United States Patent [19]

Barrell et al.

[11] **3,747,290**

[45] **July 24, 1973**

[54] **BUILDING STRUCTURE**

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[22] Filed: **July 15, 1971**

[21] Appl. No.: **162,816**

[52] **U.S. Cl.** **52/90**, 52/93, 52/309, 52/579

[51] **Int. Cl.** **E04c 3/07**

[58] **Field of Search** ..... 52/92, 266, 270, 52/275, 493, 82, 86, 90, 93, 584, 602, 615, 579, 726, 57, 309; 248/174; 46/30, 31, 1 L

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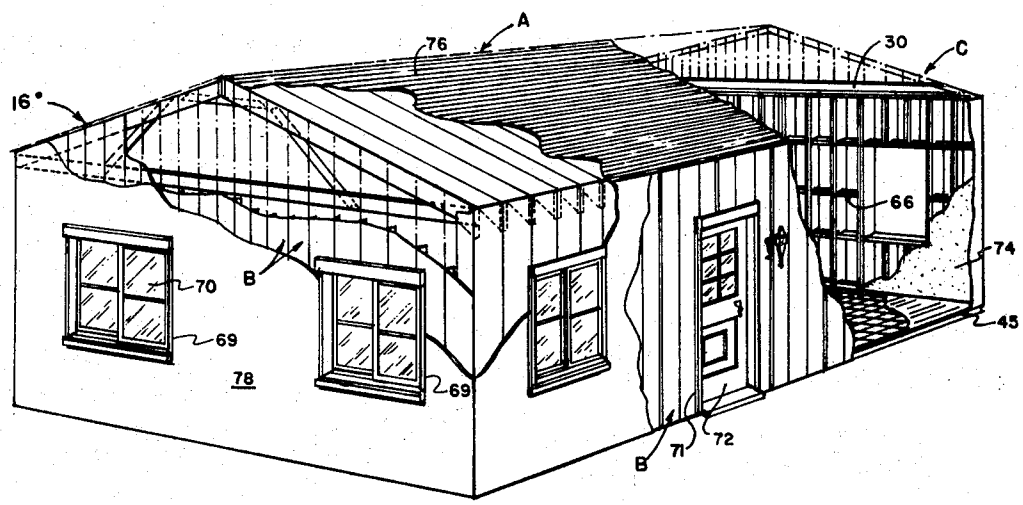
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Primary Examiner—John E. Martagh
Assistant Examiner—Carl D. Friedman
Attorney—J. Wesley Everett et al.

[57] **ABSTRACT**

A building construction of a plurality of panels formed from sheet material, each panel having a central section and two opposite side sections extending outwardly at right angles to one side of the central section, the panels being fastened side by side in any suitable manner to form a building or similar structure, including side walls, end walls and a roof, the walls and roof panels being covered with a re-enforced plastic material, and means carried by at least the wall and end panels for attaching thereto a second wall primarily for the purpose of refinishing the interior of the building.

