West

[54] EXPANDABLE BUILDING WITH TELESCOPING ENCLOSURES AND HINGEDLY CONNECTED BARRIERS

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- [22] Filed: Apr. 22, 1970
- [21] Appl. No.: 30,896
- 52/121

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[45] Apr. 4, 1972

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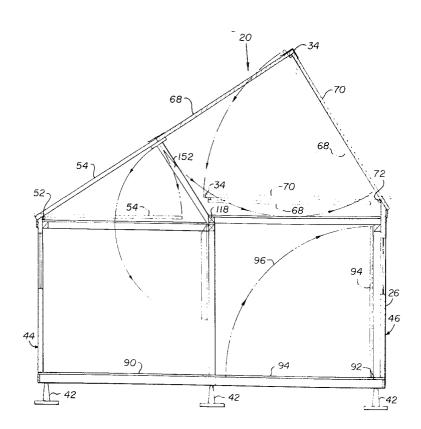
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Primary Examiner—Frank L. Abbott Assistant Examiner—Leslie A. Braun Attorney—Bauer & Amer

[57] ABSTRACT

A building formed of at least two sections expandable from a compact, telescoped arrangement which is convenient for storage and transportation into an erected condition bounding a cabin-type enclosure, each section further having cooperating roof constructions which unfold to provide the necessary headroom for the enclosure and which also contribute a desirable gabled appearance to the completed building.

2 Claims, 25 Drawing Figures



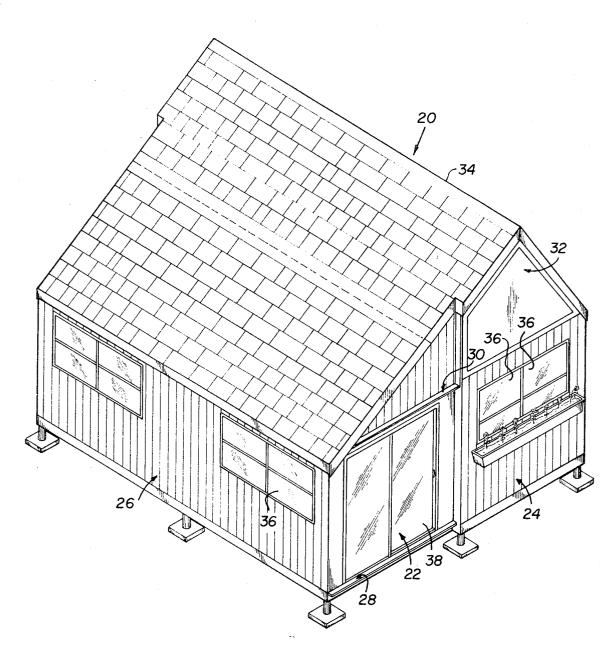


FIG. I

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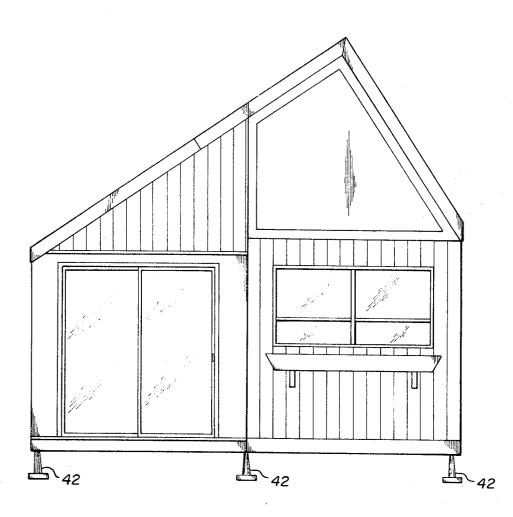


FIG.2

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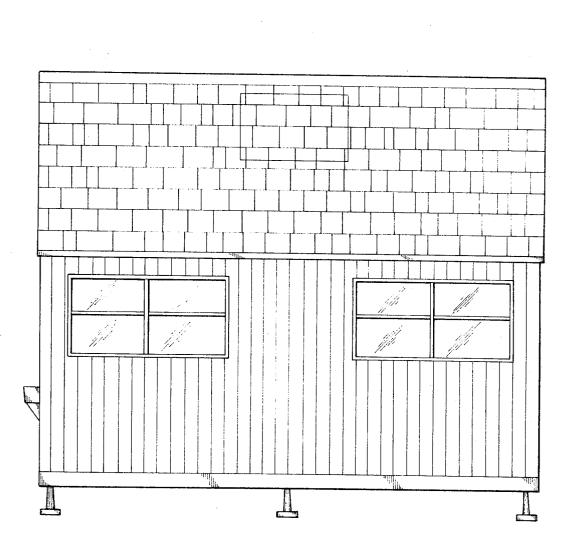


