United States Patent [19]

Aitken

[11] **3,714,749**

[45] **Feb. 6, 1973**

[54] **PORTABLE BUILDING CONSTRUCTION**

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[73] Assignee: **Instant Structures, Inc.,** Albany, N.Y.

[22] Filed: **Sept. 2, 1971**

[21] Appl. No.: **177,480**

Related U.S. Application Data

[63] Continuation of Ser. No. 747,215, July 24, 1968, abandoned.

[52] **U.S. Cl.** **52/70,** 52/71

[51] **Int. Cl.** **E04b 1/344**

[58] **Field of Search** ..... 52/64, 70, 71, 82, 79, 143, 52/80, 81; 135/1 R

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Primary Examiner—Price C. Faw, Jr.
Attorney—Townsend and Townsend

[57] **ABSTRACT**

A building construction having a collapsible roof and a collapsible floor coupled to the roof, whereby the floor and roof form a unit which can be alternately expanded and collapsed. The roof unit has a number of hingedly interconnected sections and the floor unit has a plurality of hingedly interconnected panels with the sections and panels being disposed to permit the same to be substantially parallel with each other when the roof and floor are collapsed. When expanded, the roof forms side openings which can be at least partially covered by sidewall panels hingedly connected to the adjacent roof sections.

18 Claims, 31 Drawing Figures

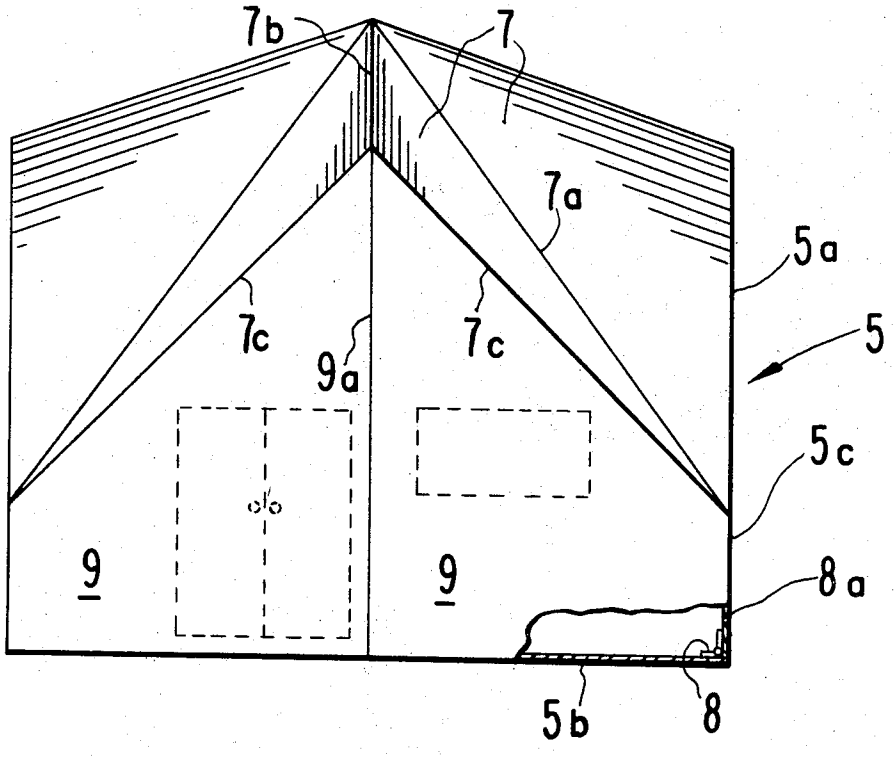


FIG_1a

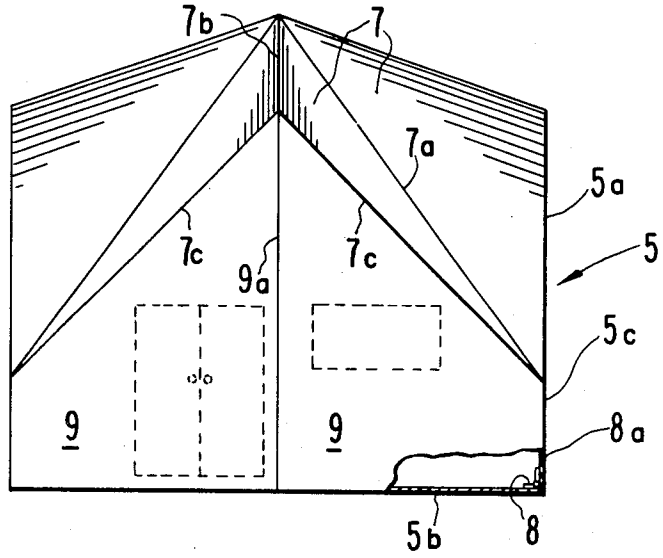
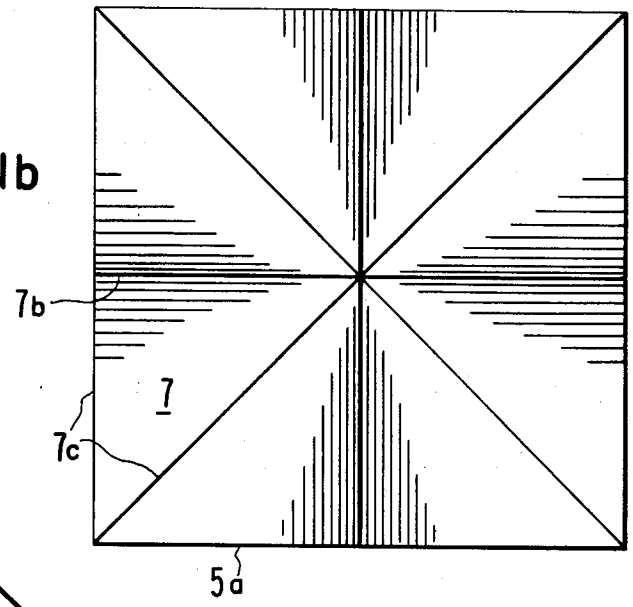