10 Claims, 19 Drawing Figures



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SHEET 1 OF 4

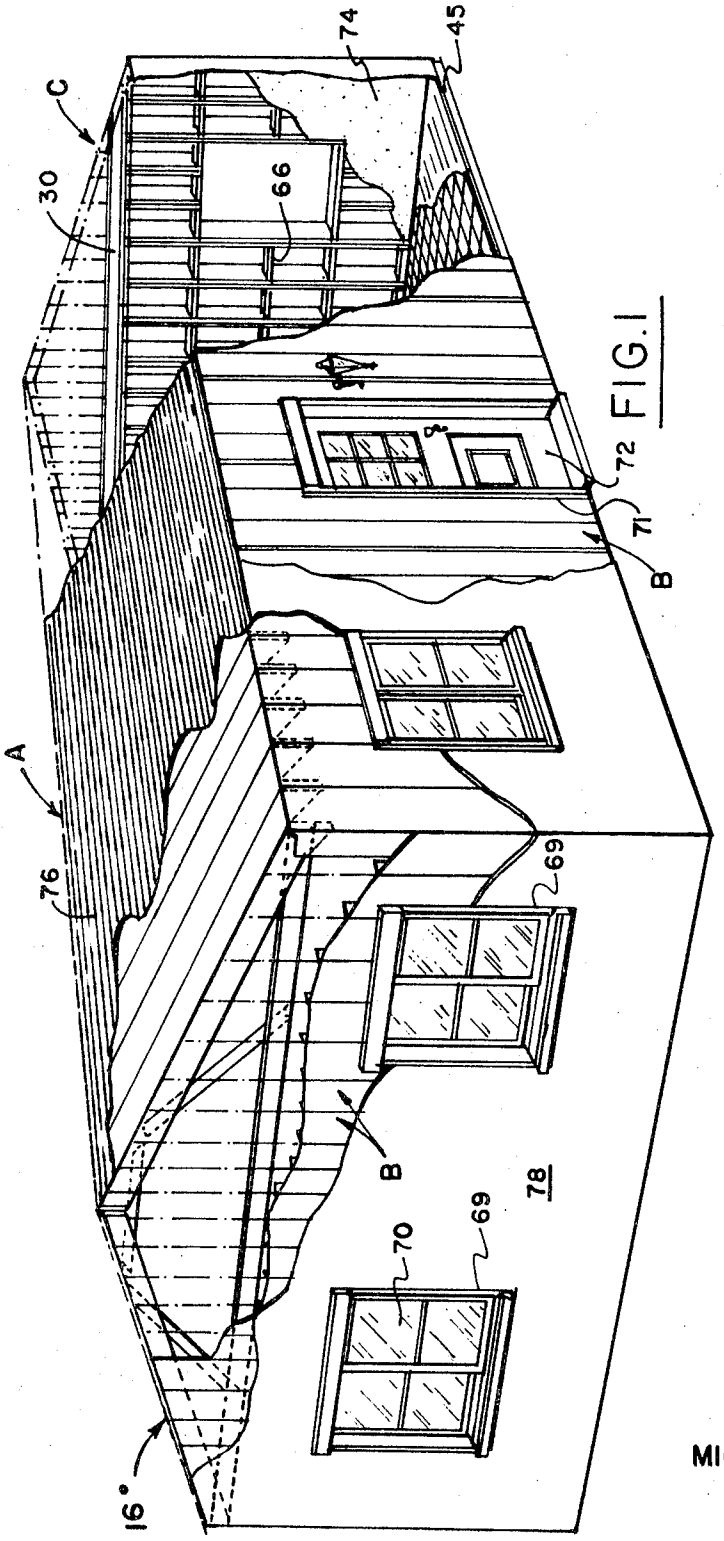


FIG. 1

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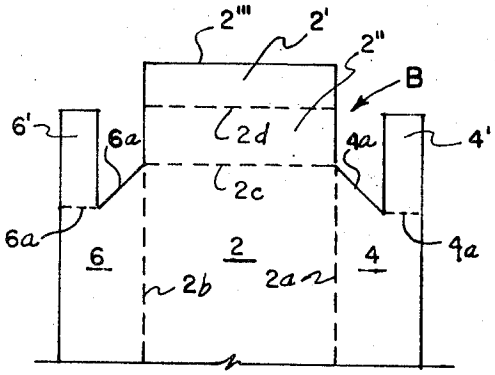