FIG.3

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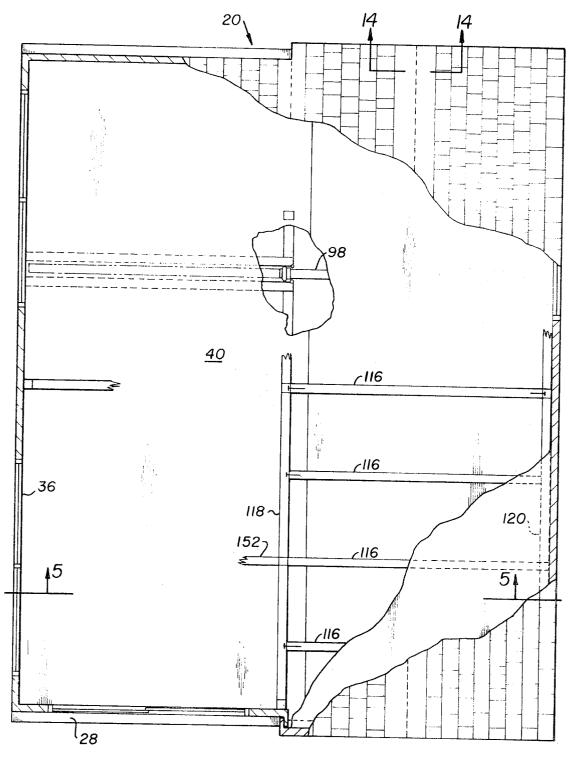


FIG. 4

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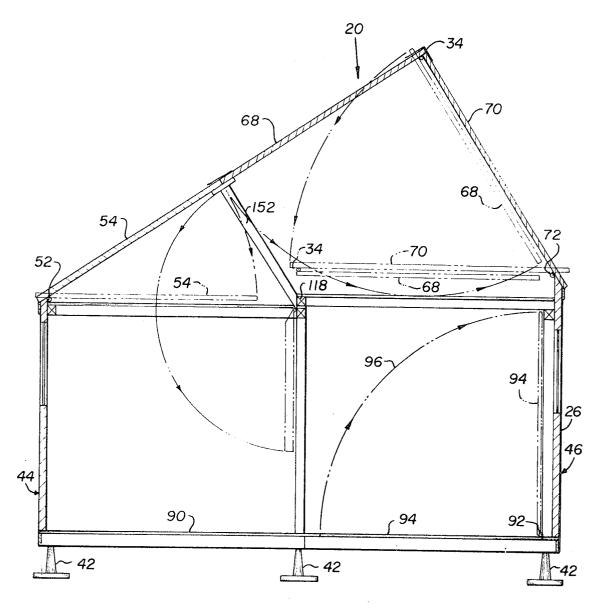


