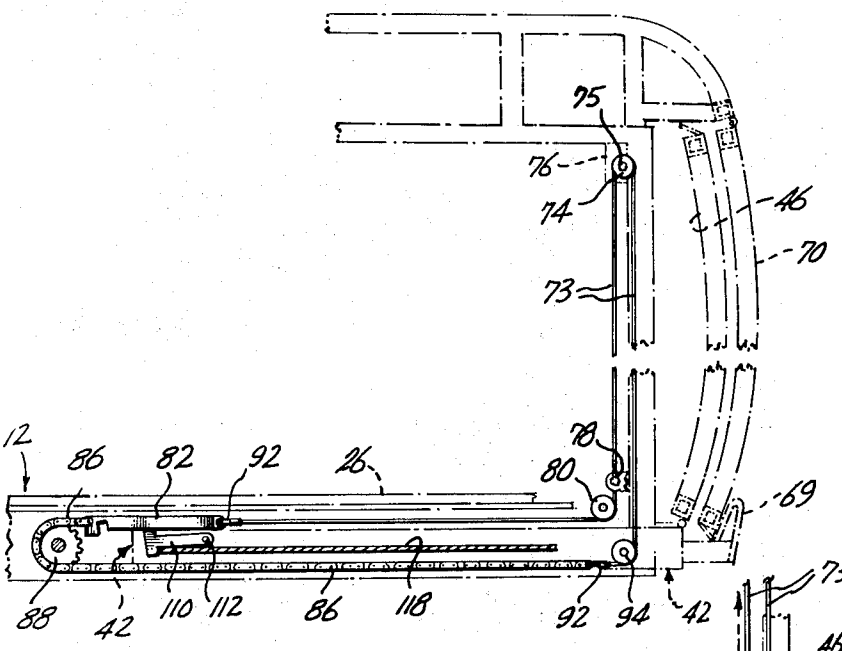


Fig. 7.

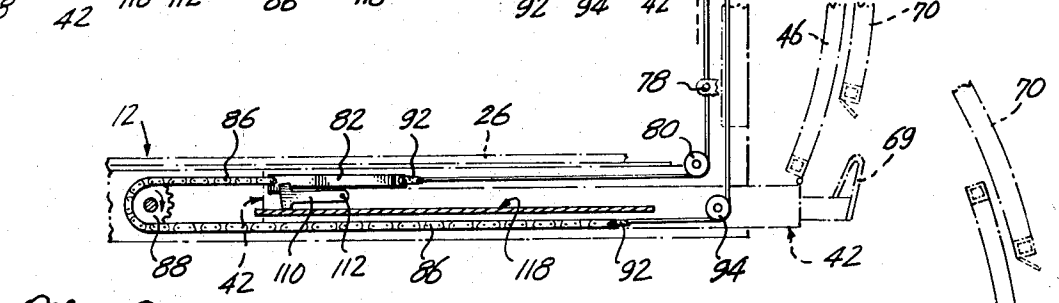


Fig. 8.

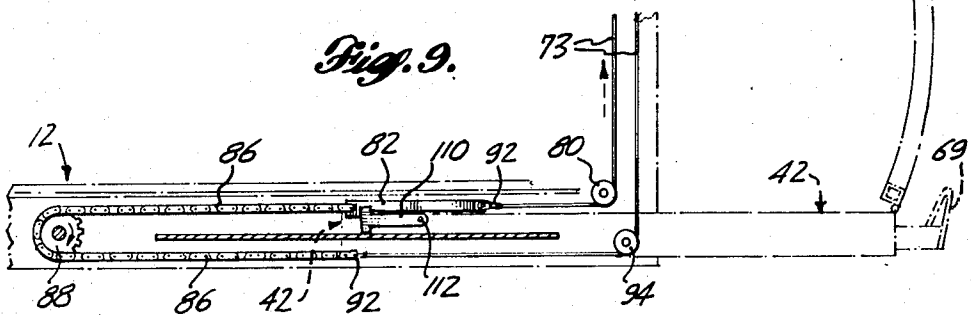


Fig. 9.