FIG. 2

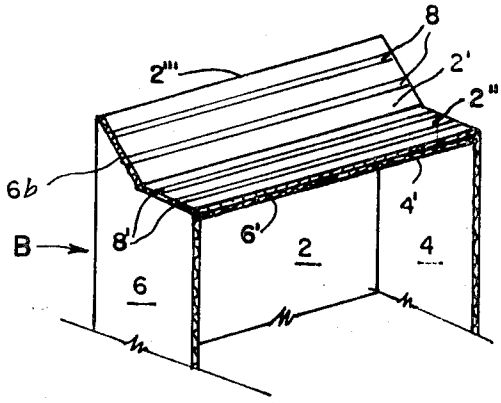


FIG. 3

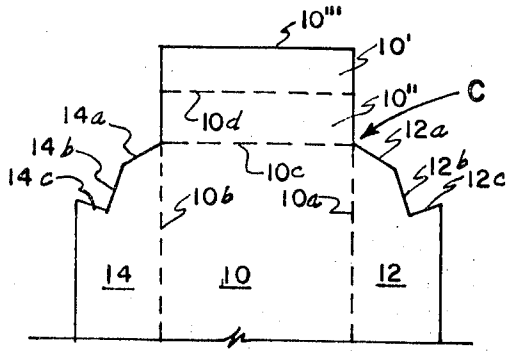


FIG. 4

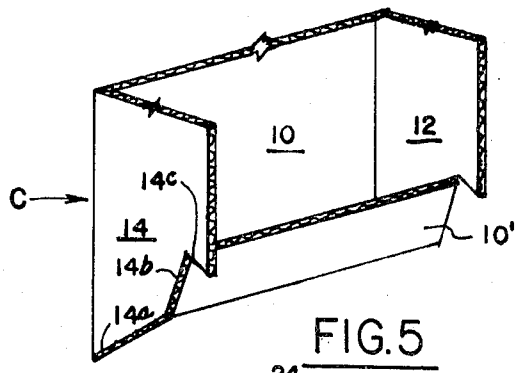


FIG. 5

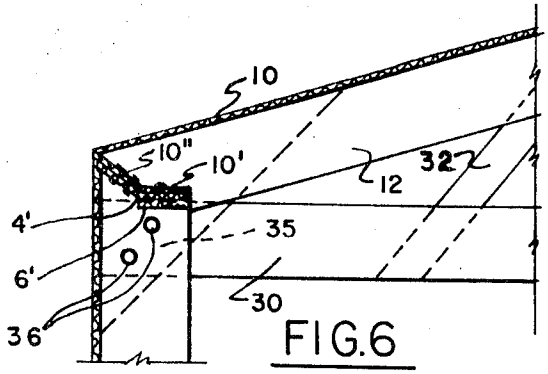


FIG. 6