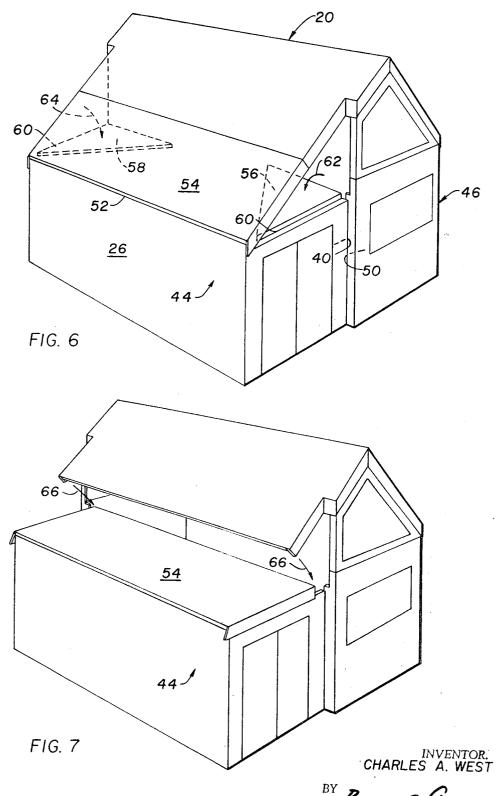
FIG. 5

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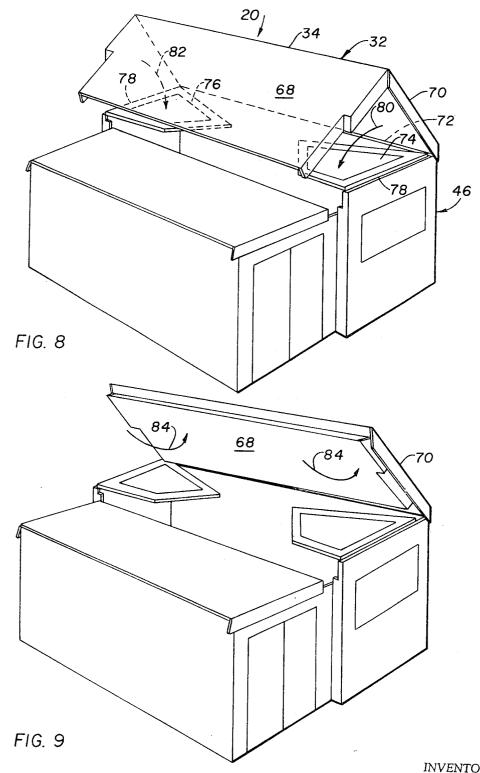
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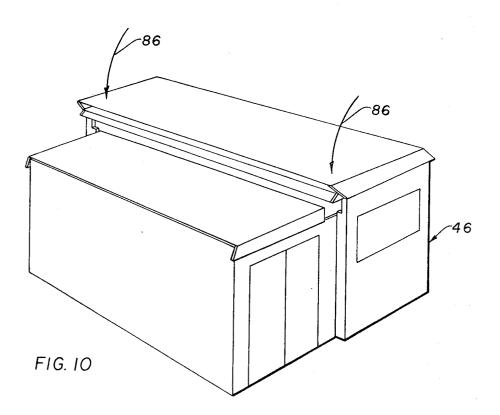


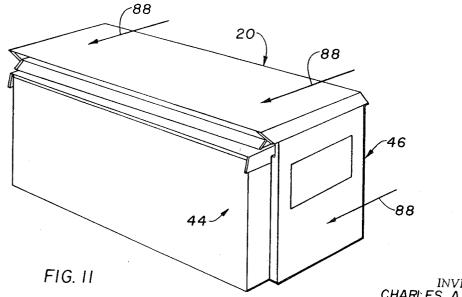
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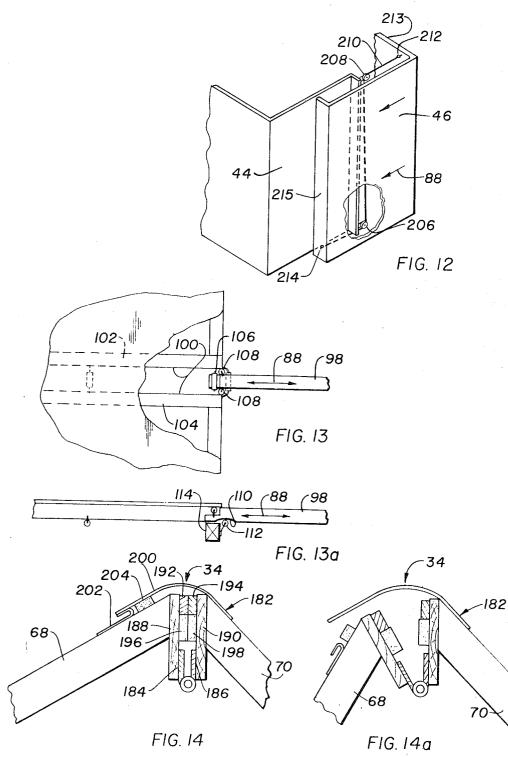


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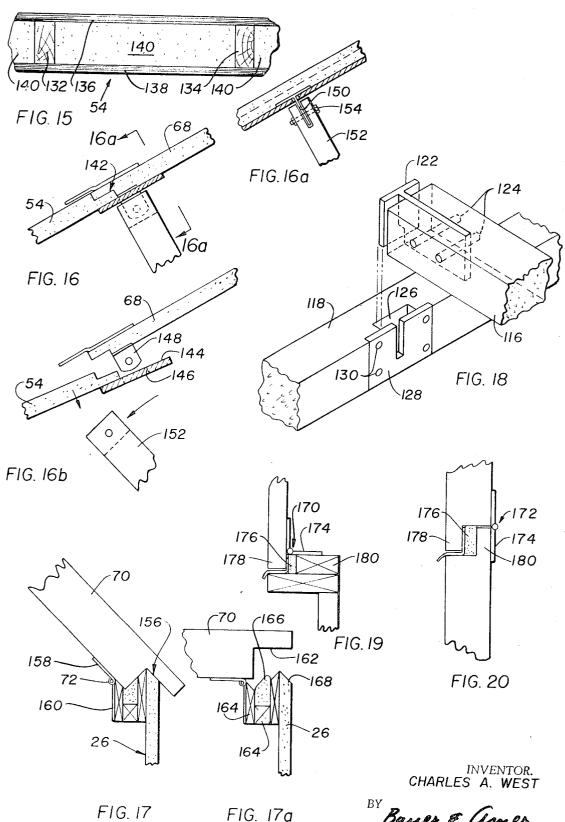
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PATENTED APR 4 1972

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EXPANDABLE BUILDING WITH TELESCOPING ENCLOSURES AND HINGEDLY CONNECTED BARRIERS

The present invention relates generally to building constructions, and more particularly to improvements for a camp-5 ing or similar type building enclosure which, according to one essential requirement, must be portable and yet also have adequate structural stability and strength when in use.