FIG_1b



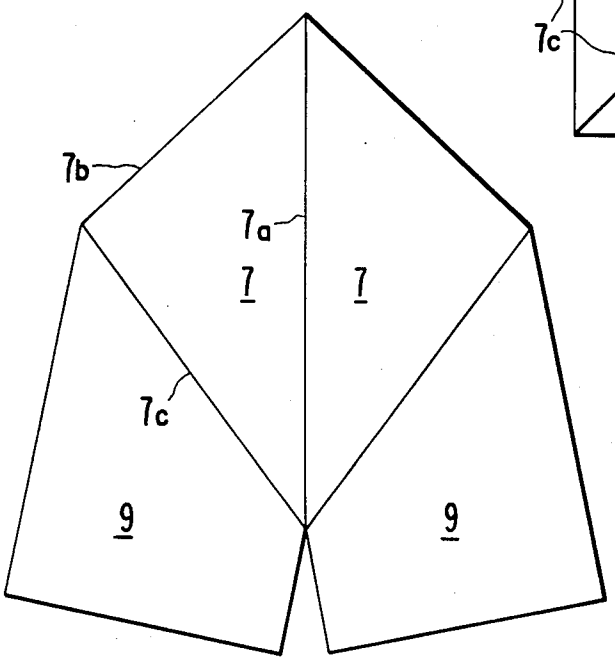


FIG_1c

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FIG_2

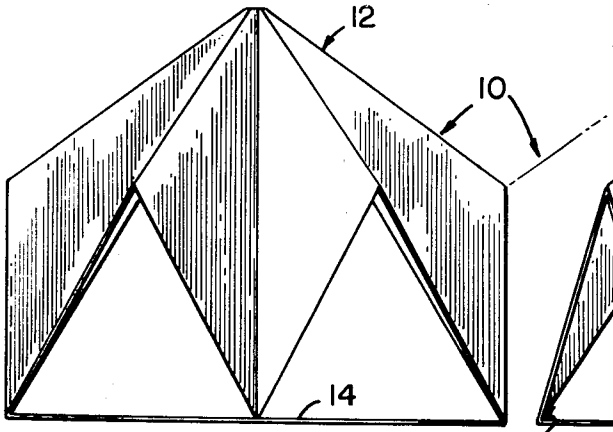
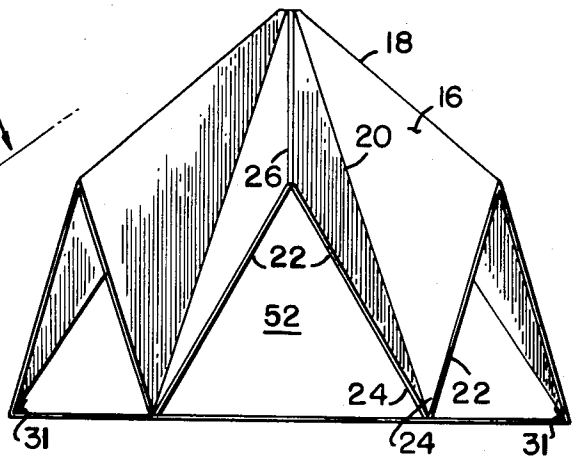


FIG_2a



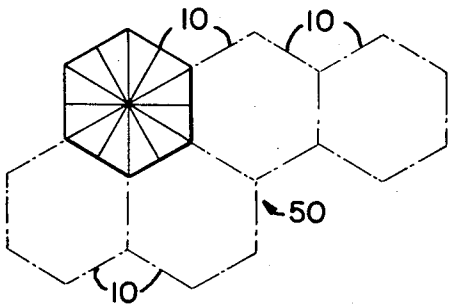


FIG_3

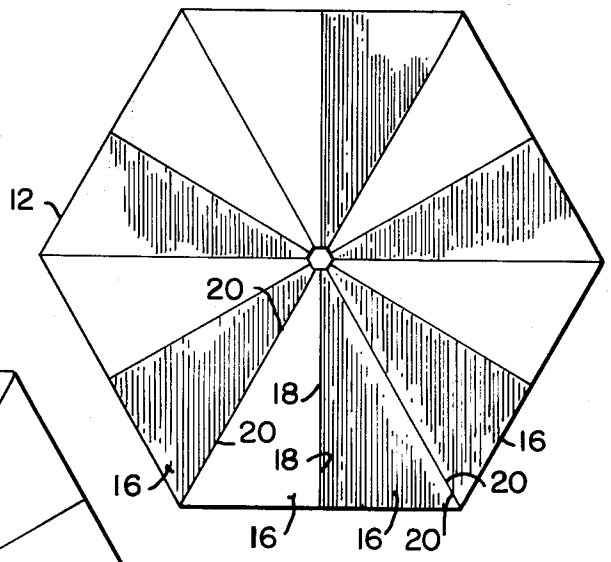


FIG_5

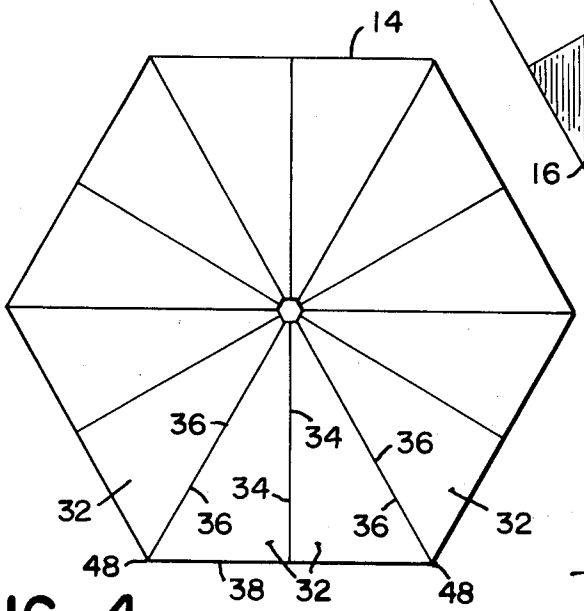


FIG_4

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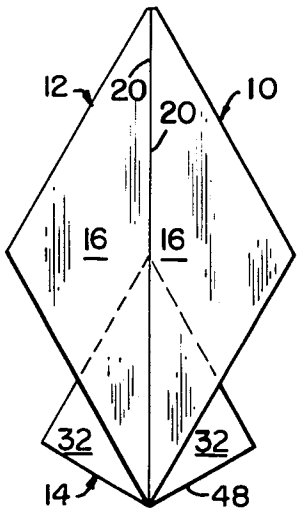


