United States Patent [19]

Welz

[11] **3,731,440**

[45] **May 8, 1973**

[54] **COLLAPSIBLE PREFABRICATED BUILDING**

[76] Inventor: **Hans-Joachim Welz,** Hindenburgstr. 56, Korntal, Germany

[22] Filed: **Apr. 13, 1971**

[21] Appl. No.: **133,626**

[52] **U.S. Cl.** **52/71,** 52/227, 52/309

[51] **Int. Cl.** **E04b 1/343**

[58] **Field of Search**.....52/71, 64, 69, 220, 52/230, 227, 288, 309, 464, 503, 108

[56] **References Cited**

UNITED STATES PATENTS

2,886,856	5/1959	Che	52/69
3,503,170	3/1970	Shelley	52/79
3,407,546	10/1968	Yates et al.	52/309
3,060,640	10/1962	Harris	52/230
3,464,168	9/1969	Russel et al.	52/227
2,751,635	6/1956	Donnahue	52/79
2,611,454	9/1952	Arehert et al.	52/71
3,156,018	11/1964	Slayter	52/79
3,372,518	3/1968	Rensch	52/227
3,494,092	2/1970	Johnson et al.	52/69
3,553,923	1/1971	Dompas	52/79
1,397,976	11/1921	McAvoy	52/227
2,590,685	3/1952	Coff	52/230
3,195,190	7/1965	Malo	52/79
3,562,973	2/1971	Gangemi	52/309
3,257,760	6/1966	Calthorpe	52/71
3,469,356	9/1969	White	52/71
2,701,038	2/1955	Mooney	52/69

FOREIGN PATENTS OR APPLICATIONS

6,804,097	10/1968	Netherlands	52/79
775,773	5/1957	Great Britain	52/309

Primary Examiner—John E. Murtagh
Assistant Examiner—Leslie A. Braun
Attorney—Michael S. Striker

[57] **ABSTRACT**

A collapsible prefabricated building is composed of walls some or all of which may be made up of plate sections connected by ropes or hinges in such a manner that they can be folded together to make a package composed of the superimposed stacked plate sections, with the building being erectable simply by folding the plates apart and having them assume their predetermined relative positions.

16 Claims, 17 Drawing Figures

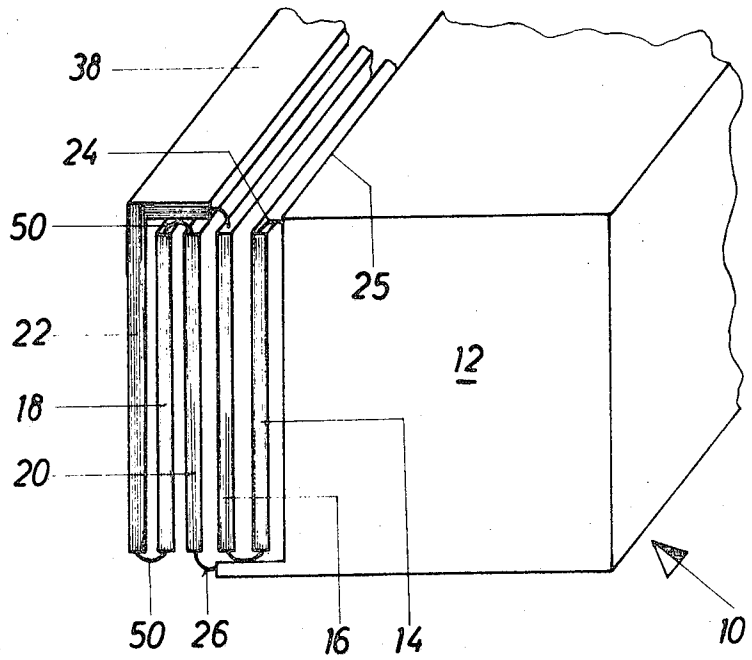
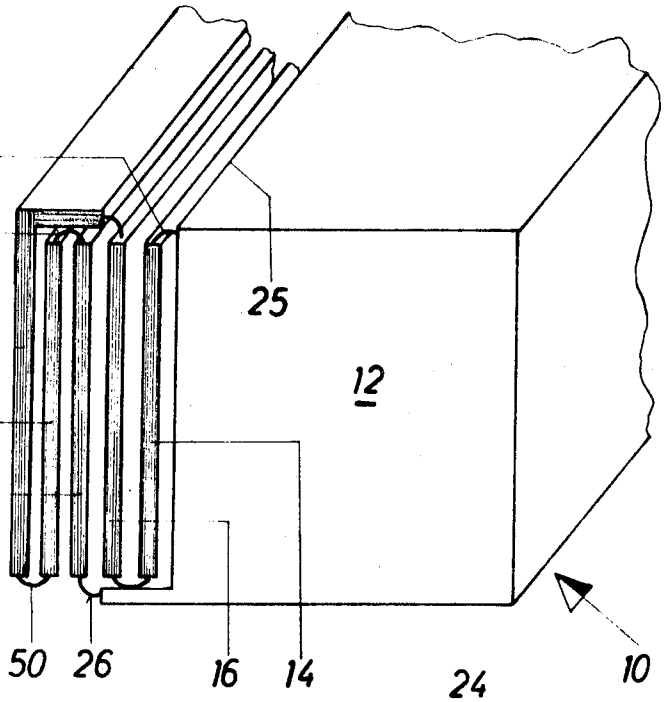