It is already well known to provide an enclosure, such as a mobile tent, trailer or the like, especially for use by campers, 10 which has a compact condition that contributes to portability, and which is also adapted to be converted, preparatory to use, into a larger, erected condition having the requisite living and headroom space. While these known building enclosures are generally satisfactory in that each is readily converted to 15 bound a larger internal space, the final erected or completed structure invariably significantly lacks, both in appearance and in construction, features associated with permanent buildings. That is, the erected shape or contour is not conventional for a permanent structure, and often, as a compromise 20 to facilitate the conversion from the smaller to larger size, the resulting building has inadequate weather barrier properties.

Broadly, it is an object of the present invention to provide an improved camper or expandable building enclosure overcoming the foregoing and other shortcomings of the prior art. 25 Specifically, it is an object to provide a building sufficiently compact to be readily transported, which also converts into a traditional gabled cabin-type building, the resulting traditional or conventional shape of which embodies slanting roof panels and other features which contribute to significantly improved 30 weather barrier properties and other noteworthy aspects.

A building demonstrating objects and advantages of the present invention includes telescoped housing sections which, in the erecting of the building, slide apart to bound a comparatively reasonably large living space or area. Following this 35 opening movement, roof panels on these sections are then unfolded into a triangular roof construction which is not only structurally stable but also contributes an aesthetic gabled appearance to the completed structure.

The above brief description, as well as further objects, features and advantages of the present invention, will be more fully appreciated by reference to the following detailed description of a presently preferred, but nonetheless illustrative embodiment in accordance with the present invention, when taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a cabin-type building according to the present invention in its erected condition;

FIG. 2 is a front elevational view of the building;

FIG. 3 is a side elevational view showing further details of 50 the building;

FIG. 4 is a plan view of the building, with portions thereof broken away to illustrate internal structural features thereof;

FIG. 5 is a front elevational view, in section taken on line 5-5 of FIG. 4, illustrating the movement of the various parts 55 which selectively provide the building with a compact storage condition and an erected condition, the various paths of movement of the parts thereof being illustrated in phantom perspective;

FIGS. 6-11 are simplified perspective views which 60 progressively show the manner in which the building, in its erected condition, is modified and placed in its compact storage condition, namely, to wit:

FIG. 6 illustrates the folding in of the gable roof supports of the building;

FIG. 7 illustrates the lowering of one roof section;

FIG. 8 illustrates the folding in of the remaining gable roof supports;

FIG. 9 illustrates the folding of the remaining two-panel roof construction;

FIG. 10 illustrates the lowering of the aforesaid roof construction; and

FIG. 11 illustrates the telescoping together of the two housing sections which result in the compact storage condition of the building. FIG. 12 is a partial perspective view of a mechanism interconnecting the two telescoped housing sections hereof in which portions are broken away to better illustrate the structural features thereof;

FIGS. 13 and 13*a* illustrate the floor and supporting structures for the building hereof, namely to wit:

FIG. 13 is a partial plan view illustrating details of cooperating telescoping floor joists, a portion of the overlying floor being omitted to better illustrate structural details; and

FIG. 13a is a side elevation of the cooperating telescoping floor joists;

FIGS. 14 and 14a are partial elevational views illustrating details of an appropriate hinge connection along the roof ridge line of the two-panel roof construction hereof, namely to wit:

FIG. 14 illustrates the hinge joint in its closed position and FIG. 14a illustrates the same following relative pivotal movement of the panels;

FIG. 15 is a sectional view illustrating an appropriate construction for a panel used for the building hereof;

FIGS. 16, 16a and 16b are related partial sectional views of the support structure used in supporting one of the roof panels, namely to wit:

FIG. 16 illustrates the roof in its erected condition with the support braces in supporting position;

FIG. 16a is a sectional view, taken on lines 16a-16a of FIG. 16, illustrating further structural details; and

FIG. 16b illustrates the manner of disconnecting the roof panels and its supporting braces;

FIGS. 17 and 17*a* are partial related elevational views illustrating an appropriate hinge joint of a roof eave hereof, namely to wit:

FIG. 17 illustrates a roof panel and a supporting side wall in the erected condition of the building; and

FIG. 17*a* illustrates the side wall following a pivotal movement of the roof panel.