FIG_6

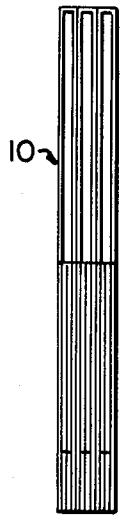


FIG_7

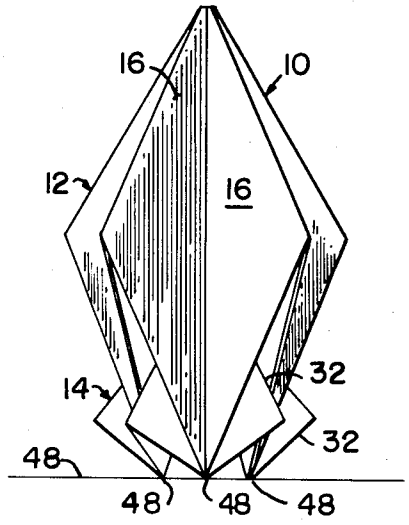


FIG_8

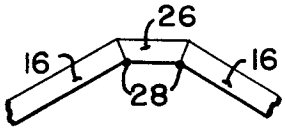


FIG_10

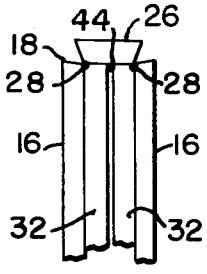


FIG_11

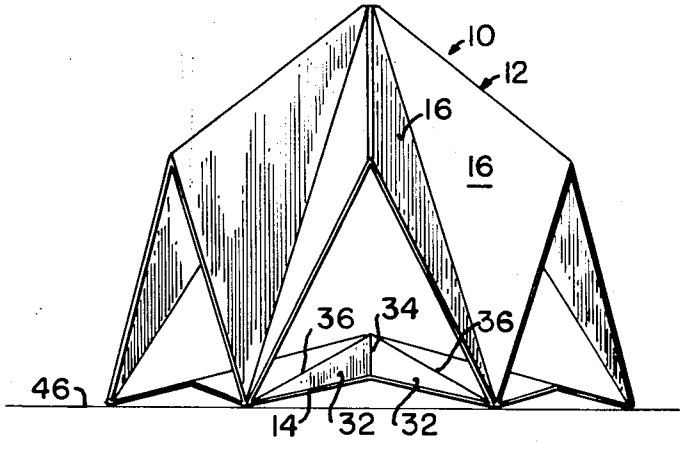


FIG_9

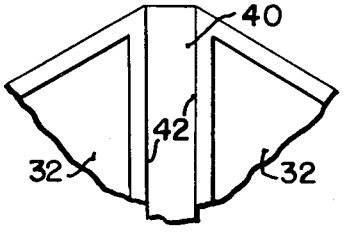


FIG_12

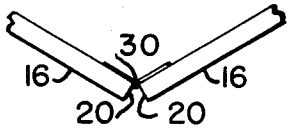


FIG_14

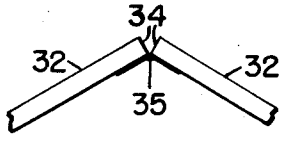


FIG_15

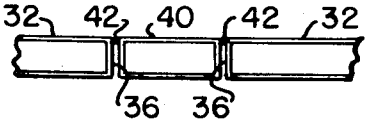
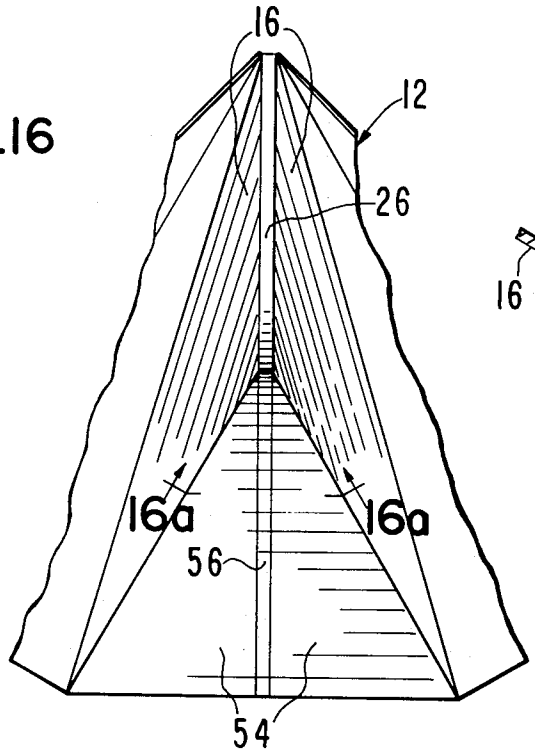


FIG_13

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FIG_16



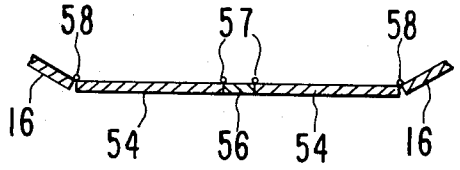


FIG_16a

FIG_18

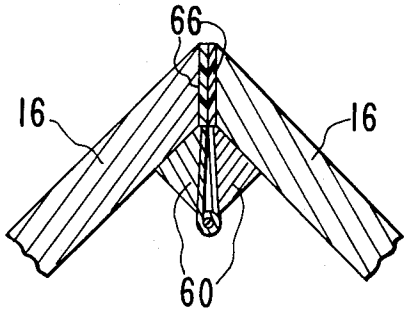


FIG_17

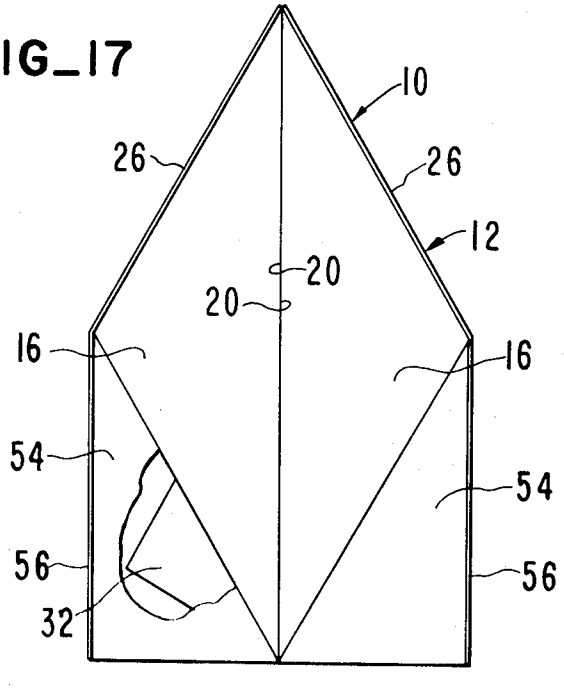
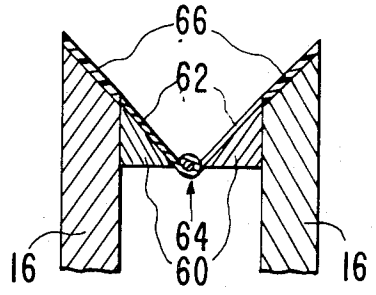