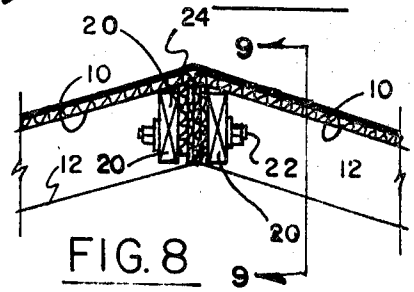


FIG. 8

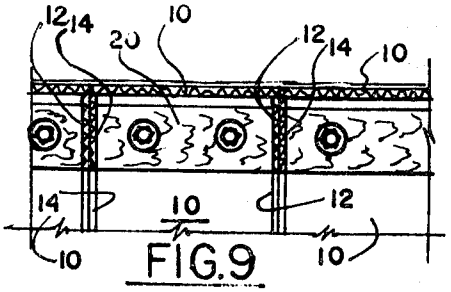


FIG. 9

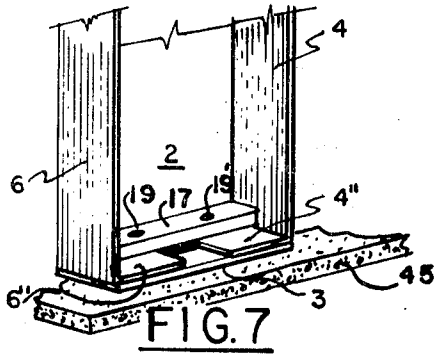


FIG. 7

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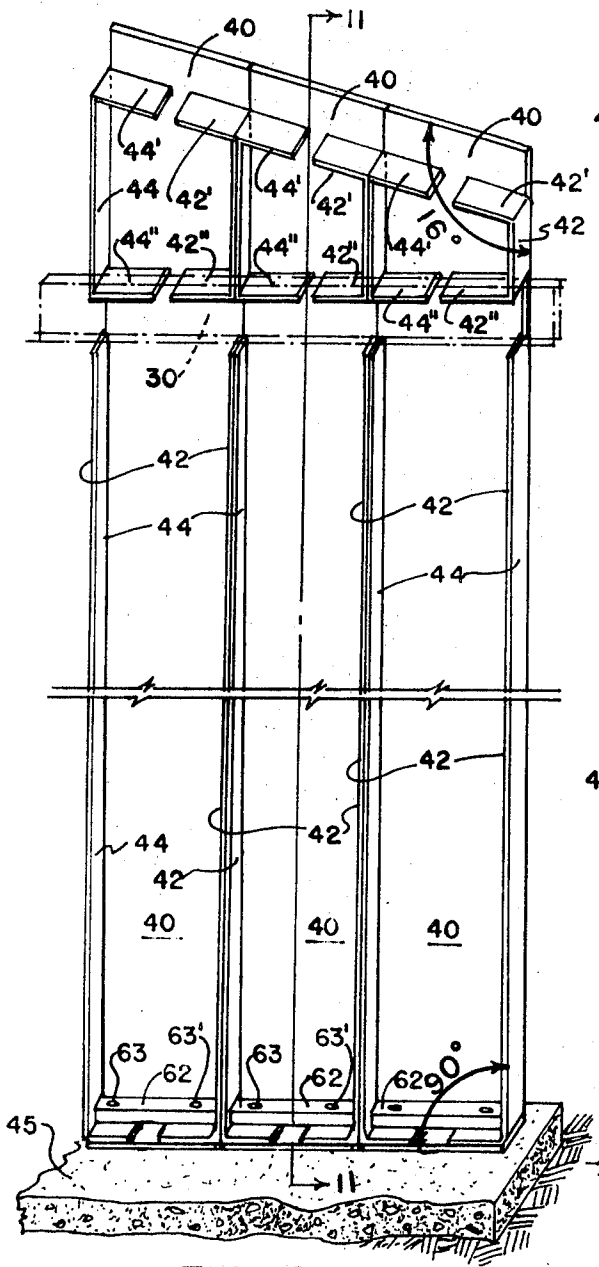