FIG. 18 is a partial perspective view illustrating an appropriate manner of connecting a loft joist to cooperating supporting beams;

FIG. 19 is a partial elevational view illustrating an appropriate weather-proof hinged joint for the gable supports used in supporting the roof construction hereof; and

FIG. 20 is a sectional view similar to FIG. 19, but illustrating an alternate weather-proof hinged joint for the gabel support members hereof.

Reference is now made to the drawings, and in particular to FIGS. 1-4, in which a cabin-type building of the present invention, generally designated 20, is illustrated in its erected condition. Specifically, in this condition, building 20 has front and rear walls, generally designated 22 and 24, respectively, which cooperate with opposite side walls 26 to bound an internal enclosure that is approximately 16 feet by 20 feet and provides head room of approximately 8 feet as measured from a floor construction, generally designated 28, to the base, as at 30, of a gabled roof construction, generally designated 32. In other words, the 8-foot head room is that which is approximately the height of the opposite side walls 26 and front and rear walls 22 and 24. Additionally, the gabled roof construction 32, at its highest elevation, which coincides with the ridge line or peak 34, in turn bounds a generally triangular or wedge-shaped attic enclosure which is advantageously utilized as sleeping quarters for the building 20. The most significant aspect of building 20, however, is its capability, as will be explained in detail subsequently herein, of being dismantled and converted 65 from the erect condition of FIGS. 1-4 into a compact storage condition in which it occupies a significantly reduced volume of approximately 7 feet by 20 feet by 8 feet. In others words, in its compact condition which is advantageous both for storage and transporting the building 20, the space requirements are 70 approximately half the width, or in other words a reduction of 14 to 7 feet, and the roof construction 32 is eliminated entirely by being folded into a compact, substantially planar configuration.

From the foregoing it should be readily appreciated that the 75 significant aspect of building 20 is therefore related to the structural features thereof which enable the folding and unfolding movements of the various parts thereof, as well as the telescoping of various parts, again all as will be subsequently explained in detail, which provide the erected and compact conditions of the building 20. Nevertheless, at this convenient point in the description, it should be noted that building 20 includes conventional building features such as windows, individually and connectively designated 36, in both the front, rear and side walls, and also includes, specifically in the front wall 22, a sliding or other conventional door 38 opening into the building enclosure, generally designated 40 in FIG. 4. The foregoing aspects contribute to the advantageous use of the building 20, but are not essential aspects thereof to the extent that any one of a number of types of windows or doors may be used in the practice of the invention hereof.

Still referring to FIGS. 1–4, and particularly FIGS. 1–3, it will be noted that in a preferred embodiment, the building 20 is supported in an elevated condition on strategically located jack points, individually and collectively designated 42. The use of support structure 42 is preferred, but, of course, is not essential, since building 20 can be placed on an appropriately flat supporting surface, such as a concrete slab or the like.

Before describing the structural details of building 20, it is believed helpful to first describe the manner in which it is contemplated that the building 20 be provided with its previously noted compact and erected conditions. This conversion is best understood from FIG. 5, and also from progressive examination of FIGS. 6-11, respectively, to which figures reference is now made. It will be understood that in these figures building 30 20 and the various parts which constitute the same have been greatly simplified so that the structural details do not obscure the movements of the various building parts which provide the two operative conditions of the building.

The already noted internal building enclosure 40 is actually 35 bounded by two housing sections, generally designated 44 and 46, respectively, which are arranged in telescoped relation. That is, the previously referred to front and rear walls 22 and 24 and the opposing side walls 26 cooperate to provide two housing sections 44 and 46 and these housing sections, addi- 40 tionally, each have facing side openings 40 and 50 which extend the entire debth of building 20, all as is clearly illustrated in FIG. 6. Thus, in the erected condition of building 20, the facing side openings 40 and 50 of housing sections 44 and 46 lie generally in a medial vertical plane of the building and 45readily provide the user with access to the two enclosures bounded by the two sections 44 and 46 by merely stepping back and forth through the openings 40, 50. Additionally, the smaller housing section 44 is accommodated within the opening 50 of the larger section 46 and, as a consequence, readily permits the telescoping together of the two sections, all as is illustrated in FIG. 11.

Before the telescoping of the housing sections, it is necessary that the roof construction separately supported by each of these housing sections be converted from its erected threedimensional configuration into its substantially flat, planar condition. Specifically, housing section 44 has hingedly mounted along the upper portion of side wall 26, as at the traditional or conventional roof eave location 52, a roof panel 60 54. Cooperating with roof panel 54 are front and rear gable support panels 56 and 58 respectively hingedly connected to the opposite front and rear walls 22 at the opposite upper wall edges 60. Consequently, pivotal closing movement 62 and 64 of the gable supports 56 and 58 in turn free the roof panel 54 65 for pivotal closing movement 66 which provides the compact condition of the housing section 44, all as depicted in FIG. 7.