FIG_18a



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FIG_19a

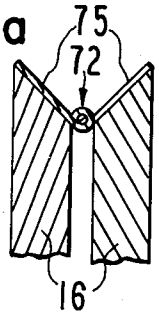


FIG_19

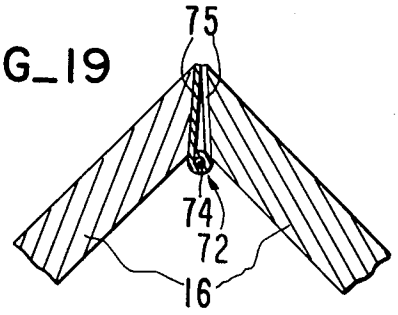


FIG_20

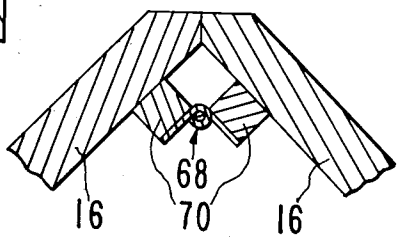
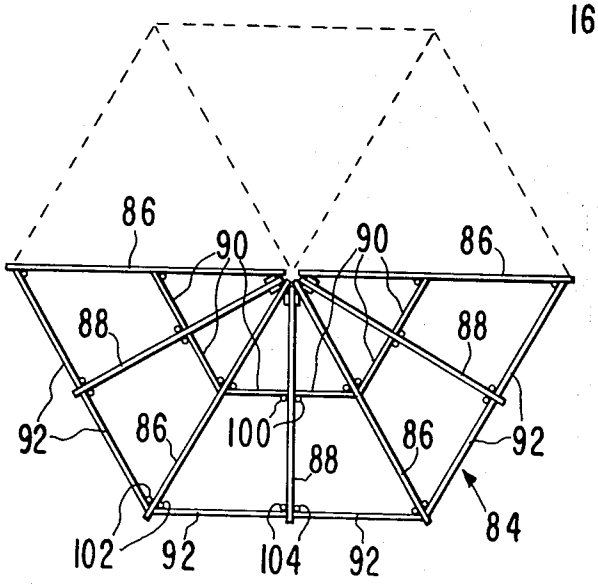


FIG_23



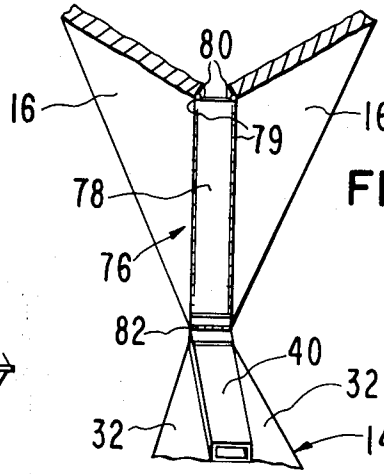


FIG_21

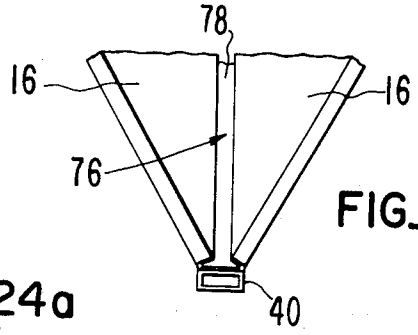


FIG_22

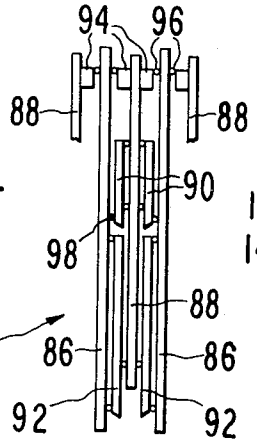
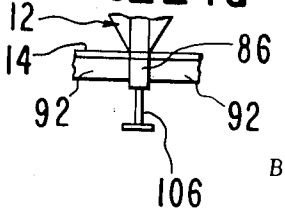


FIG_24

FIG_24a



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PORTABLE BUILDING CONSTRUCTION

This is a continuation of application Ser. No. 747,215, filed July 24, 1968, and now abandoned.

This invention relates to improvements in the construction of buildings or the like and, more particularly, to an improved portable building capable of being collapsed and expanded.

While the present invention may be applicable to a number of different uses, it is especially adapted for use as a portable building which can be carried from place to place in a collapsed condition and expanded at a building site into an operative condition so that it is substantially ready for use immediately. Such a construction fulfills many needs for a portable building. For instance, the building of this invention is suitable for portable classroom use, wherein classroom space is required for a limited time and in areas at which minimum land improvements are called for or are desired. The building of this invention can be made in standard sizes and configurations and, by virtue of this feature, a number of buildings of this invention can be arranged in side-by-side relationship to form a building complex of relatively large dimensions. Such a construction greatly increases the usable space at a particular site and minimizes the time required to prepare the land at the site as well as the construction time necessary to provide the additional space.

Many other advantages accrue from the use of the present invention. The building of this invention can be removed from one site and taken to a storage area or transported to a second site, as desired. No permanent attachment to the ground is necessary to utilize the building of this invention, although the building can be permanently attached in place if such is deemed necessary or desirable.

The building of this invention is also constructed so that it is possible that the building can be dropped from aircraft by parachute or lowered from a helicopter to a building site, and means can be provided which would permit the building to move into its expanded condition before or after it strikes the ground and thereby be ready for immediate use. Thus, the invention is further suitable for use in modern warfare where portable shelters, command posts, or the like are required in remote sections of an area which cannot be penetrated by land vehicles.

The essential feature of the invention is its collapsible roof which can be combined with a floor so that the roof and floor can move together from collapsed conditions to expanded conditions. The roof has sections which are disposed to accommodate certain panels of the floor in a nested relationship, whereby the floor panels and roof sections are substantially parallel with each other when the building is collapsed. This construction permits the building to occupy a minimum of space while it is collapsed and facilitates the transfer of the building from one location to another as well as minimizes the space required to store the building.

Another feature of the invention is that the building can be formed from any one of a wide variety of building materials and can be made inexpensively while still being simple and rugged in construction. Such construction, therefore, adapts the building for sudden shocks, such as being air-dropped in remote areas, so that the components of the building remain intact even though they are subjected to environmental extremes when they are handled.

The primary object of the invention is to provide an improved building construction having a collapsible roof capable of being combined with a collapsible floor to present a building unit which can be erected in a minimum of time and with a minimum effort while, at the same time, providing a construction which is simple and rugged and adapted for a wide variety of uses.

Another object of this invention is to provide a building of the type described whose collapsible roof has sections which are disposed, when the roof is collapsed, to nest certain of the panels of a multi-paneled, collapsible floor associated with the roof, so that the roof and floor will occupy a minimum of space when they are collapsed to permit them to be easily moved from place to place or stored, as desired.

Another object of this invention is to provide a building construction formed of a plurality of collapsible buildings of the type described with the buildings being arranged in alignment with each other to form a single building of increased dimensions while, at the same time, permitting the individual buildings to maintain their collapsible character.

A further object of this invention is the provision of a collapsible building of the type described wherein the roof and floor of the building have improved hinge means to permit the same to be readily collapsed and expanded and to permit the roof sections and floor panels to be substantially parallel with each other when the building is collapsed to facilitate transfer and storage thereof.

Other objects of this invention will become apparent as the following specification progresses, reference being had to the accompanying drawings for an illustration of the several embodiments of the invention.