FIG.: 1



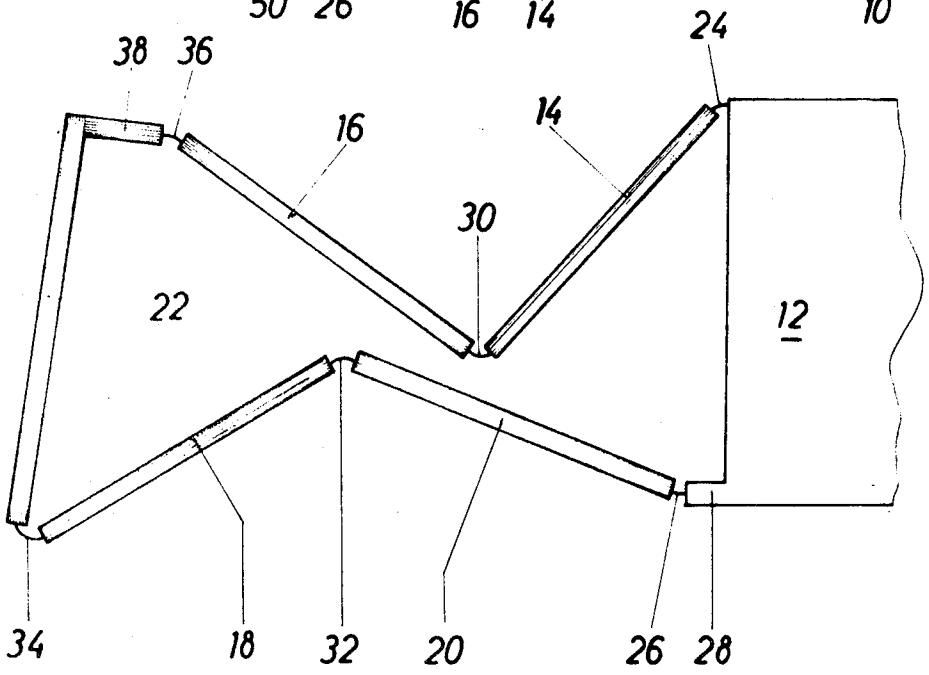


FIG.: 2

INVENTOR
HANS JOACHIM VELZ
BY Leonard J. Stickney
ATTORNEY

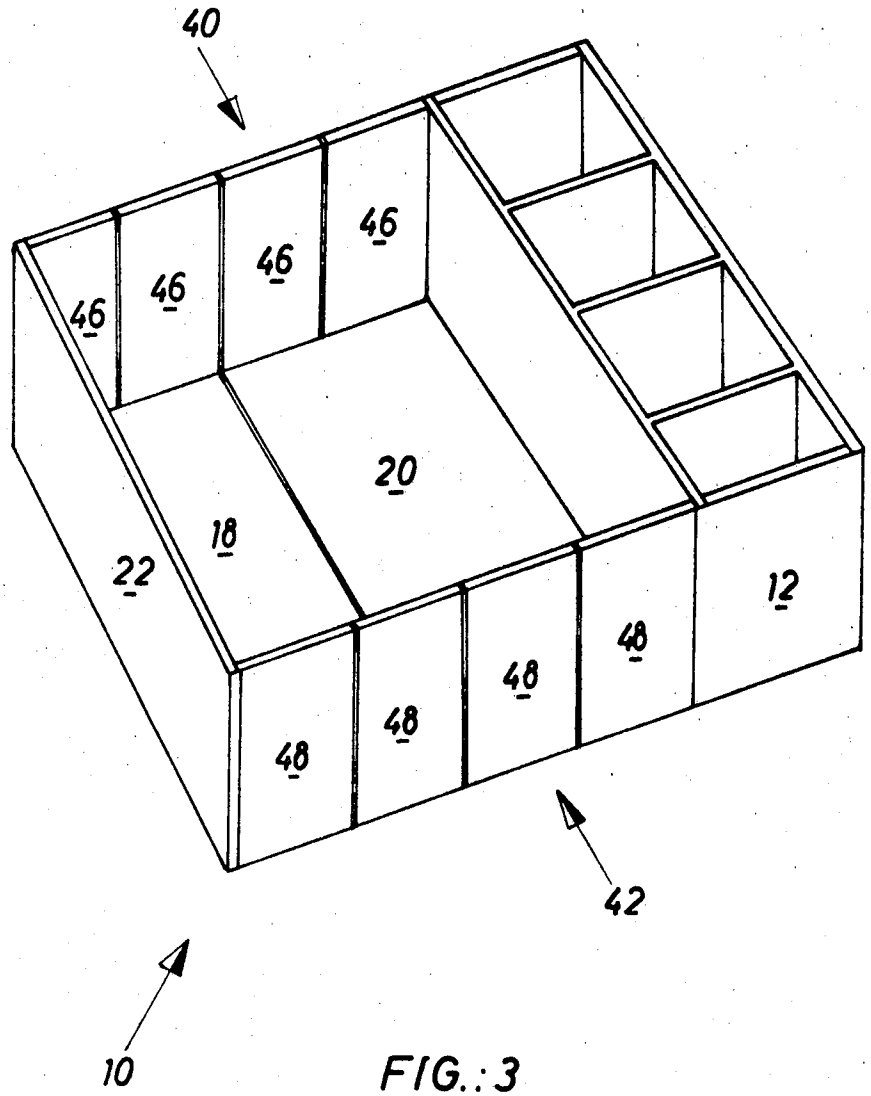


FIG.: 3

INVENTOR
HANS-JOACHIM WEGZ
BY

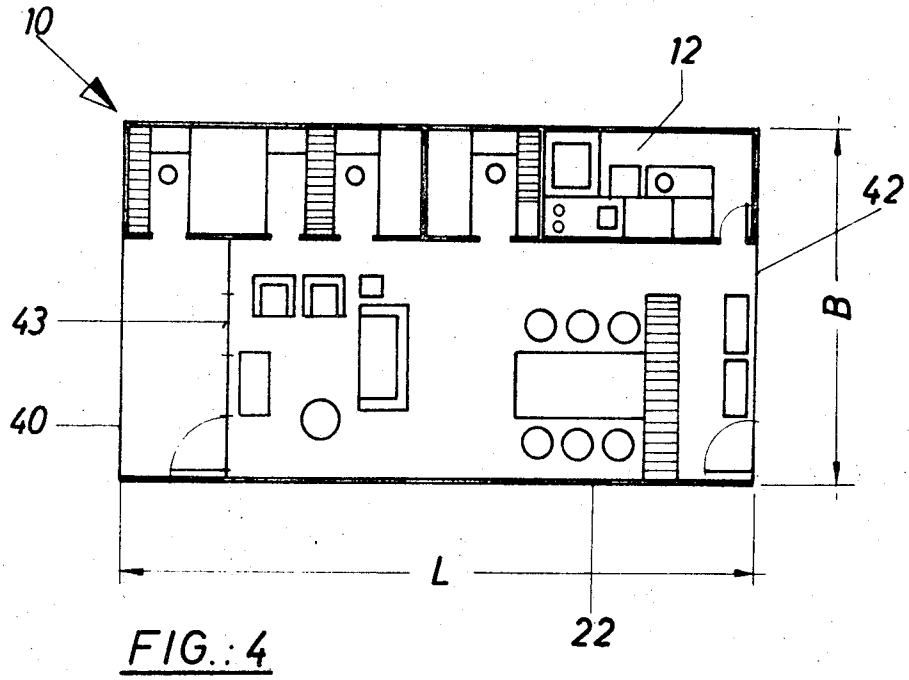


FIG.: 4

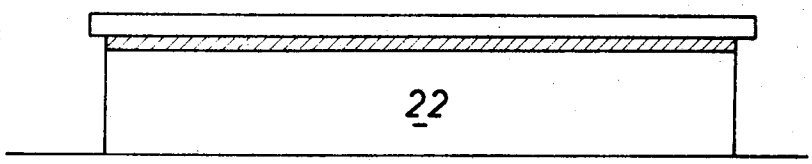


FIG.: 4a

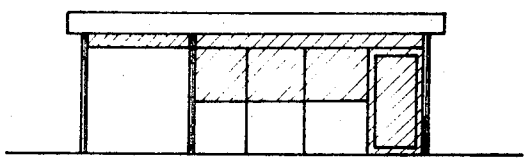


FIG.: 4b

INVENTOR
HANS-JOACHIM WEGZ

BY
Attorney

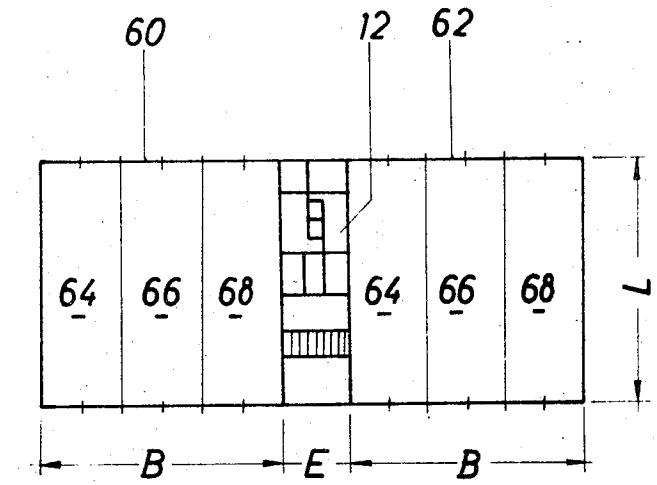


FIG.: 5

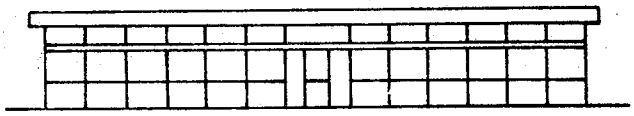