FIG. 10

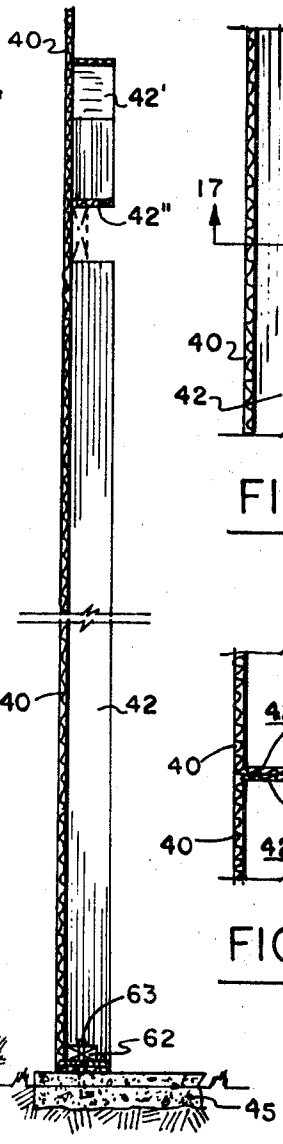


FIG. 11

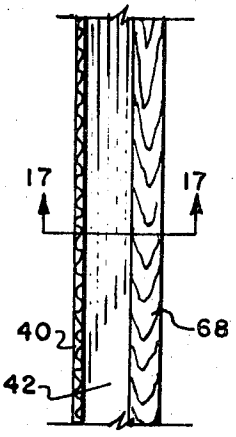


FIG. 16

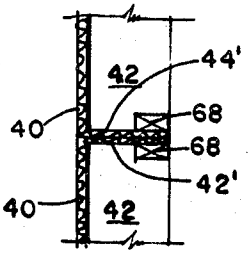


FIG. 17

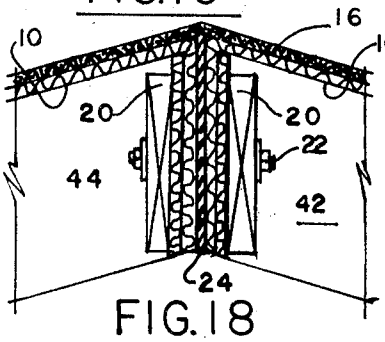


FIG. 18

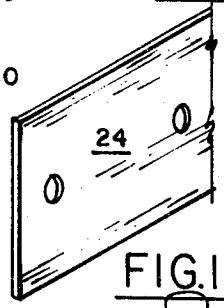


FIG. 19

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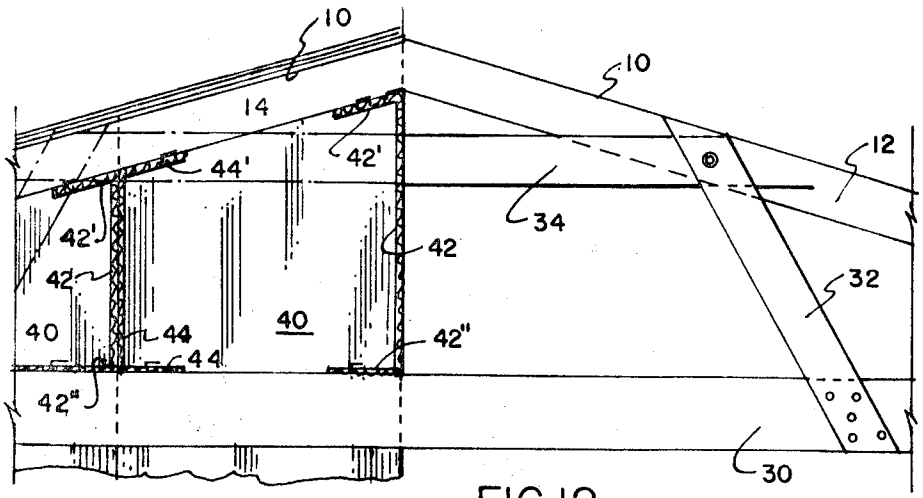