In the drawings:

FIG. 1*a* is a side elevational view of a four-sided building having a collapsible roof, floor and sidewalls;

FIG. 1*b* is a top plan view of the building of FIG. 1*a*;

FIG. 1*c* is a side elevational view of the building when the latter is collapsed;

FIG. 2 is a side elevational view of a six-sided building of this invention in its expanded condition;

FIG. 2*a* is a view similar to FIG. 2 but looking at the building from a different angle;

FIG. 3 is a schematic top plan view of a building complex formed by a number of buildings of FIG. 2;

FIG. 4 is a top plan view of the expanded floor of the building of FIG. 2;

FIG. 5 is a top plan view of the expanded roof of the building;

FIG. 6 is a side elevational view of the building in its collapsed condition;

FIG. 7 is an end elevational view of the collapsed building of FIG. 6;

FIG. 8 is a view similar to FIG. 6 but showing the building partly expanded;

FIG. 9 is a view of the building expanded to a greater degree than shown in FIG. 8;

FIG. 10 is a fragmentary, cross-sectional view of a pair of hingedly interconnected, expanded roof sections;

FIG. 11 is a view similar to FIG. 10 but showing the collapsed roof sections with floor panels therebetween;

FIG. 12 is an enlarged, fragmentary top plan view of the expanded floor;

FIG. 13 is an enlarged, fragmentary, cross-sectional view of the floor portion of FIG. 12;

FIG. 14 is a view similar to FIG. 10, but showing a pair of roof sections joined together by another type of hinge;

FIG. 15 is a view similar to FIG. 14, but showing a pair of floor panels hinged together;

FIG. 16 is a fragmentary, side elevational view of the building with sidewall panels covering a side opening thereof;

FIG. 16*a* is a cross-sectional view taken along line 16*a*–16 of FIG. 16;

FIG. 17 is a view similar to FIG. 6, but showing the building with collapsible sidewalls thereon;

FIG. 18 is an enlarged, fragmentary, cross-sectional view of a pair of expanded roof panels joined together by another type of hinge;

FIG. 18*a* is a view similar to FIG. 18, but showing the roof sections in their collapsed condition;

FIG. 19 is a view similar to FIG. 18, but showing still another type of hinge;

FIG. 19*a* is a view similar to FIG. 19, but showing the roof sections collapsed;

FIG. 20 is a view similar to FIG. 18 but showing a third type of hinge;

FIG. 21 is a fragmentary, side elevational, interior view of the building showing a hinge interconnecting adjacent portions of the floor and roof;

FIG. 22 is an exterior view of the structure of FIG. 21;

FIG. 23 is a top plan view, partly in phantom, of a collapsible base for the building of FIGS. 2 and 2*a*;

FIG. 24 is a fragmentary, top plan view of the base of FIG. 23 when it is collapsed; and

FIG. 24*a* is an end elevational view of a portion of the base of FIG. 23.

One embodiment of the building of this invention is shown in FIGS. 1*a*, 1*b* and 1*c* and includes a four-sided building 5 having a collapsible roof 5*a*, a collapsible floor 5*b* and one or more collapsible sidewalls 5*c*. The building is movable from an expanded condition (FIG. 1*a*) with the roof overlying the floor to a collapsed condition (FIG. 1*c*) with the roof, floor and sidewalls substantially parallel with each other. For clarity, the floor is omitted from FIG. 1*c* but the teachings of the invention with respect to the collapsing of the floor will be described in another embodiment of the invention set forth hereinafter.

Roof 5*a* has a plurality of generally triangular roof sections 7 which are substantially identical to each other and which are hinged together along contiguous edges in a manner to permit the roof to collapse and expand. Each section 7 has side edges 7*a*, 7*b* and 7*c*. Edge 7*a* of each roof section is hinged to the corresponding edge 7*a* of the next adjacent roof section. Similarly, edge 7*b* is hinged to the corresponding edge 7*b* of the section next adjacent thereto. Edge 7*c* is hinged to an upper edge of the adjacent sidewall 5*c*. While FIG. 1*a* shows edges 7*b* to be sloping, they can be horizontal if desired.

Floor 5*b* will be coupled by hinges 8, at the four corners of the building to upright portions 8*a* of the adjacent sidewalls, only a single hinge of the upright portion 8*a* to which it is attached being shown in FIG. 1*a*. The floor has a number of panels which are triangular in configuration and which are projections of the roof sections 7 thereabove, i.e., they have the same shape as the portions of the roof sections which they underlie. As will be set forth in more detail with respect to another embodiment of the invention, the floor, when the building is collapsed, will have certain of its panels nested between particular roof sections. To achieve this, some of the hinges of the building will provide for spacing between such roof sections to accommodate this nesting of the floor panels.

Each sidewall 5*c* includes a pair of sidewall panels 9 which are hinged together along a common line 9*a* extending downwardly from roof 5*a* and are hinged to the adjacent edges 7*c* of the corresponding roof section 7. When the building is collapsed, the sidewall panels 9 assume the positions shown in FIG. 1*c*. Since the floor is hinged to the sidewalls only at the corners of the building, the floor can collapse simultaneously with the collapsing of the roof and sidewalls.

In building 5, roof 5*a* is spaced above floor 5*b*. In another embodiment to be described, the floor and roof are hinged together.

Another embodiment of the building of this invention is denoted by the numeral 10 and is shown in its expanded condition in FIGS. 2 and 2*a*. Building 10, which is six-sided, includes a roof 12 hingedly connected to a floor 14 to form a unitary construction which permits the roof and floor to be collapsed and expanded together. FIG. 4 illustrates the expanded condition of floor 14 and FIG. 5 illustrates the expanded condition of roof 12. FIG. 6 shows building 10 in its collapsed condition, wherein roof 12 and floor 14 have sections and panels, respectively, which are in substantial parallelism with each other by virtue of the articulated character of the roof and floor as hereinafter described.

Roof 12 is comprised of a plurality of generally triangular sections 16, each of which is substantially identical in all respects to the others. Each section 16 has three peripheral margins 18, 20 and 22 of predetermined lengths. Margins 18 and 20 are convergent as the upper extremity of roof 12 is approached. Margins 20 and 22 are convergent as the lowermost extremity of the roof is approached. The portion denoted by the numeral 24 and defined by the convergence of margins 20 and 22 presents a supporting leg for the corresponding section 16, portion 24 being hingedly connected to floor 14, specifically at one peripheral extremity thereof by a hinge 31 (FIG. 2*a*).

Margin 18 of each section 16 is hingedly connected to the margin 18 of the next adjacent section 16. The hinge at this connection may be of the type shown in FIGS. 10 and 11, wherein a spar 26 carries a pair of hinges 28 at its longitudinal edges for connection with the adjacent sections 16, whereby the sections are slightly spaced apart, the purpose of which is to accommodate a pair of floor panels 32 of floor 14 as shown in FIG. 11. Spar 26 preferably extends throughout the length of corresponding margins 18 as shown in FIG. 2.