FIG.: 5a

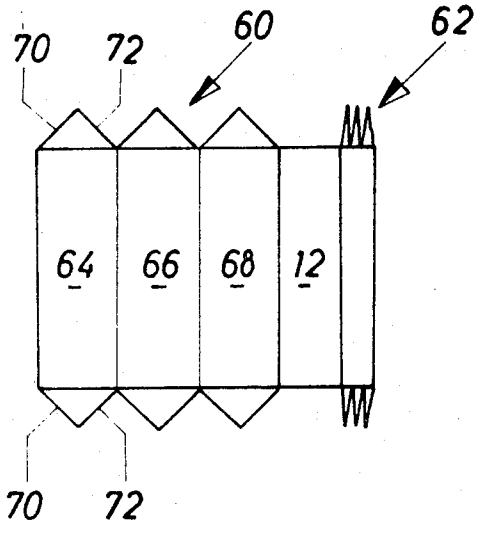


FIG.: 5b

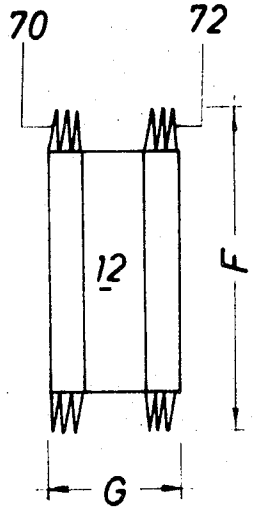


FIG.: 5c

INVENTOR.
HANS-JOACHIM WELZ
BY
Lindon S. Stetler
Attorney

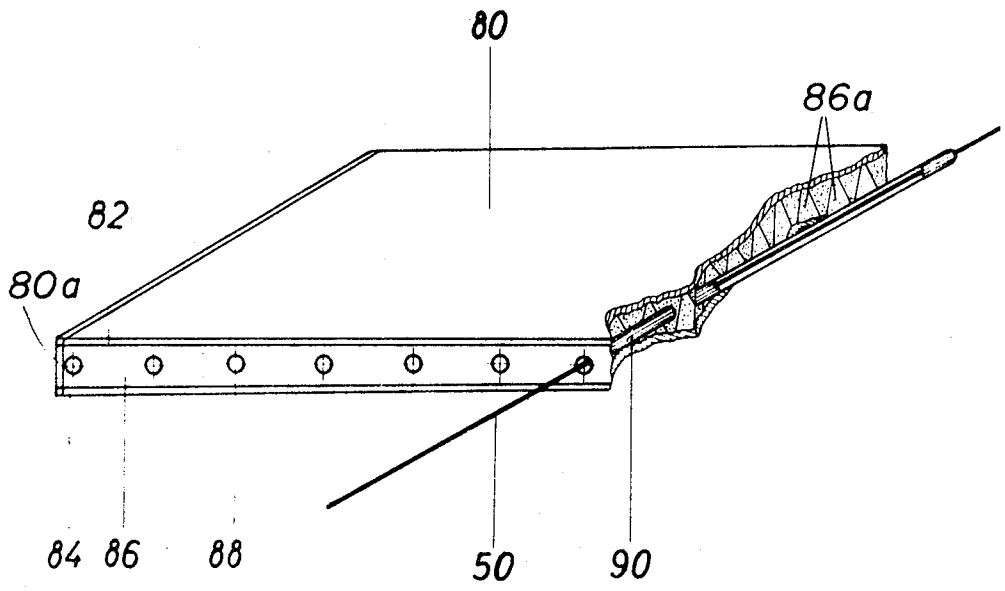


FIG. 6

INVENTOR.
HANS-JOACHIM WEGZ
BY
Nelson S. Stiles
Attorney

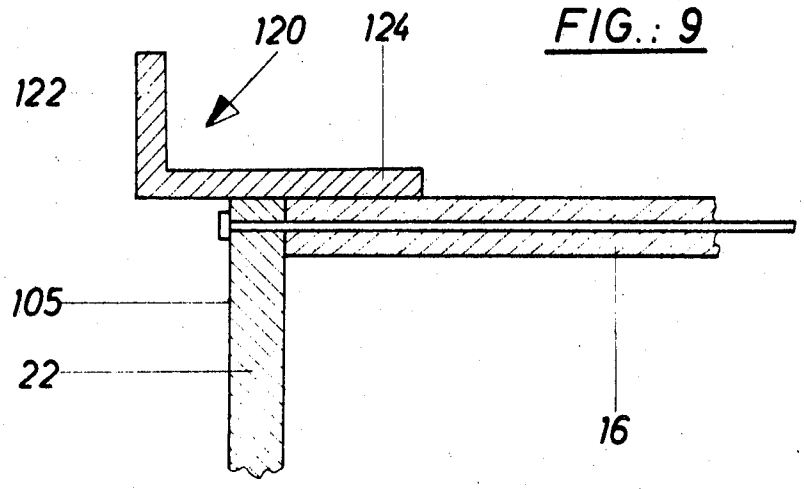


FIG.: 9

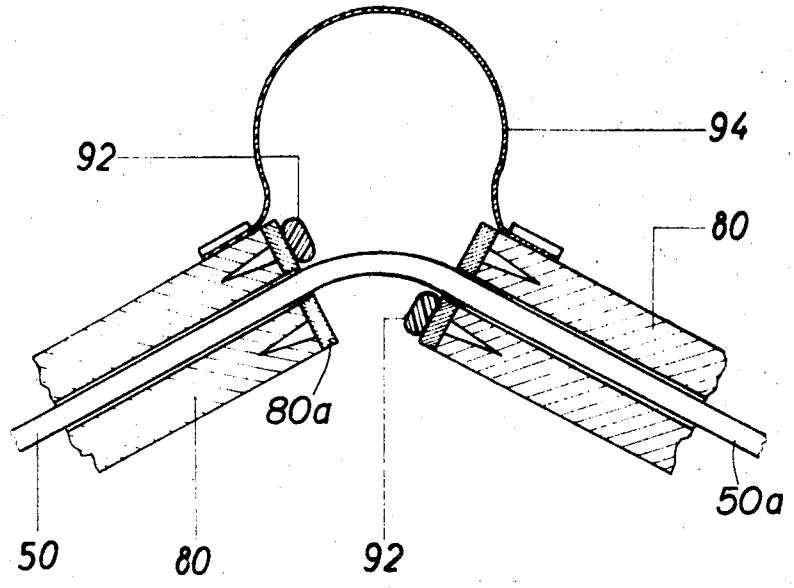


FIG.: 7

INVENTOR.
HANS-JOACHIM WELZ
BY
Ludlow & Stickler

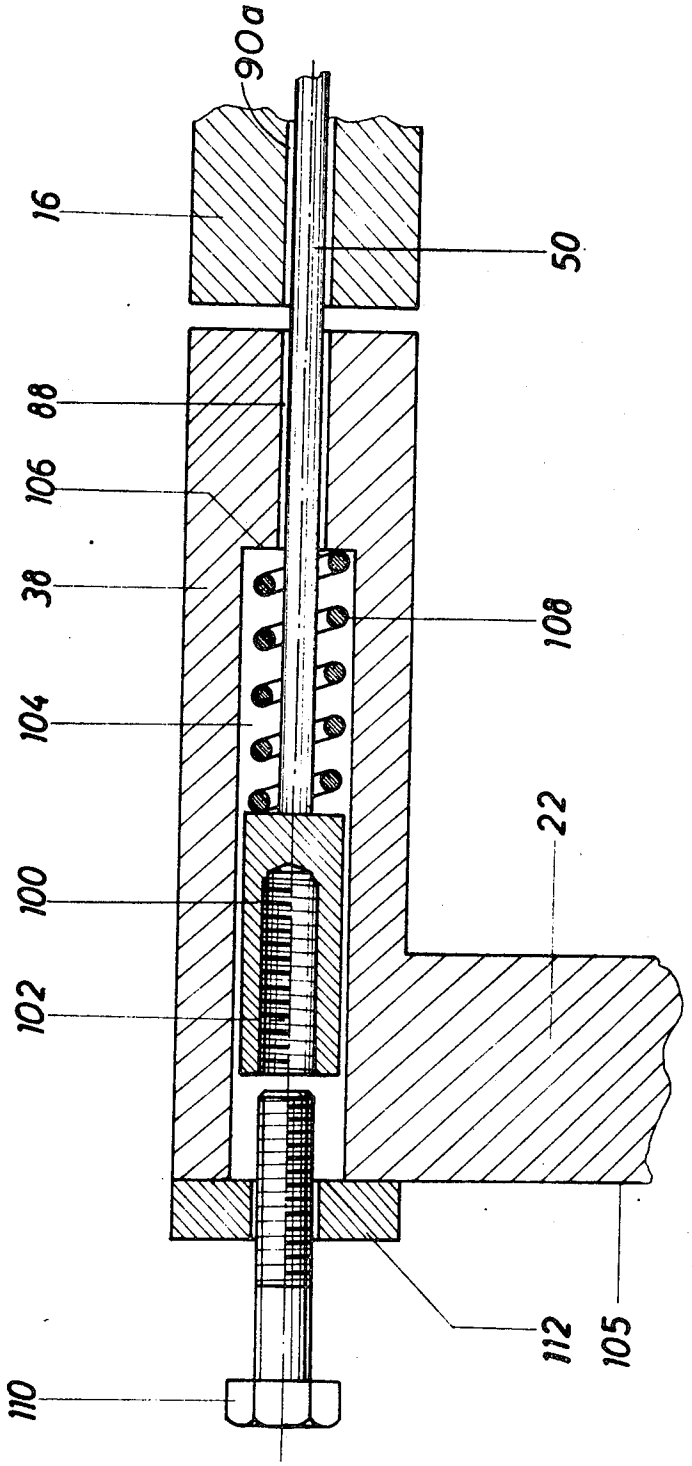


FIG. 8