FIG. 12

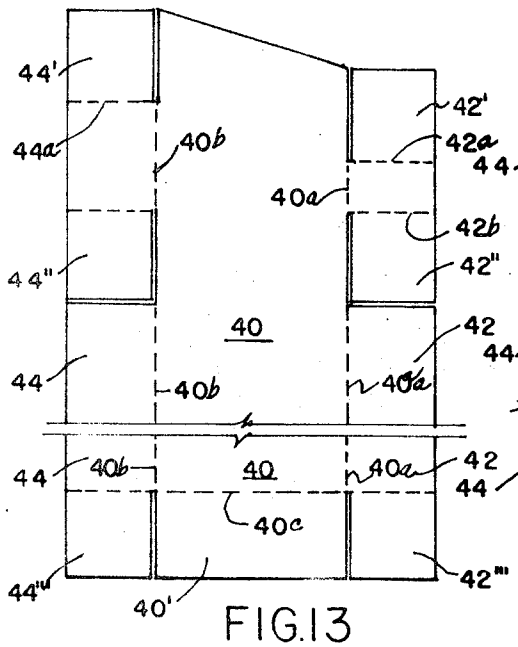


FIG. 13

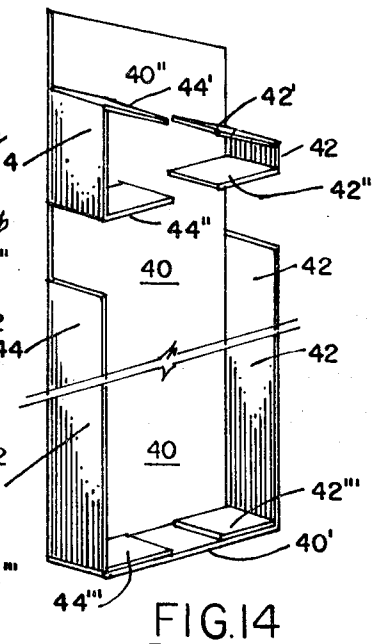


FIG. 14

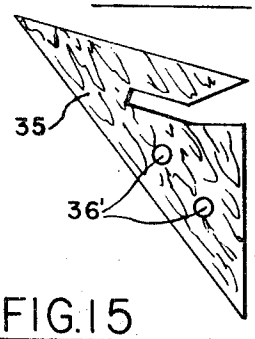


FIG. 15

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BUILDING STRUCTURE

The present invention relates primarily to an improved building structure constructed from panels of predetermined sizes and forms.

The panels may be made from many types of material, such as heavy corrugated paper board, and other suitable materials that made be made in sheets which may be cut and formed into panels. While the present description relates primarily to corrugated paper board, this invention is not limited thereto.

The primary object of the invention relates to an improved type of panel for building construction made from an inexpensive basic material to produce low cost housing and similar buildings.

Another object of the invention is to provide a structure that requires a minimum amount of skilled labor.

A further object of the invention is to provide a structure of reenforced corrugated paper board panels that is sturdy, water-proof and durable, and quickly and easily assembled.

While several objects of the invention have been pointed out, other objects, uses and advantages will become more apparent as the nature of the invention is more fully disclosed by the following description when taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view in elevation of a building having portions broken away to illustrate the structure of the interior of the building.

FIG. 2 is a fragmentary view in elevation of the upper end of a sheet of material cut and scored from which a side wall panel is made.

FIG. 3 is a fragmentary perspective view of a preformed upper end portion of a side wall panel made from the sheet shown in FIG. 2.

FIG. 4 is a fragmentary elevational view of one end of a sheet cut and scored for forming a roof panel.

FIG. 5 is a fragmentary view in perspective of the end of the roof panel made from the sheet shown in FIG. 4.

FIG. 6 is a fragmentary sectional view through the junction of a side wall panel and a corresponding roof panel showing the specific manner in which the two panels are abutted one to the other.

FIG. 7 is a fragmentary perspective view of the formed lower end of the side wall panel.

FIG. 8 is a fragmentary sectional view showing the detail construction of two joined roof panels along the ridge of the roof.

FIG. 9 is a sectional view taken along the line 9—9 of FIG. 8.

FIG. 10 is a fragmentary view in elevation of a plurality of end wall panels shown in abutted relationship.

FIG. 11 is a sectional view taken on line 11—11 of FIG. 10.

FIG. 12 is a fragmentary view in elevation looking from inside the end of the building illustrating the manner in which the end panels are secured at their upper ends.

FIG. 13 is a fragmentary view in elevation of the upper and lower ends of a sheet of material cut and scored from which an end panel is made.

FIG. 14 is a fragmentary view in perspective of the pre-formed upper and lower end panel.

FIG. 15 is a view in elevation of a gusset used in reenforcing the area where the side walls and roof panels are joined.

FIG. 16 is a view in elevation of a reenforcing strip for attaching an inner wall.

FIG. 17 is a sectional view taken on line 17—17 of FIG. 16.

FIG. 18 is an enlarged modified sectional view similar to FIG. 8 showing the joined roof panels along the ridge of the roof.

FIG. 19 is a fragmentary perspective view of a reenforcing member extending along the roof ridge.