Contiguous margins 20 of each pair of adjacent sections 16 are connected together in the manner shown in FIG. 14 by a single hinge 30, such as a piano hinge or the like. Thus, when roof unit 12 is collapsed, certain of the sections 16 will be in face-to-face relationship and in juxtaposition to each other, specifically those sections which are joined together at corresponding margins 20. Those sections 16 joined together at margins 18 will be spaced apart as shown in FIG. 11.

Floor 14 is comprised of a plurality of substantially triangular, generally identical floor panels 32, each panel having a pair of margins 34 and 36 which converge as the central extremity of floor 14 is approached and a third margin 38 which is at the outer periphery of floor 14. Margin 34 of one panel 32 is hingedly connected by a hinge 35 to a corresponding margin 34 of the adjacent panel 32 (FIG. 15). Similarly, margin 36 of each panel 32 is hingedly connected to margin 36 of the next adjacent panel 32 as shown in FIG. 4. The hinge connection of margins 36 may be of the type shown in FIGS. 12 and 13, wherein a spar 40 separating a pair of panels 32 has a pair of hinges 42 connected to margins 36 of respective panels 32. This construction causes panels 32 to be spaced apart for the same reason as that with respect to the hinge of FIGS. 10 and 11. The single hinge connection at margins 34 (FIG. 15) allows the corresponding panels 32 to have a common hinge line so that such panels will be in face-to-face relationship when floor 14 is collapsed. Panels 32 having the common spar 40 connected thereto will be spaced apart but substantially parallel with each other when the floor is collapsed to permit the nesting therebetween of a pair of sections 16 whose margins 20 are joined together. Thus, sections 16 and panels 32 can be nested together so that building 10 can be collapsed into a flattened configuration as shown in FIG. 6. FIG. 7 illustrates how sections 16 and panels 32 are substantially parallel with each other when the building is in its collapsed condition, whereby the building occupies a minimum of space to facilitate storage and transit.

To illustrate the way in which building 10 is used, it will be assumed that the building is initially in its collapsed condition (FIG. 6) wherein sections 16 and panels 32 are substantially parallel with each other (FIG. 7) with certain of the panels 32 being nested between respective sections 16 and certain of sections 16 being nested between respective panels 32.

Building 10, in its collapsed condition, is then moved in some suitable manner to a building site on whose surface 46 the building is to be erected. The building is placed on surface 46 and expanded by causing floor 14 to move outwardly to, in turn, move leg portions 24 of roof sections 16 outwardly and away from each other. FIG. 8 illustrates an early phase of the expansion process wherein the tips or extremities 48 defined by the lower ends of portions 24 are moved outwardly and away from each other from their mutually aligned positions shown in FIG. 6. As tips 48 moves apart, floor 14 moves in a manner such that floor panels 32 tend to assume horizontal positions. Since portions 24 are connected by hinges 31 to floor unit 14, sections 16 also move outwardly and away from each other under the influence of the movement of tips 48. FIG. 9 illustrates a later phase of the expansion process, wherein roof 12 is almost completely expanded and floor 14 has its floor panels 32 almost horizontal. Generally, floor panels 32 will be substantially coplanar with each other when floor 14 is completely expanded. The building has the configuration shown in FIGS. 2 and 2*a* when it is completely expanded.

To maintain the expanded condition of building 10, it is provided with means for holding the roof sections 16 in expanded, generally fixed positions. Such means can be provided by the specific configuration of each spar 26 wherein, as shown in FIG. 10, the beveled side edges of each spar limit pivoting movement of sections 16 to a predetermined arc so that such sections will stop in the expanded positions of FIG. 10. The bevel of spar 26 will be determined by the size of floor 14 since a given roof can possibly cover floors of different sizes. In the alternative, assuming that each spar 26 has generally parallel side edges, a ring or other connecting structure could be secured to sections 16 at their upper extremities to hold them in the required fixed positions. A further way of accomplishing this would be to provide wedges between each spar 26 and an adjacent roof section 16, such wedges extending along the corresponding hinge line and being held in place by any suitable fastener. The last-mentioned way of holding the roof sections in place would be used if the side faces of spar 26 are parallel instead of beveled.

FIG. 3 shows how a number of building units 10 can be arranged to form a building complex 50 whose interior volume is the sum of the individual interior volumes of the various buildings 10. In this arrangement, the buildings are in alignment with each other and stacked in honeycomb fashion to permit expansion in different directions. To this end, each pair of adjacent buildings 10 are connected together in some suitable manner at the openings 52 thereof defined by edges 22 (FIG. 2*a*), which openings can be made essentially vertical by the specific selection of the dimensions of sections 16.

FIGS. 16 and 16*a* show the use of sidewall means across at least one of the side openings 52 formed by margins 22 of roof 12. To this end, a pair of sidewall panels 54 are disposed in closing relationship to an opening 52, panels 54 being hingedly connected to a central spar 56 aligned with a corresponding spar 26 on roof 12. The outer, inclined margins of panels 54 are coupled by hinges 58 to the adjacent sections 16 whereby the sidewall panels 54 are hingedly connected to roof 12 in a manner to permit collapse of the sidewall means with the roof and the floor into a flattened configuration shown in FIG. 17. When collapsed, the sidewall panels extend outwardly from roof 12 and receive therebetween the portions of the adjacent floor panels 32 which project outwardly from roof 12. This feature is shown in FIG. 17, wherein one of the sidewall panels 54 is broken away to reveal the floor panels 32 adjacent thereto.

Each of the openings 52 can be covered by a pair of sidewall panels 54 in the manner described. Also, a pair of sidewall panels 54 can be provided with door or window openings and one or more of the openings 52 can be left uncovered to permit building 10 to be used to form a building complex of the type shown in FIG. 3.

The use of sidewall panels 54 assures that the roof 12 can expand only to a maximum amount. The hinged connection of panels 54 with sections 16 limits the outward travel of sections 16 during the expansion of the building. Additional means can be provided to hold sections 16 fixed relative to each other after they have been expanded so that sections 16 will not pivot relative to each other such as when they are subjected to wind or other forces.

FIGS. 18 and 18a show another way of hingedly connecting a pair of adjacent roof sections or a pair of ad-

jacent floor panels when it is desired to maintain a space between the sections or panels for nesting purposes. To illustrate the structure of this hinge, a pair of adjacent roof sections **16** have respective wedge-shaped members **60** secured to their inner surfaces, a pair of plates **62** of a hinge have a hinge pin **64** and are secured to members **60** with the hinge pin disposed inwardly and centrally of sections **16**. In the expanded condition (FIG. **18**), sections **16** converge toward each other and are provided with beveled extremities having sealing strips **66** which are in juxtaposition with each other for sealing purposes. In the collapsed condition as shown in FIG. **18***a*, sections **16** are substantially parallel with each other to provide the space for receiving a pair of floor panels **32** therebetween. Other configurations of the extremities of sections **16** can be used, if desired. For instance, the configuration of FIG. **20** can be used wherein a pair of sections **16** converge toward and engage each other when roof **12** is expanded. A hinge **68** is secured to a pair of rigid members **70** connected to respective sections **16** with the hinge having its hinge plates arranged to define a channel member when the roof sections are expanded, whereby the hinge will increase the structural length of the roof joint.