As best illustrated in FIG. 8, housing section 46 similarly supports a roof construction which, however, is comprised of two roof panels 68 and 70 hingedly connected to each other at the previously noted ridge line 34. Panel 70 is also hingedly connected to the housing section 46, as at the upper edge 72 of the opposing side wall of this housing section, or what is coincident with the opposite eave of the roof construction 32. Cooperating with the partial roof construction consisting of 75

the panels 68 and 70 are front and rear gable support panels 74 and 76 which, like the other gable supports 56 and 58, are hingedly connected along front and rear edges 78 and which each fold inwardly through pivotal closing movements 80 and 82, all as clearly illustrated in FIG. 8. This closing folding movement proceeds the placement of the roof panels from their erect condition subtending an obtuse angle into an adjacent compact condition in which they substantially lie in the

same plane. This is demonstrated by FIGS. 9 and 10 which also illustrate that after removal of the supporting gables 74 and 76 the dismantling procedure contemplates the closing movement 84 of panel 68 relative to panel 70 and then the closing movement 86 of the two panels 68 and 70 upon the housing section 46.

Next, as clearly illustrated in FIG. 11, the compact storage condition of building 20 is achieved by relative sliding movement 88 of the housing sections 44 and 46 which results in the telescoping together of these two sections. To convert the 20 resulting compact FIG. 11 version of the building 20 into the erect condition of FIGS. 1-5 in which it is actually used as a cabin or similar type building enclosure, it is necessary only to reverse the procedures and movement of parts just described in connection with FIGS. 5-11.

Reference is now made to FIGS. 4 and 5 for a further explanation and understanding of the internal structural features of the building or cabin 20. Specifically, it will be noted that the floor construction 28 actually consists in the illustrated preferred embodiment of a permanent horizontally oriented floor 90 within the housing section 44 and, within the housing section 46, a hingedly mounted, as along edge 92, pivotally movable floor 94. Thus, preparatory to telescoping together of the housing sections 44 and 46, floor 94 is raised through pivotal movement 96 into a vertical position adjacent the side wall 26.

As may be appreciated from FIG. 4 and FIGS. 13 and 13a, the telescoping movement of the housing sections 44 and 46 necessitates a corresponding telescoping of strategically located floor joists 98 that serve as part of the floor construction within the housing section 44. To this end, and referring specifically to FIGs. 13 and 13a, each of the joists 98 (only one of which is shown in FIGS. 4, 13 and 13a) is operatively arranged to be projected within a channel 100 appropriately defined between depending permanent floor support beams 102 and 104 arranged transversely of the housing section 44. Appropriately oriented rollers 106 and 108 are arranged to keep parts from physical rubbing contact with each other and also to facilitate the telescoping movement 88 therebetween. 50 A typical joist 98, as clearly illustrated in FIG. 13a, is advantageously provided with a seating notch 110 for a roller 112 mounted on cross beam 114 which effectively signals the attainment of the fully expanded position of the housing sections 44 and 46 relevant to each other. Once this position is 55 obtained, the pivotally movable floor 94 of housing section 46 is lowered into place to complete the floor construction 28. In this regard, it will be noted that permanent floor 90 effectively serves as a support for the furniture and other contents normally stored not only within the housing section 44 but also 60 within the housing section 46, those contents that are normally used within housing section 46 being transferred to the permanent floor 90 preparatory to the telescoping of the housing sections together.

Still referring to FIG. 4, it will be noted that at strategic spaced locations within the housing section 46 are transversely oriented support beams, individually and collectively designated 116. Beams 116 provide rigidity to the housing section 46 by being connected between longitudinally oriented support beams 118 and 120. The connection of the beams 116 to the longitudinal beams 118 and 120 may be permanent or, as illustrated in FIG. 18, the connection may be detachable. In either case, the transverse beams 116 are advantageously used to provide a sleeping loft within the head room bounded by the roof panels 68 and 70. 5

As clearly illustrated in FIG. 18, an appropriate detachable connection for the beams 116 includes a T-bracket 122 bolted, as at 124, to beam 116 and adapted to be accommodated in a cooperating T-shaped slot 126 formed, in part, by a plate 128 bolted, as at 130, to the support beam 118.

Reference is now made to FIG. 15 illustrating an appropriate construction for one or more of the panels mentioned in connection with the building 20, such as panel 54. It is contemplated as part of the invention hereof that these panels, such as panel 54, be constructed partly of wood and 10 also partly of a lighter material, such as polyurethane or other such plastic. As illustrated in FIG. 15, the preferred internal construction of panel 54 therefore consists of internal wood braces 132, 134 appropriately attached or secured to surface plywood or other similar panels 136 and 138, and completed by internal blocks 140 of polyurethane or other such plastic. The result is a panel construction which is sufficiently rigid and which has sufficient strength for the purposes intended, and which is also lightweight and has sufficient weather barrier properties to prevent rain and snow from entering the building enclosure 40.