INVENTOR.
HANS-JOACHIM WELZ
BY
Adam S. Steiner
Attorney

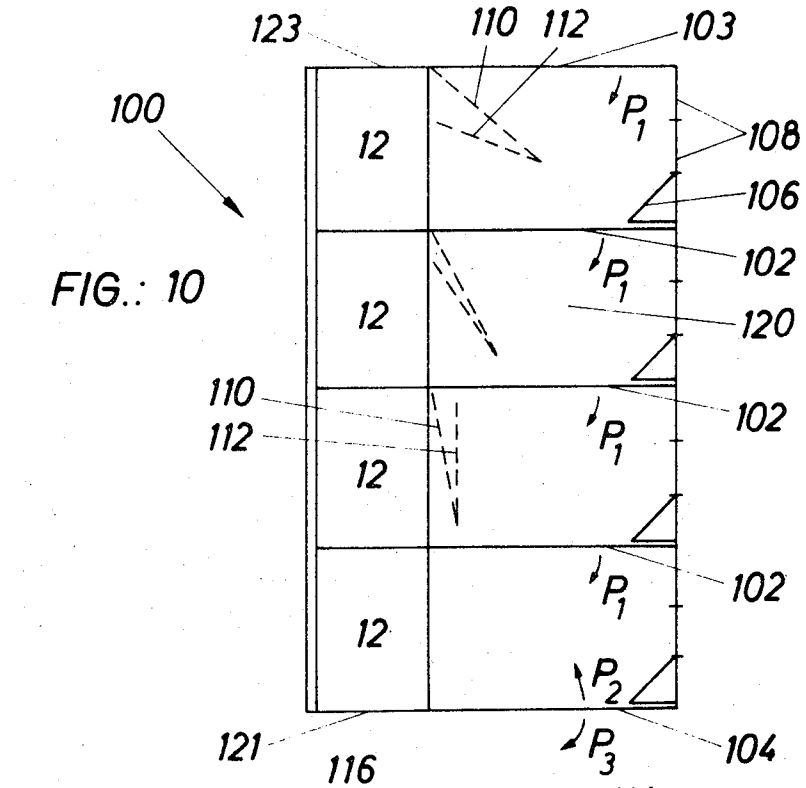


FIG.: 10

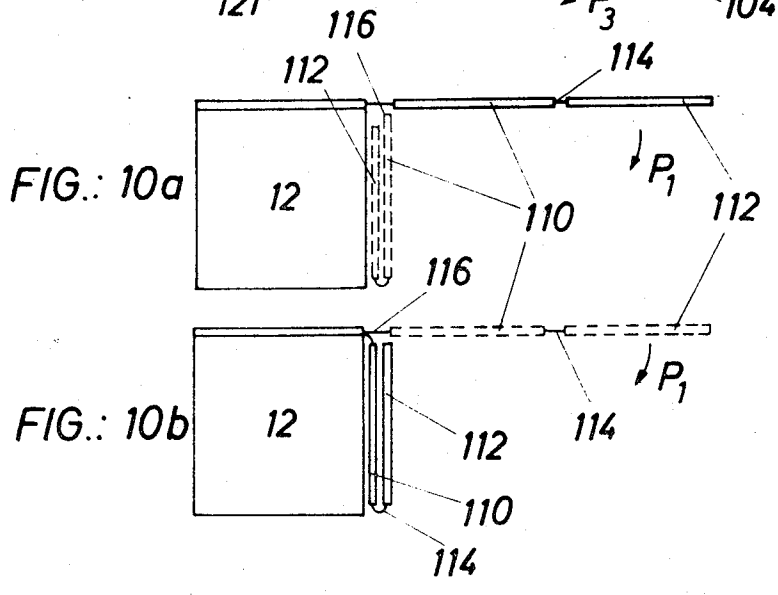


FIG.: 10a

FIG.: 10b

INVENTOR
HANS-JOACHIM WELZ
BY
Attorney

COLLAPSIBLE PREFABRICATED BUILDING

BACKGROUND OF THE INVENTION

The present invention relates generally to building structures, and more particularly to portable buildings. Still more specifically, the present invention relates to a portable prefabricated collapsible building.