FIGS. **19** and **19***a* show the hinge mounting of a pair of adjacent hinge sections **16** connected at margins **20** thereof by a hinge **72** whose hinge pin **74** is adjacent to margins **20**. Thus, when the sections move from the expanded condition of FIG. **19** to the collapsed condition of FIG. **19***a*, the sections will be substantially in side-by-side relationship to each other for nesting between a pair of floor panels **32**.

The features of FIGS. **18–20** can be utilized with floor **14** as well as with roof **12**. For instance, the hinge joint of FIGS. **12** and **13** can be replaced by the construction of FIGS. **18** and **18***a* or by that of FIG. **20**. This will eliminate spar **40** and, instead of a pair of hinges on opposite sides of a spar, a single hinge will be utilized. Similarly, the construction of FIGS. **19** and **19a** can be used for the junction between adjacent panels **32** along their margins **34**.

Hinges **31**, if the same are conventional, cause the roof **12** to be configured, when collapsed, with the outermost sections **16** slightly out of parallelism with the roof sections therebetween. The reason for this is that conventional hinges are of a finite width such that the hinges take up space which causes the center parts of the outer sections **16** to bulge outwardly and, therefore, be slightly out of parallelism with the roof section **16** next adjacent thereto. This tendency to bulge outwardly ordinarily places a stress on the outermost hinge pins connected to spar **26** so that these hinge pins should be removed as a step in effecting the collapse of building **10** so as to prevent the hinge pins from being sheared off.

To avoid this problem, a hinge, denoted by the numeral **76** and shown in FIGS. **21** and **22** is provided at each junction of roof **12** and floor **14**, specifically at the lower ends of margins **20** of sections **16**. Hinge **76** includes a rigid strip **78** which preferably extends to the top of building **10** and has a pair of longitudinal side edges connected by hinges **79** to the rearmost edges of the corresponding sections **16**. The outermost margins **80** of such sections are free and normally spaced apart when building **10** is in the expanded condition with section **16** disposed as shown in FIG. **21**. The width of strip **78** is twice the thickness of each section **16** so that the sections can be in juxtaposition or coplanar when the building is collapsed.

The bottom end of strip **78** is connected by a hinge pin **82** to a spar **40** of floor **14**. The width of strip **78** is substantially the same as that of spar **40** so that strip **78** can be nested between the two adjacent floor panels **32** when building **10** is collapsed and when the adjacent sections **16** are in juxtaposition with each other.

With the use of hinge **76**, building **10** can be collapsed and thereby disposed with the roof sections and floor panels substantially parallel with each other at all times. The hinge pins **82** do not need to be removed in order to achieve such parallelism. Thus, hinge **76** avoids the problems of conventional hinges and prevents the building up of any stress on the various hinge pins **82**.

Building **10** can be placed on any suitable surface but oftentimes it is preferable to position the same slightly above ground and to this end, a collapsible frame **84** is provided. Frame **84** defines a subfloor for floor **14** which can be itself collapsed so that it is suitable for transfer to and from a building site. Frame **84**, therefore, adds to the portability of building **10** and renders it more versatile in that the building can be set up at a variety of building sites without requiring any substantial improvements of the land or site on which the building is to be disposed.

Frame **84** preferably has the same configuration as floor **14**. Other configurations can be used, if desired.

The preferred embodiment of frame **84** includes a number of radial beams **86** of substantially the same length, each pair of adjacent beams **86** having a central beam **88** therebetween and of a slightly shorter length. A pair of inner braces **90** and a pair of outer braces span the distance between beam **88** and respective beams **86**.

Each beam **88** has a pair of blocks **94** which carry hinges **96** attached to the corresponding beams **86** (FIG. **24**), whereby beams **86** can swing from the angular positions thereof as shown in FIG. **23** to the parallel positions as shown in FIG. **24**. Also, each brace **90** is pivoted by a hinge **98** to the adjacent beam **86** and is provided with a releasable fastener **100** for securing the inner end of each brace **90** to beam **88**. Similarly, each beam **92** is pivotally coupled by a hinge **102** to the corresponding beam **86** and is releasably secured by a fastener **104** to beam **88**. When braces **90** and **92** are unfastened from beam **88**, they are swung to positions parallel to respective beams **86**, whereupon beams **86** can then be swung to the parallel positions of FIG. **24**.

Each beam **86** has a block **94** on each side thereof and a beam **88** is connected to each block **94**, respectively. When frame **84** is expanded, it has the configuration of FIG. **23** and when it is collapsed, it has the configuration of FIG. **24** with all of the beams and the braces substantially parallel with each other.

In use, frame **84** is initially in its collapsed condition and carried in this manner to a building site, at which site the frame is placed on the ground and the various beams **86** are swung apart and into the radiating positions of FIG. **23**. Braces **90** and **92** are then swung out of parallelism with respective beams **86** so that they ex-

tend transversely of such beams and permit connection with beams **88**. After the braces have been fastened to beams **88**, the frame is ready for use and floor **14** of building **10** can be placed on the frame and thereby be supported above ground (FIG. **24***a*).

To maintain frame **84** itself above ground, each beam **86** may be provided with a leg **106** (FIG. **24***a*) at each of its inner and outer ends. Leg **106** may be of any configuration and can be of any length, as desired. Beams **86** and **88** and braces **90** and **92** can be of any suitable material, such as wood, metal or the like. When frame **84** is collapsed, it is sufficiently compact to facilitate its being moved from place to place with a minimum of effort.

Frame **84** is especially suitable for use in leveling floor **14** when frame **84** supports building **10**. To this end, legs **106** of frame **84** are made adjustable in height so that they can render the upper, effective support surface of frame **84** substantially horizontal regardless of the slope of the terrain therebelow.

Another aspect of the subfloor defined by frame **84** is that it can be hingedly connected to floor **14** in some suitable manner to form part of building **10**. Used in this manner, frame **84** could collapse with floor **14** and be carried as a unit.

I claim:

1. A building construction comprising: a roof having a plurality of generally triangular sections, each section being hingedly connected to the sections adjacent thereto to permit the roof to be expanded and collapsed; means coupled with the sections for holding the same against further expansion beyond predetermined expanded positions relative to each other when the roof is expanded; and a floor hingedly coupled to said roof and having a number of generally triangular panels, each panel being hingedly connected to the panels adjacent thereto, said roof and said floor being movable together from expanded conditions with said panels disposed below said sections to collapsed conditions with said sections being in stacked relationship to each other and with at least certain of said panels being in nested relationship with said sections.