Reference is now made to related FIGS. 16, 16a and 16b which illustrates an appropriate manner in which the free ends of roof panels 54 and 68 are connected to each other. These panels, as clearly illustrated in FIG. 16, are provided with cooperating lapping configurations providing a lap joint 142. As best illustrated in FIG. 16b, panel 54 includes a laterally extending plate 144 provided with an opening 146 to selectively opening, the bracket 148 being bolted in depending relation from panel 68. The projecting end of bracket 148 is adapted to be received within a slot 150 provided in an end of a support brace 152 and the supporting connection is completed by a bolt 154 or the like which is projected through aligning 35 openings in bracket 148 and in the end of supporting brace 152. At this opposite end, brace 152 will be understood to be pivotally connected to the longitudinally oriented support beam 118, all as is clearly illustrated in FIGS. 4 and 5.

Reference is now made to FIGS. 17 and 17a which illustrate 40 an appropriate weather-proof hinge joint 156 at the pivot connection of roof panel 70 to the supporting side wall 26. The previously noted axis 72 of the hinge joint 156 coincides with the axis of the hinged plates 158 and 160 which are appropriately respectively secured to roof panel 70 and to side 45 wall 26. As clearly illustrated in FIG. 17, the pivoting edge of panel 70 is advantageously provided with a lapping joint configuration 162 while the upper cooperating edge of support wall 26 includes wood braces 164 for rigidity and strength and 50 also elastomeric bodies 166 and 168 to provide weather barrier properties to the hinge joint 156 in its closed condition as depicted in FIG. 17.

FIGS. 19 and 20 respectively illustrate other forms of weather-proof hinge joints 170 and 172 which each include a 55 hinge 174 and an elastomeric body 176 occupying an interposed position between rigid construction members 178 and 180. The elastomeric body 176 is effective, by virtue of its interposed position, of preventing the seepage of moisture past the hinge joint 170 and 172. Hinge 170 is recommended for 60the pivotally mounted gabled support members 74 and 76, whereas hinge joint 172 is recommended for the gable support members 56 and 58.

Reference is now made to FITS. 14 and 14a which show an appropriate weather-proof hinge joint, generally designated 65 182, which is advantageously used along the previously noted roof peak or ridge line 34 at the juncture of the roof panels 68 and 70. The hinge joint 182 includes hinge plates 184 and 186 appropriately secured in depending relation from longitudinally oriented frames 188 and 190. Mounted on the facing 70 surfaces of the frames 188 and 190, and specifically along the upper edges thereof, are strips 192 and 194, and in an interposed location, a pair of facing elastomeric bodies 196 and 198. Thus, in the erect position of the roof panels 68 and 70

strips 192 and 194 are closed upon each other with the result that the elastomeric bodies 196 and 198 are pressed firmly against each other and form a seal which effectively prevents the seepage of water moisture into the cabin interior bounded by the panels 68 and 70. Supplementing the weather barrier properties of the hinge joint 182 is a fiber glass cap 200 having an appropriate molded shape, as illustrated, which enables it to serve as a covering for the hinge joint 182. The unattached or free end of the cap 200 cooperates with a fiber glass member 202 to form a closure for the hinge joint 182, the effectiveness of which as a barrier to water seepage is further enhanced by an additional elastomeric body 204.

A final significant structural feature recommended for and advantageously used in the construction of the building 20 15 hereof is illustrated in FIG. 12 to which figure reference is now made. This figure illustrates a preferred manner of supporting the building parts which are slidable relative to each other such as, for example, the housing sections 44 and 46. Specifically, assuming that section 44 is the stationary of the two 20 housing sections, it has been found advantageous in some instances to support the movable housing section 46 in cantilever fashion from the stationary housing section 44 or, in other words, to support housing section 46 on housing section 44 without any underlying supporting jack points 42 beneath the housing section 46. This obviates any possible interference of the jacks 42 with the sliding movement of housing section 46.

The cantilever supporting structure hereof includes spacedaccommodate a T-bracket 148 which is projected through this 30 apart vertically oriented cable rollers 206 and 208 journaled for rotation adjacent the upper and lower edges of a support wall of the housing section 44. A fixed length cable 210 having one end firmly anchored, as at 212, to one edge of housing section 46 and its opposite end firmly anchored, as at 214, to the opposite edge of housing section 46 is wrapped in one direction about the roller 206 and in the opposite direction about the roller 208. Thus, between its ends 212 and 214 the cable 210 is in tension or is taut. As a consequence, section 46 is restricted from movement relative to section 44 in all directions except the previously noted telescoping or sliding movement 88.