Prefabricated buildings, such as houses or the like, are already known. Generally speaking the individual structural components thereof—whether they be of wood, concrete, metal or like—are prefabricated at a manufacturing site—that is for instance a factory—and are then transported to the erection site where they are connected to erect the building. Undeniably, this type of prefabricated building can be erected much more quickly than conventionally constructed buildings; however, despite the savings in time which have already been achieved, the time and expenses required for erecting and connecting the individual constituent components even of such prefabricated structures is still rather substantial. This is quite aside from the fact that the structural components themselves quite frequently are of relatively complicated configuration, being provided with projections, cut-outs, recesses, dowels, grooves or the like by means of which the necessary assembly operations are carried out, that is which aid in assembling the components into a rigid building structure. The complicated construction of such components of course is reflected in the manufacturing cost.

SUMMARY OF THE INVENTION

It is, accordingly, an object of the present invention to overcome the above-outlined disadvantages of the prior art.

More particularly it is an object of the present invention to provide a prefabricated building the structural components of which form a unit and which can be collapsed and stored and transported in such condition, with the building being erectable at a chosen site simply by reversing the collapsing process.

A concomitant object of the present invention is to provide such a construction which permits collapsing and erecting of the building in the shortest possible period of time.

In pursuance of the above objects, and of others which will become apparent hereafter, one feature of the invention resides, briefly stated, in a collapsible prefabricated building comprising wall means which is adapted to surround an enclosed space and composed at least in part of a plurality of plate sections. Linking means links the wall means for relative freedom of movement of the plate sections in a sense enabling displacement of these sections between an erected condition in which the wall means surrounds the enclosed space, and a folded condition.

A building constructed according to the present invention can be fully assembled at a manufacturing site, with floor, ceiling and walls already being connected with one another. Once the connection of the various components in their proper relative relationship has been carried out, that is once the building has been assembled at the manufacturing site, it is collapsed by folding the plate sections in such a manner as to obtain a package which can then be transported to the building site. To erect the building at the building site it is simply necessary to fold the plate sections apart, that is to reverse the folding process which has taken place at the manufacturing site, until the various sections define the floor, the ceiling and the side walls—and also intermediate divider walls if such are provided—whereupon they are locked in place by suitable tensioning means.

It will be appreciated that with a building constructed in accordance with the present invention, transportation as well as storage is considerably simplified because all components of the basic structure are connected but the structure itself can assume when in collapsed condition, the form of a more or less rectangular or quadratic compact package or block. This evidently decreases the space requirements of the constituent components during storage as well as transportation, and also reduces the transportation expenses involved. Moreover, in collapsed condition the building according to the present invention can be readily handled, for instance by cranes or other lifting devices, all of these features being considerable advantages in addition to the fact that the building can be erected on the building site within a period of time of such brevity as has heretofore not been achieved.

It is particularly advantageous, although by no means mandatory, that the building be in part composed of a rigid basic cell component, that is a building portion which is not collapsible and which may contain certain instllations—such as bath, lavatory, kitchen and/or other similar installations—which can best be pre-installed during the manufacture of the building. In this case the collapsible wall means is connected with this rigid cell component and is unfolded and erected at the building site. At least two of the collapsible components or plate sections, for instance a ceiling plate section and a floor plate section will be connected with the rigid cell components. It is also advantageous if the end walls of the building are themselves composed of collapsible plate sections and, in the event that the building is of the type whose interior is subdivided by divider walls, if these divider walls are themselves also composed of collapsible plate sections.

The plate sections themselves are advantageously in form of panels composed of relatively thin cover layers which are transversely spaced and the distance between which is filled with synthetic plastic foam material bonded to the inner sides of the cover sheets or layers. The foam material may be suitably reinforced by embedded ribs or the like and such a compound construction for building panels is already known. According to the present invention, however, it is advantageous if the inner foam layer of the panels is provided with a plurality of parallel passages or hollows which extend between two transversely spaced opposite edge portions of the respective panel, with ropes or the like—which according to one embodiment may constitute the linking means which articulately connects the panels—passing through the respective hollows. Such ropes or cables—which terms will be employed herein to designate any suitable elongated flexible means which can be used for this purpose, may advantageously—but need not be—in form of fiberglas cables which also may be sheathed in synthetic plastic material, especially polyvinylchloride. Cables of this type have been found to be advantageous for such use, having been proven to be sufficiently elastic to permit

the plate sections to be folded between collapsed and erected condition, and on the other hand to be sufficiently strong to be able to withstand the amount of tensioning needed after erection to maintain the plates in erected condition, that is to maintain the building in usable state.

In erected condition the plate sections will abut with their respectively adjacent edge faces. In order to provide a seal at these junctures the present invention provides, according to a further embodiment, that sealing elements or lips extending along these edge faces be provided, which may for instance consist of a flexible elastic synthetic plastic and which provide a seal between the juxtaposed edge faces when the plate sections are in erected condition. In addition to or in place of these sealing lips, foil strips of suitable material, such as synthetic plastic, may also be provided which overlie the respective junctures—preferably at the exterior of the building—and provide the necessary sealing action. These foil strips will then be secured to the adjacent plate sections in the region of the edge portions thereof whose edge faces will abut when the plate sections are in erected condition.

It is hardly necessary to emphasize that in place of ropes or similar means for articulate linking of the plate sections, other means such as hinges may also be utilized.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary perspective view of a building according to one embodiment of the invention, in collapsed condition;

FIG. 2 is an end view of the embodiment in FIG. 1, showing in partially erected condition;

FIG. 3 is a top perspective illustrating an erected building somewhat different from that of FIGS. 1 and 2, with the roof omitted to show interior details;

FIG. 4 is a top-plan view of the building in FIG. 3;

FIG. 4*a* is a side elevation of the building in FIG. 3;

FIG. 4*b* is an end elevation of the building shown in FIG. 4*a*;

FIG. 5 is a diagrammatic top plan of a further embodiment of the invention;

FIG. 5*a* is a side elevation of FIG. 5;

FIG. 5*b* is a top plan showing the building of FIG. 5 in partially collapsed condition;

FIG. 5*c* is a view similar to FIG. 5*b* but showing the building in completely collapsed condition;

FIG. 6 is a fragmentary perspective view, partially broken away, illustrating a panel for use in the novel building;

FIG. 7 is a fragmentary sectional detail view illustrating sealing of the juncture between two abutting panels;

FIG. 8 is a fragmentary sectional detail view illustrating an arrangement for tensioning of the linking means to maintain the panels of a building according to the present invention in erected condition;