2. A portable building comprising: a roof assembly having a plurality of hingedly interconnected roof sections, said assembly being movable from a collapsed condition with the roof sections substantially parallel with each other to an expanded condition with the roof sections overlying a surface area to be covered; a floor assembly having a plurality of hingedly interconnected floor panels and being hingedly interconnected with said roof assembly, said floor assembly being movable with said roof assembly from a collapsed condition with the floor panels substantially parallel with said roof sections to an expanded condition with the floor panels in covering relationship to said surface area, whereby the floor assembly underlies said roof assembly.

3. A building as set forth in claim **2**, wherein each roof section is substantially triangular and has one extremity hingedly coupled to said floor assembly.

4. A building as set forth in claim **2**, wherein said floor assembly is spaced from said roof assembly, and including sidewall means spanning the distance between said assemblies and hinged thereto.

5. A building as set forth in claim **2**, wherein said roof and floor assemblies define a plurality of side openings when the assemblies are in respective expanded conditions, and wherein is included a sidewall panel for each opening respectively, the sidewall panels being hingedly connected to said roof assembly for covering said openings when the assemblies are in their expanded conditions, said sidewall panels being movable to positions in substantial parallelism with the roof sections and the floor panels when said assemblies are in respective collapsed conditions.

6. A building as set forth in claim **1**, wherein each roof section has a normally uppermost extremity, said holding means including structure connected to the uppermost extremities of said roof sections.

7. A building as set forth in claim **1**, wherein each pair of adjacent roof sections have respective, generally contiguous, longitudinal, hingedly interconnected edges, there being hinge means defining a double hinge line for the contiguous edges of certain pairs of adjacent roof sections, said holding means including structure adjacent to the contiguous edges of said certain pairs of adjacent roof sections respectively.

8. A portable building as set forth in claim **2**, wherein certain of said roof sections are spaced apart when the roof is in its collapsed condition, certain of said floor panels being in side-by-side relationship and disposed within the space formed by a respective pair of said certain roof sections when said floor unit is in its collapsed condition.

9. A portable building comprising: a roof having a plurality of roof sections, each roof section having a pair of edges contiguous to corresponding edges of a pair of adjacent roof sections; means hingedly interconnecting the contiguous edges of each pair of adjacent roof sections, respectively, whereby said roof can be expanded and collapsed; and a floor hingedly coupled to said roof and having a number of panels, each panel being hingedly connected to the panels adjacent thereto, said roof and said floor being movable together from expanded conditions with said panels disposed below said sections to collapsed conditions with said sections being in stacked relationship to each other and with at least certain of said panels being in nested relationship with at least certain of said sections.

10. A portable building as set forth in claim **9**, wherein said hingedly interconnecting means comprises structure defining a single hinge line for each pair of adjacent roof sections.

11. A building construction comprising: a roof having a plurality of sections, each section being hingedly connected to the sections adjacent thereto to permit the roof to be expanded and collapsed; a main floor hingedly coupled to said roof and having a number of panels, each panel being hingedly connected to the panels adjacent thereto to permit the floor to be expanded and collapsed, said roof and said floor being movable together from expanded conditions with said panels disposed below said sections to collapsed conditions with said sections being in stacked relationship to each other and with at least certain of said panels being in nested relationship with said sections; and a collapsible subfloor positionable below said main floor for supporting the latter and said roof when the same are in their expanded conditions.

12. A building construction comprising: a number of buildings, each building having a roof provided with a

plurality of roof sections, each roof section being hingedly connected to the sections adjacent thereto to permit the roof to be expanded and collapsed, and a floor hingedly coupled to said roof and having a number of floor panels, each panel being hingedly connected to the panels adjacent thereto, said roof and said floor of each building being movable together from expanded conditions with said panels disposed below said sections to collapsed conditions with said sections being in stacked relationship to each other and with at least certain of said panels being in nested relationship with said sections, said buildings being arranged relative to each other with at least a pair of buildings in side-by-side contiguous relationship, whereby the contiguous pair of building define a building complex.

13. A building comprising: a roof having a plurality of sections, each section being hingedly connected to the sections adjacent thereto to permit the roof to be expanded and collapsed; a floor having a number of panels, each panel being hingedly connected to the panels adjacent thereto to permit the floor to be expanded and collapsed; and means hingedly interconnecting the roof sections with respective floor panels at locations permitting the roof and floor to be movable together from expanded conditions with said floor disposed below said roof to collapsed conditions with said roof sections and said floor panels in stacked relationship.

14. A portable building comprising: a roof having a plurality of roof sections, each roof section having a pair of edges contiguous to corresponding edges of a pair of adjacent roof sections; means hingedly interconnecting the contiguous edges of each pair of adjacent roof sections respectively, whereby said roof can be moved from an expanded condition with the roof sections angularly disposed relative to each other to a collapsed condition with the roof sections substantially parallel with each other; a collapsible floor; and means hingedly connecting the floor to said roof unit, said connecting means including a strip secured to the contiguous edges of at least one pair of adjacent roof sections, said floor having a spar terminating adjacent to the lower end of the strip, said strip having a width substantially equal to that of said spar, and a hinge pivotally securing said strip at its lower end to said spar.

15. A portable building comprising: a roof having a plurality of roof sections, each roof section having a pair of edges contiguous to corresponding edges of a pair of adjacent roof sections; means hingedly interconnecting the contiguous edges of each pair of adjacent roof sections respectively, whereby said roof can be moved from an expanded condition with the roof sections angularly disposed relative to each other to a collapsed condition with the roof sections substantially parallel with each other; and a collapsible floor, said roof being positionable on said floor for support thereby, said interconnecting means including a hinge structure coupled to a pair of roof sections for moving the same from angled, operative positions to generally parallel, collapsed positions to define a space therebetween, said hinge structure including a hinge pin centrally disposed between and spaced from the corresponding roof sections.

16. A building construction comprising: a roof having a plurality of generally triangular sections, each section being hingedly connected to the sections adjacent thereto to permit the roof to be expanded and collapsed, one end of each roof section being adjacent to the outer periphery of the roof when the latter is expanded; and means connected with the ends of at least certain of said roof sections and extending inwardly of said outer periphery when said roof is expanded for determining the expansion thereof.

17. A building constructions as set forth in claim 16, wherein said determining means is hingedly coupled to the ends of said certain roof sections.

18. A building construction as set forth in claim 16, wherein said determining means includes a collapsible floor having a number of hingedly interconnected, generally triangular floor panels, there being a floor panel for each of said certain roof sections, respectively, each floor panel being hingedly connected to the end of the respective roof section, said floor being collapsible with said roof.

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