> Specifically, ascending vertical movement of housing section 46 is prevented by roller 208 which is in supporting engagement beneath the cable loop 210, whereas descending vertical movement is prevented by roller 206 which is in supporting engagement above the cable loop 210. Additionally, any turning movement or moments about the axis of either of the rollers 206 and 208 is prevented by the engagement of these rollers with the cable loop 210. Sliding movement 88, on the other hand, is readily possible since movement of the housing section 46 in this alignment of the rollers 206 and 208 and movement of the end 212 towards this roller arrangement for a corresponding compensating distance. In other words, the result of any sliding movement 38 (in the direction illustrated or in the opposite direction) is that the length of cable 210 as delineated between end 214 and roller 206 will change, but this change will be compensated for by a corresponding change in the length of the cable as delineated between roller 208 and end 212. Yet, in restricting vertical and turning movement of housing section 46 relative to housing section 44, the arrangement of the cable 210 about the rollers 206 and 208 effectively maintains the housing section 46 in cantilever-type supported relation from the stationary housing section 44.

> In order to limit sliding movement 83, the cable ends 212, 214 are advantageously connected respectively to walls 213, 215 which are transverse to the sliding movement 88 and which thereby serve as stops preventing sliding movement past the rollers 206 and 208.

In summary, it should be readily appreciated that there has been described herein a noteworthy building 20 which is particularly advantageous for use by campers or others who have a need for a temporary building enclosure. As described herein, the building 20, among other noteworthy features, has wherein they subtend an obtuse angle therebetween, the edge 75 a compact storage condition in which it takes up a minimum

volume and is readily transported to a remote building site. At the building site, it is then readily converted from its compact condition into an erected condition in which it bounds a reasonable spaceous living area 40 and further has a gabled roof construction 32 which increases the head room above the bousing section 44 and which, above housing section 46, provides the necessary room for sleeping quarters. Moreover, the erected condition of building 20 hereof, by virtue of its gabled roof construction 32, has a very highly desirable aesthetic appearance which is normally associated with permanent building constructions. The gabled roof 32 therefore significantly contributes to the commercial aspects and value of the building 20 which is intended primarily as a temporary building construction.

A latitude of modification, change and substitution is in-15 tended in the foregoing disclosure and in some instances some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the spirit and scope of the inven-20 tion herein.

What is claimed is:

1. A building construction as defined in claim 1 including means for supporting said second housing section on said first housing section in cantilever relation, including at least one 25 pair of spaced-apart, vertically aligned rollers journaled for rotation upon said first housing section, and at least one cooperating cable length connected at its opposite ends to said second housing section and intermediate said connected ends being in wrapped relation about said rollers so as to coun- 30 teract all relative movements therebetween except sliding movement transverse to said vertical alignment of said rollers.

2. A building construction unfoldable from a compact storage condition into an extended condition defining a cabin-

type enclosure comprising first and second rectangular housing sections, each said first and second housing section being defined by a side wall, a front wall, a rear wall, a floor, a first rectangular arrangement of frame members bounding a top opening, and a second rectangular arrangement of frame members bounding a side opening in opposing relation to said side wall, said first and second housing sections having operative positions telescoped one within the other defining said

- compact storage condition and being slidably movable therefrom into said extended condition thereof in which said side openings are in adjacent position and said side walls, front and rear walls, and floors cooperate to define said cabin-type enclosure, a first roof construction for said first housing section consisting of two hingedly connected panels one of which
- is hingedly connected to said frame member bounding said top opening and adjacent said side wall thereof, a second roof construction for said second housing section consisting of one panel hingedly connected to said frame member bounding said top opening adjacent said side wall thereof, said first and second roof constructions being pivotable from horizontally
- oriented storage conditions within each of said top openings into operative erect conditions cooperating to define a threedimensional roof construction of triangular shape in cross section on top of said internal cabin-type enclosure, and gable
- 25 there is a start internal calon-type checkstre, and gable members hingedly connected along the tops of said front and rear walls pivotable from horizontally oriented storage conditions within each of said top openings into vertically oriented erect conditions in supporting relation to said panels of said 30 first and second roof constructions, whereby said three-dimensional roof construction contributes both head room and an aesthetic gabled appearance to said building construct-
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UNITED STATES PATENT OFFICE CERTIFICATE OF CORRECTION

Patent No. 3,653,165 Dated April 4, 1972

Inventor(s) CHARLES A. WEST

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 1 should be renumbered as Claim 2; and Claim 2 should be renumbered as Claim 1. Signed and sealed this 11th day of July 1972.

(SEAL) Attest:

EDWARD M.FLETCHER, JR. Attesting Officer

ROBERT GOTTSCHALK Commissioner of Patents