FIG. 9 is a fragmentary sectional view illustrating reinforcing means for use in conjunction with a building according to the present invention;

FIG. 10 is a top-plan view illustrating a further embodiment of the invention;

FIG. 10*a* is a top-plan view showing the building of FIG. 10 in partially collapsed condition; and

FIG. 10*b* is a top-plan view showing the building of FIG. 10 in completely collapsed condition.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing in detail firstly FIGS. 1 and 2, it will be seen that the building 10 according to the present invention, which is shown there only fragmentarily, is in collapsed condition. This building 10 comprises a basic structural unit in form of a rigid cell 12 which cannot be collapsed and in which such installations as kitchen, bathroom or the like are to be housed. There are further provided panels 14, 16, 18, 20 and 22. Of these, plate or panel 14 is connected at 24 with the upper longitudinal edge 25 of the structural component 12, and panel 20 is similarly connected at 26 with the lower longitudinal edge of the component 12, both connections being articulate. As FIGS. 1 and 2 clearly show, the component 12 is provided on its floor or bottom wall with a longitudinally projecting nose 28 to which the panel 20 is connected and which will be discussed subsequently.

FIG. 2 shows that panel 14 is articulately connected with panel 16 at 30, whereas panel 20 is articulately connected with panel 18 at 32. Panel 18 in turn is connected at 34 in articulate manner with the panel 22 which constitutes and end wall of the building when the same is erected, and the panel 16 is similarly articulately connected with the panel 22 at 36. Actually, the connection at 36 is with a nose or projection 38 which extends along the edge portion of the panel 22 which in the erected condition of the building will be the upper edge of this panel and which will be discussed subsequently, it being understood at this point however that the projection 38 corresponds to the nose 28 of the component 12.

The building 10 is assembled at the manufacturing site and then collapsed to the position shown in FIG. 1. In this condition it forms a compact block or package which requires comparatively little space and which can be quite readily transported. It is shipped in this condition to the building site where it is to be erected. To effect this erection it is simply necessary to move the panel 22 towards the left—assuming that the package is positioned at the building site in the condition shown in FIG. 1—whereupon the panels 14, 16, 18 and 20 become folded apart in the manner illustrated in FIG. 2 to form the ceiling (panels 14 and 16) and the floor (panels 18 and 20) of the building. Once the erection is completed the panels 14 and 16 and the panels 18 and 20 will of course be located in substantially horizontal condition whereas the plate or panel 22 will be located in vertical position. In this embodiment the articulate junctures between the panels themselves, as well as between the panel and the basic component 12, are composed of ropes 50 which will be described in more detail with reference to FIG. 6. One end of each of the ropes 50 is of course connected to

the basic component 12 and when the panels have been moved to erected condition the ropes are tensioned. How the tensioning is effected will also still be described, but it will be clear that this will lock the panels in erected condition and make the ceiling composed of the panels 14 and 16 self-supporting at least to a certain extent. It can, of course, be further reinforced by subsidiary supports such as jacks or the like, internal divider walls or even the end walls. The end walls may, incidentally, be in form of glass walls but they may also be composed of panels similar to those which constitute the ceiling and floor, and this possibility will be discussed subsequently.

FIG. 1 shows that when the building is in collapsed condition the arrangement of the panels is such that the panels 14 and 16—which subsequently on erection will form the ceiling of the building—are located adjacent the basic component 12, followed by the panels 18 and 20 which later will form the bottom or floor. The nose or projection on the component 12—and which will preferably extend over the entire length of the latter—serves in effect to bridge the thickness of the panels 14 and 16, whereas the nose or projection 38 on the panel 22 serves to bridge the thickness of the panels 18 and 20. It will be appreciated, of course, that these projections 28 and 38 may be omitted but that in this case a greater length of the linking ropes 50 will be exposed between the panel 20 and the lower longitudinal edge of the component 12, and also between the panel 16 and the upper longitudinal edge of the panel 12, by which distance the panels must then be pushed together with the building is erected and the ropes are tensioned.

Evidently the embodiment in FIGS. 1 and 2 is exemplary and for instance larger-dimensioned buildings are to be erected, more than two of the panels may be provided for the ceiling and floor, respectively. Conversely if a smaller interior space is to be provided, the end wall 22 can be directly connected with the panels 14 and 20, and the panels 16 and 18 be omitted.

The slightly modified embodiment illustrated in FIGS. 3–4*b* corresponds essentially to that of FIGS. 1 and 2, except that in this embodiment the side walls 40 and 42 are also made of panels which can be articulately folded. In FIGS. 1 and 2 such side walls were omitted and it will be understood that in that embodiment they will be separately provided, to be secured to the building when the latter is in erected condition. In FIGS. 3–4*b*, however, the side walls 40 and 42 constitute an integral part of the building itself, with the side wall 40 being composed of articulately connected panels 46 and the side wall 42 similarly being composed of articulately connected panels 48. The width of the panels 46 and 48, respectively, advantageously corresponds to half the width of the panels 18 and 20, respectively, and as FIG. 5*b* shows, the panels 46 and 48 are folded outwardly of the building when the latter is collapsed for storage or transportation. As in FIGS. 1 and 2, ropes 50 traverse the panels 46 and 48, respectively, each rope having one end connected to the basic component 12 and its other end connected to the end wall panel 22. The articulate connection of the floor panels 18 and 20 with the component 12 and the end wall panel 22 is the same as discussed with respect to FIGS. 1 and 2, and the similar connection of the ceiling panels—which have been omitted in FIG. 3 to permit a view of the interior of the building—is identically the same as in FIGS. 1 and 2. The floor plan of the building in FIG. 3 is shown in FIG. 4 and it will be seen that the basic component 12 may accommodate such installations as the kitchen, the bath, a lavatory and similar installations, whereas the actual living space is surrounded by the walls 40 and 42 as well as the end wall 22. A foldable divider wall 43 may be provided which subdivides the interior of the building.

The basic component 12 may be in form of a rigid component, for instance of synthetic plastic material which is already subdivided into individual compartments for the kitchen, the bath and the like. However, it is emphasized that it is entirely possible to make the component 12 itself of panels which are articulately connected and can be erected in the same manner as the other panels. Experience has shown, however, that for various reasons including protection against damage during transportation and also to make the completed building more readily and quickly usable once it has been erected, it is desirable that the component 12 be of rigid construction and the various installations such as kitchen, bath and the like be already accommodated in it at the manufacturing site.

Merely as a point of interest, and not to be construed in any sense as a limitation, it is pointed out that the building shown in FIGS. 3–4*b* may for instance have a depth B (see FIG. 4) of approximately 6.5 meters and a length L of approximately 12 meters.