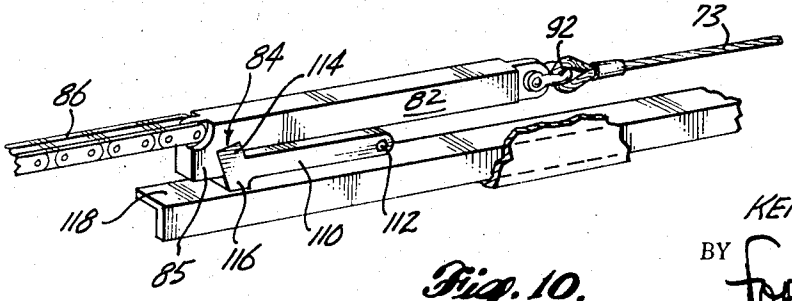


Fig. 10.

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EXPANDABLE HOUSE STRUCTURE

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Int. Cl. B60p 3/34
U.S. Cl. 296—27 5 Claims

ABSTRACT OF THE DISCLOSURE

A housing unit is provided which is capable of being expanded from a compact condition desirable for mobility by vertical movement of a roof section relative a main frame section and by substantially simultaneous longitudinal extension of at least one end section outward of the other sections.

SUMMARY OF THE INVENTION

A rectangular floor frame has a pair of upstanding opposed side walls. An outwardly movable drawer section is telescopically associated with at least one but preferably with both the nonwalled ends of the floor frame. A roof section has side walls that overlap the floor frame side walls and is vertically movable from the telescoped to the expanded position desirably to enclose living space. The roof section has hinged end wall means to cooperate with the drawer section or sections to close the space therebetween when the house is expanded. Elevator means and draft means is provided in the walls of the sections and is operable from a central station to move the various sections in extension or vice versa as desired. The important object of the invention has been the provision of suitable housing structural sections so related and coordinated that the transition between the extended and compacted conditions is simply, smoothly and rapidly accomplished. A further object has been the embodiment of such structure in a mobile housing unit.

IN THE DRAWINGS

FIG. 1 is a perspective view of an expandable mobile house embodying this invention;

FIG. 2 is a view of such house expanded;

FIG. 3 is a partial cross section in the plane 3—3 of FIG. 1;

FIG. 4 is a fragmentary elevational view of the frame of the house expanded;

FIGS. 5 and 6 are cross sections taken on line 5—5 and 6—6, respectively, of FIG. 4;

FIGS. 7, 8 and 9 are elevation views in the plane A—A of FIG. 5 partially in section and partially in phantom showing apparatus producing relative movement of frame elements during expansion or contraction of the house;

FIG. 10 is a perspective view of linkage means employed during the expansion of the house;

FIG. 11 is a detailed view in plan of a wall connection; and

FIG. 12 is a vertical sectional view on line 12—12 of FIG. 4.

DETAILED DESCRIPTION

The preferred construction of this invention is shown as embodied in what is described as a trailer home or a mobile home. It will be apparent that the structural features and elements combined in this invention may be variously applied in other housing structures. A rectangular floor frame comprising longitudinal members 12 and cross members 14 is mounted upon wheels 16 in a conventional manner. Such frame is provided with a forward extending tongue 18 including a hitch coupling 20 to secure the tongue in towing relation to a tractor vehicle. Tongue 20 includes a jack leg 22 for use when the unit is disconnected from its tractor. Tongue 18 may also carrying a fuel bottle 24 for heating, cooking and refrigeration purposes.

The main floor frame, comprising members 12, 12 and 14, 14, is decked with flooring panel 26, at the sides of which are an opposed pair of upstanding walls 28. Each of the walls 28 comprise vertical frame members 32, 34 and longitudinal frame members 36, best seen in FIG. 4. The structural members are preferably tubular and are appropriately joined by well-known welding techniques to form a rigid frame. The side walls 28 are sheathed by suitable plates or panels 38. It will also be understood that the interior surfaces of the frames may be suitably lined as by the use of wood or other paneling. The spaces in the frame enclosed by the wall panels are filled with insulative material. Thus, it will be seen that the main frame comprises a rectangular floor having a pair of upstanding walls at opposite edges thereof. Normally, such frame in the case of a doubly expandable house does not include any end walls. That is, the frame in this form is open ended.

There is an outwardly movable drawer section which is telescopically related at each end of the floor frame. This drawer frame of the outwardly movable section comprises main longitudinal beams 42 at the sides, a cross member 44, end frame members 46, and cross members 48. Each beam 42 is telescopically related to a main frame beam 12 as best shown in FIG. 5. In the contracted condition beam member 42 is fully telescoped within frame member 12 and in the expanded position it is withdrawn as shown in FIG. 4. Frame members 46 at the front of the drawer section are externally and internally sheathed by panels 47 to form a closed end wall. A pair of inner and outer panels 49 extend from the outer end of frame 39 toward the walls of the main frame 28, which is interposed therebetween (see FIGS. 5 and 11).

Roof section 50 has opposed depending side walls 52 and 54 which telescope downward external of the side walls 28 of the floor frame and also of the sides of said movable end section 39. Roof section 50 comprises upright structural members 54 and 56, longitudinal members 60 and 61 and cross members 62, joined to form a rigid frame as depicted in FIG. 4. Upright members 54 are guidedly secured to upright members 32 in the manner shown in FIG. 6. Member 32 carries a slotted guide or track 64 and element 54 carries an interfitting T-shaped guided member 66. By this arrangement vertical travel in a straight line of the frame 50 with respect to the main or floor frame is obtained.

Roof section 50 at each end, in the preferred embodiment shown, includes a depending wall 70 which is horizontally hinged at 72. When the roof section is lowered or telescoped with respect to the floor frame, as shown in FIG. 7, front wall 70 is disposed in close juxtaposition to the wall 46 of the movable end section 39. Horns 69 engage the lower edge of wall 70 and guide and secure it in the lowered position. As roof section 50 is raised, front wall 70 slides or peels with respect to wall 46 for an initial period of movement. Then wall 46 begins to be projected outward, and wall 70 continues to be raised. The two tend to slide with respect to each other until the position shown in FIG. 4 is reached. Then the upper frame edge 48 of end section 39 and the lower frame edge 71 of wall 70 come into interfitting relation to form a closed joint in what is then the outwardly bowed end wall of the mobile house.

Roof section 50 is provided with a half door element 51 and windows 53 and 55 in side wall 52.

Wall 28 of the rectangular floor frame may also have a half door element 54 in registry with door element 51

so that when the structure is raised, as shown in FIG. 2, a full length access door facility is available for ingress and egress with regard to the enclosure.

Referring to FIG. 11, post **54** of frame **50** telescopes into frame post **34** of the main frame. Sheave **74** is journalled on pin **75** mounted in cheek plates **76** supported on post **34**. The sheave extends through a slot in a wall of post **34** into close proximity to post **54**. Cable **73** passes over sheave **72** and descends between posts **34** and **54** and is anchored at **78** to the lower end of post **54**. Near floor level is sheave **80** aligned with sheave **74** around which cable **73** passes. Cable **70** is connected to coupler link **82** having notch **84** therein. Chain **86** is connected to link **82** opposite cable **73** and encircles sprocket **88** on shaft **90** (see FIG. 12). Chain **86** then extends outward from sprocket **88** beneath link **82** to connection **92** with the other end of cable **73** which then passes around sheave **94** and extends to sheave **74**.

Driven shaft **90** is journalled in bearings **96** mounted beneath deck **26** and extends across the main frame where there is another sprocket (not shown) to operate similar mechanism on the other side of the vehicle. Sprocket gear **100** on driven shaft **90** connects by means of a chain **102** to a sprocket located on a counter shaft within drive coupling **104**. Shaft **106** and ratchet handle **108** permits manual operation of the system which, of course, may also be power operated.