In the embodiment of FIGS. 5–5*c* the basic component 12—corresponding to the one discussed in the preceding embodiments is located between two collapsible sections of the building. One section is identified generally with reference numeral 60 and the other with reference numeral 62 and in both sections the bottom wall or floor, the ceiling, the two side walls and one end wall are constructed of collapsible panels. The other end wall of each of the sections 60 and 62 is of course constituted by the basic component 12. Such a building is particularly well suited as a simple and rapidly erectable classroom or auxiliary school building, with the sections 60 and 62 constituting individual classrooms served by the component 12 which may contain bathrooms, storage rooms, lavatories or the like. The length L of each section 60 and 62 (see FIG. 5) may for instance be approximately 9 meters and the depth D may also be 9 meters, again with no limitation as to size being intended to be conveyed. In FIG. 5*a* I have shown an end elevational view of the building of FIG. 5, and in FIG. 5*b* I have shown in a top-plan view how the building may be collapsed for storage and shipping purposes. Section 62 in this view is already collapsed whereas the section 60 is being collapsed but is not yet in collapsed condition. The panels 64, 66 and 68 which form the ceiling—with corresponding panels not being visible but forming the floor—are folded in the same manner as discussed with respect to FIGS. 1 and 2, whereas the panels 70 and 72 constituting the side walls of the building sections are folded outwardly as shown in FIG. 5*b*. The width of each of the panels 70, 72 is advantageously half the width of the bottom and ceiling plates 64, 66 and 68. To avoid misunderstandings it is pointed out that in FIG. 5*b* the panels 70 and 72 are shown in partially forward condition purely for ex-

planatory purposes, although the panels **64**, **66** and **68** have not yet been folded.

In FIG. **5***c* the sections **60** and **62** have both been folded up against the basic component **12** and the building is now ready for transportation. The overall length of the package obtained in this manner is identified with reference character F and may be approximately 12 meters whereas the overall width G may be approximately 3.2 meters if the plates or panels **64**, **66** and **68** have a length of 9 meters and a width of 3 meters, with the panels **70** and **72** having a width of approximately 1.5 meters.

Coming now to FIG. **6** it will be seen that I have illustrated therein a panel construction which can be used for the various panels of the embodiments heretofore described and those which are still to be described subsequently. The panel in toto is identified in FIG. **6** with reference numeral **80** and composed of two cover layers **82** and **84** between which there is sandwiched a layer **86** of synthetic plastic foam material. The cover layers themselves may consist of synthetic plastic material or of a metal such as aluminum, or in fact they may consist of other suitable materials. Ribs or similar reinforcements **86***a* may be embedded in the layer **86** for reinforcing purposes; they may consist of synthetic plastic, metal, wood or the like, and may be connected or of one piece with one or both of the cover layers **82** and **84**. A grid-shaped reinforcing component may also be provided between the layers **82** and **84** if so desired, with the foam material of the layer **86** filling all space remaining between the layers **82** and **84**, that is such space which is not taken up by the grid-shaped reinforcing component.

In any case, however, the panel **80** is provided in the layer **86** with a plurality of spaced parallel or substantially parallel channels or internal hollows **88** whose diameter may but need not be on the order of between substantially 0.3 and 3 cm. It is advantageous that a tube **90** of metal or synthetic plastic be accommodated in each of the hollows **88** and extend over all or part of the elongation of the hollows. The latter, it should be understood, extend from one to an opposite edge portion of the panel **80**, and the tubes **90** serve for reinforcing purposes to protect the material of the layer **86** against damage. Instead of the provision of the single tube **90** in each hollow **88**, as illustrated in FIG. **6**, it is also possible to utilize the embodiment illustrated in FIG. **8** wherein tubular sections **90***a* are inserted into the hollows **88** at the opposite axial ends thereof. In either case, however, the tube **90** or sections **90***a* may be frictionally retained in the respective hollows **88**, or they may for instance be adhesively secured therein.

All exposed edge faces of the panels **80**, or only those at which the hollows **88** open, may be provided with protective cover strips **80***a* which are suitably secured to them. In FIG. **6** only one such cover strip **80***a* is shown and overlies one of the edge faces in which the hollows **88** do not open, but normally it will be preferred to provide the cover strips **80***a* on those edge faces where the hollows **88** do open, with protection for the other edge faces being only secondarily provided. If the cover strips **80***a* overlie the edge faces where the hollows **88** open, then they must of course be provided with apertures registering with the hollows **88** and having a diameter corresponding at least to that of the hollows **88**. Ropes **50**, for instance glass fiber ropes which may or may not be provided with sheathing **50***a* of synthetic plastic material (see FIG. **7**) pass through the tubes **90** or the sections **90***a*. The ropes may have a diameter of approximately 3 mm to approximately 30 mm, but this is not to be considered limiting in any sense. They provide for an articulate connection or consecutively arranged ones of the panels **80** which makes it possible to fold the panels, that is in the manner discussed in the preceding embodiments. The ropes **50** may of course be replaced with hinges, a possibility which has not been illustrated but which will be readily apparent to those skilled in the art. It is to be understood, however, that the ropes have the advantage that they serve not only for articulate connection but also for tensioning of the respective panels to maintain them in erected condition and to support weight which can be of importance in buildings.

In FIG. **7** I have illustrated the juncture between two consecutive ones of the panels **80**. It will be seen that for sealing purposes the edge faces of the panels **80** which will abut when the panels are in erected condition, that is when they are located in a common plane instead of being inclined as shown in FIG. **7**, are provided with sealing means, in form of sealing strips or lips **92** extending lengthwise of the respective edge face. They may consist of a suitable soft synthetic plastic material which is conformable, that is which can yield to obtain the requisite sealing effect, and they may be suitably secured to the respective panels, as by adhesive means or in other manner. Reference numeral **80***a* identifies these protective strips which overlie the exposed edge faces and in which the sealing lips **92** are secured. It is of course possible to provide only one edge face of the two abutting edge faces with such a sealing lip **92**, but in the illustrated embodiment both of the abutting edge faces are provided with such sealing lips and in FIG. **7** one of these sealing lips extends along one major side of one panel whereas the other extends along the opposite major side of the other panel to provide a dual sealing effect both at the inner side and at the outer side of the junction between the panels **80**. In place of the sealing lips **92**, or in addition to them, the junction may also be sealed by an elastic foil strip **94** which may be of synthetic plastic material and which advantageously has the configuration shown in FIG. **7**. This is preferably provided on that side which is located at the exterior of the building when the latter is erected, and is secured to the outer side of the panels **80** in suitable manner in the edge regions of the panels adjacent the edge faces which are to be abutted. Of course, such foil strips **94** extend over the entire length of the edge faces, as do the sealing lips **92**.

In FIG. **8** I have illustrated an arrangement for tensioning of the ropes **50**. It will be seen that the rope **50** (of which one is shown for exemplary purposes) passes out of the respective hollow in the panel **16**, extending through a tubular section **90***a* inserted thereinto, and passes into the projecting portion **38** of the panel **22**, with the projectng portion being provided with a similar hollow in which again a tubular section **90***a* is inserted. The end portion of the rope **50** which is accommodated in the projection **38** of the panel **22** is provided with a tensioning member **100** having the illustrated tapped bore **102**. The member **100** is located

in a bore **104** of the projection **38** which is of greater diameter than that of the hollow **88** so that a shoulder **106** is formed at the juncture of the hollow **88** with the bore **104**. It is advantageous that there will be located, surrounding the corresponding portion of the rope **50** and compressed between the shoulder **106** and the member **100**, a pressure or extension spring **108** which tensions the rope **50**. A screw or bolt **110** can be threaded into the bore **102** of the member **100** from an exposed edge of the projection **38** and can abut directly against this exposed edge or against an intermediate reinforcing member **112** provided for this purpose. Threading of the bolt **110** into the tapped bore **102** will result in tensioning of the rope **50** when such threading continues after the head of the bolt **110** abuts against the member **112** or the exposed edge of the portion **38**.