Dog arm **110** is pivotally coupled by pin **112** to frame member **42**. Arm **110** has a T-head including lugs **114** and **116** (see FIG. 10). Lug **114** engages in notch **84** in link **82** and is held therein by reason of lug **116** riding on a flange ledge **118** which is part of the frame structure.

Referring to FIGS. 7, 8 and 9 it will be seen that when the frame elements are fully compacted, as in FIG. 1, dog **110** and link **82** are disengaged. Upon initial travel of link **82** relative dog **110**, the distance determined by the length of link **82**, lug **114** engages in notch **84** against the trailing wall **85** and the two parts are secured together. Initial movement of the member **42** is thus obtained only after there has occurred initial vertical movement of the top element **50**. This permits hinged wall **70** to be lifted away from retaining or locking horns **69** and also for the upper inner part of wall **70** to be raised relative drawer end wall **46** before the latter begins to move outward. This avoids untoward outward angular displacement of the hinged wall **70** as would otherwise be the case if movement of drawer section **39** were not initially restrained.

The upper trailing corners of drawer walls **49, 49** are joined by yoke **120** secured in place by fasteners **122**. Yoke **120** engages around post **54** when the latter is raised and functions as a stop to limit outward extension of the upper edges of walls **49**. However, by insuring that beams **42** and floor **40** are extended or caused to over travel a slightly greater distance than the travel of the upper edges of the drawer section **39**, the yoke **120** comes into positive locking engagement with post **54** before beams **42** have been fully extended. This results in the drawer section **39** and its floor being canted slightly as it pivots around the yoke-post engagement.

There is inherent looseness or slack in such an assembly as has been described. Cables stretch and parts adjust under loading.

Normally the end sections **42** contain bunks for sleeping and storage areas underneath. The cant of the floor **40** and section **39** accommodates a slight settling in the end sections **39** when a load is applied with the result that floor **40** becomes level with floor **26** and does not sag as otherwise could be the situation.

The triangular spaces between the upper edges of the side walls of drawer sections **39** and the hinged wall **70** are closed when the roof is fully raised by window sections **130** hinged at **132** which swing upward into position from horizontal disposition when the house is compacted.

It will be understood that in a housing unit where there are two end sections there need be two extension mechanisms. Second sprocket **89** on shaft **90** powers such second mechanism which, however, works in reverse order to the one described.

This is accomplished by merely inverting or reversing the chain-cable-link dog system so that it operates in the opposite direction.

Changes and modifications will occur to those skilled in the art and are contemplated herein in describing and disclosing the principles of this invention.

What is claimed is:

1. An expandable house, comprising:

a rectangular floor frame having an opposed pair of upstanding side walls vertically unconnected at one end;

a horizontally movable drawer section comprising a floor and upstanding side walls, the outer edges of which are connected by a single end wall;

said drawer section being telescopically related to said floor frame and its side walls at said one end;

a roof section overlying said floor frame and having depending walls in telescopic relation to said floor frame side walls and said single end wall of the drawer section;

the upper edge of the depending wall of said roof section, telescopically related to said drawer section end wall, being hingedly connected in a horizontal manner to said roof section to swing outward;

means to elevate said roof section relative said floor frame; and

means to horizontally move said drawer section outward relative said floor frame;

said hingedly connected end wall being swung to inclined position by outward movement of the drawer section to space-enclosing relation spanning between the roof section and the drawer section.

2. An expandable house as set forth in claim **1** in which the means to elevate the roof section and the means to horizontally move the drawer section are interconnected and are mutually activated by a single power source.

3. The structure set forth in claim **2** in which there is lost-motion connection means between the roof elevating means and the drawer section moving means whereby a predetermined elevation of the roof section occurs before horizontal movement of the drawer section begins.

4. The structure set forth in claim **3** in which the roof elevating means comprises an endless transport element including an elongated link having a notch near one end, and there is a lug associated with said drawer element closely related to said link and engageable in said link notch after a predetermined transport of said link.

5. The structure of claim **1** in which closure means are provided for disposition contiguous with the edges of said outward swung roof wall and the adjacent drawer walls and roof side walls.

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U.S. Cl. X.R.

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