In FIG. **9** I have illustrated an embodiment which affords reinforcing of the building according to the present invention. One of the roof panels is identified with reference numeral **16** and fragmentarily shown, and the end wall panel **22** is also fragmentarily shown. For reinforcing purposes I provide a reinforcing element **120**, here illustrated as an elongated member of substantially L-shaped cross-sectional configuration. Its one leg **124** overlies the upper surface of the panel **16** which constitutes by itself or in conjunction with other panels the ceiling of of the building and is secured thereto and/or to the upper edge of the end wall panel **22**. Advantageously such securing takes place in releasable manner so that the reinforcing element **120** can be moved when it is desired at a later time to collapse the building again. Suitable securing means which can be released may be in form of screws or the like, but if the building is permanently to be erected, that is if it is not anticipated that it should later be collapsed again, adhesive means may be utilized. The member **120** may be of metal or synthetic plastic material and the outwardly directed surface of its upwardly facing leg **122** preferably projects slightly beyond the outer surface **105** of the end wall panel **22**, so that the leg **122** in effect fulfills the functions of a fascia board.

In FIGS. **10**, **10***a* and **10***b*, finally, I have illustrated yet a further embodiment of the invention, according to which four individual buildings are combined to form a block **100**. Each of these buildings is composed of a basic structural cell component **12** which may contain kitchen, lavatories, and the like, as discussed in the preceding embodiments. Each building further has a combined living and bedroom **120** provided with a door **106** and one or more windows **108**.

In the embodiment of FIGS. **10–10***b* the ceiling and the floor is common to all four buildings, that is the block **100** has a single ceiling and a single floor, composed of collapsible panels **14**, **16** for the ceiling and **18**, **20** for the floor in the same manner as is illustrated in the embodiment of FIGS. **1** and **2**. THe outer walls **103**, **104** and the divider walls **102** separating the individual buildings may for instance each be composed of two plates or panels **110**, **112** which are articulately connected with one another and with the basic component **12** by means of ropes **114** and **116** in the manner discussed with respect to FIGS. **1** and **2**. The ropes **114** and **116** correspond to the previously discussed ropes **50** and can be replaced with hinges or the like.

To convert the block **100** from assembled erected condition to collapsed condition for shipping or storage, the panels **100** and **112** are pivoted about vertical axes as shown in FIGS. **10***a* and **10***b* and folded inwardly as indicated by the arrows **P1** until they abut against their respectively associated basic components **12**. This movement is indicated by the broken lines in FIG. **10**. The exterior wall **104** and **103** can be folded inwardly in the manner indicated by the arrow **P2** as shown in FIG. **10**, or else it can be folded outwardly in the manner indicated by the arrow **P3** as also shown in FIG. **10**. In the latter case the panels **110** and **112** of the walls **104** or **103** would have to be folded until they abut against the end wall **121** or **123** of the respectively associated component **12**. Subsequent to folding of the panels **110** and **112** in the described and illustrated manner, the ceiling and the roof of the entire block **100** are folded in the same manner as discussed with respect to FIGS. **1** and **2**, it being reiterated here that the ceiling and the floor in the embodiment of FIGS. **10–10***b* are common to all four of the illustrated buildings.

It will be understood that each of the elements described above, or two or more together, may also find application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a collapsible prefabricated building, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention. For instance, it is possible to construct the cell **12** of foldable panels which are connected by ropes.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended

1. A collapsible prefabricated building, comprising wall means adapted to surround an enclosed space and composed at least in part of a plurality of plate sections at least some of which are composed of two transversely spaced cover layers and a layer of foam material sandwiched between the same and provided with a plurality of elongated, transversely spaced parallel hollows extending between opposite edge portions of the respective plate section and having spaced end portions; a tubular member inserted into and accommodated in the respective end portion; and linking means, comprising a plurality of elongated flexible elements each having portions extending through respective ones of said hollows in adjacent ones of said at least some plate sections and linking said wall means for relative movement of said plate sections in a sense enabling displacement of the latter between an erected condition in which sad wall means surrounds said enclosed space, and a folded condition.

2. A building as defined in claim **1**, said wall means comprising a plurality of wall elements rigidly con-

nected and defining a basic module; and wherein said plate sections are linked with said basic module and adapted, when in said erected condition, to define at least in part at least one additional module.

3. A building as defined in claim 2, said additional module having a floor, a ceiling and a plurality of side walls connecting said floor with said ceiling; said floor, said ceiling and at least one of said side walls being composed of said plate sections; and wherein said linking means links at least two of said plate sections with said basic module.

4. A building as defined in claim 1, wherein said building has a floor, a ceiling, and side walls and end walls connecting said floor and said ceiling; and wherein all of said walls, said floor and said ceiling are composed of said plate sections.

5. A building as defined in claim 1, said wall means defining a floor, lateral walls and a ceiling of said building, and wherein said ceiling has lateral margins in the region of said lateral walls; and further comprising a reinforcing rail of substantially L-shaped cross-section extending along at least one of said margins and having one arm connected thereto and an other arm extending upwardly from said one arm and along the same.

6. A building as defined in claim 1, wherein said tubular members are adhesively secured in the respective end portions.

7. A building as defined in claim 1, said some plate sections having respective edge faces; and cover strips covering at least some of said edge faces.

8. A building as defined in claim 1, wherein said elongated flexible elements are glass-fiber ropes.

9. A building as defined in claim 1, wherein said elongated flexible elements comprise glass-fiber ropes and sheaths of synthetic plastic material surrounding the respective ropes.

10. A building as defined in claim 1, adjacent ones of said plate sections having respective edge faces which abut when said sections are in erected condition; and further comprising sealing elements extending at least along said edge faces for sealing the juncture between the adjacent sections when the latter are in said erected condition.

11. A building as defined in claim 10, wherein said sealing elements are sealing lips of sealingly conformable synthetic plastic material.

12. A building as defined in claim 1, adjacent ones of said plate sections having respective edge portions which in erected condition of said plate sections are proximal and define a juncture; and further comprising flexible foil members provided at sides of said plates which in erected condition of the latter face outwardly of said building, said foil members bridging the spacing between said edge portions and overlying said juncture.

13. A building as defined in claim 1, said elongated flexible elements having spaced terminal portions; and wherein at least one of said spaced terminal portions is provided with a tensioning member having a tapped bore into which a tensioning bolt may be threaded.

14. A building as defined in claim 13; and further comprising biasing means acting upon the respective tensioning member in a sense tending to tension the elongated flexible member associated therewith.

15. A building as defined in claim 14, wherein said biasing means comprises pressure-exerting expansion spring means.

16. A building as defined in claim 13, said plate sections having recesses of a diameter greater than the respective hollows and each coaxial with one of the same; and said tensioning members each being lodged in one of said recesses.

* * * * *