Referring to the drawings, FIG. 1 shows a type of building A having certain portions of its structure broken away to show the various stages and manner of its construction. The building is primarily constructed of a plurality of panels including side, end and roof panels.

The panels are designed to be constructed from sheet materials which will hereinafter be more fully described. These panels are formed from sheets of material that lend themselves to being cut, scored and formed, such as heavy corrugated cardboard; however, the invention is not limited to this type of material as any suitable material having the above characteristics may be used.

Referring now in particular to the side wall panels shown best in FIGS. 1, 2, 3, 6, and 7, FIG. 2 shows the upper portion of a sheet cut to the proper size and scored and formed into a side panel B. The upper end of the side panel is cut with certain dimensions having a central section 2, two side sections 4 and 6 with extended portions 4' and 6'. The central section is provided with an extension having areas 2' and 2''. The sheet is also provided with score lines 2*a*, 2*b*, 2*c*, 2*d*, 4*a* and 6*a* along which the upper end is folded to form a panel as shown in FIG. 3. The upper edge 2''' of the panel B is formed at right angles to the longitudinal axis of the panel. The folded areas 2' and 2'' provide a continuous reenforced surface for receiving one end of a corresponding roof panel. The surfaces 2' and 2'' are preferably supplied with an adhesive as shown by strips 8 and 8' in FIG. 3 for preventing lateral relative movement of the joined ends of the wall and roof panels.

FIG. 4 is an elevational fragmentary view of a blank sheet similar to that shown in FIG. 2 showing the cut and scores necessary to form the end of the roof panel C which is adapted to rest upon the upper end of the wall panel. The particular cut and forming of the upper end of the side wall and the adjacent end of the roof panel is such as to give a roof pitch of 16°; however, the pitch of the roof is not limited to this exact number of degrees and may be constructed at any suitable angle. The roof pitch depends on the location. If the building is in a climate where there is snow, it may be advantageous to increase the roof pitch; however, in a climate where there is no snow, the pitch may be less, but preferably not less than 16°. The roof panel sheet is provided with a central section 10 and two side sections 12 and 14. The central section is further provided with an extension have two areas 10' and 10'' similar to areas 2' and 2'' as previously described for FIG. 2. The upper edge 10''' is formed at right angles to the longitudinal axis of the panel. The side sections 12 and 14 are cut at angles 12*a*, 12*b*, 12*c* and 14*a*, 14*b* and 14*c* to support the side edges of the portion 10' and 10'' when the central sections are folded along the score line 10*c* and 10*d*, as shown in FIG. 5. The portion 10' and 10'' are adapted to conform to the surface 2' and 2'' for a roof pitch of 16°, and to be fixedly secured to each other as shown in FIG. 6. The manner of securing these portions

of the side wall and roof panels may be by any conventional means, such as staples, adhesive, etc.

FIG. 7 shows the formation of the lower end of the side panel wherein the lower end 3 of the central section is folded to extend outwardly perpendicular to the central section 2, the side section 4' is folded as shown at 4'' to lie in contact with the end portion 3, the side section 6'' is folded oppositely to the side portion 4'' to also lie in contact with the end portion 3, over which is placed a securing member 17 having bolts 19 and 19', securing the side panel to a floor or footing 45.

FIGS. 8 and 9 show the formation and manner of joining the opposite ends of the roof panel C. This end of the panel is formed similar to the end of the side panel shown in FIG. 7 except that it is formed at a slight angle. The central and side sections are folded inwardly as described for the bottom of the side panel shown in FIG. 7. The end of the opposite panel is folded in the same manner and on each side of these areas is a back-up block 20 which is secured by the bolts 22. There may be a thin tie strip 24 extending between the two abutted ends throughout the length of the building as shown in FIG. 10 for holding the roof panels in close relationship along the ridge.

The upper ends of the opposite side wall panels are connected by a plurality of joists 30 preferably evenly spaced throughout the width of the building. The side sections of the roof panels form the roof rafters and are reenforced by the collar member 34 and studs 32, as shown in FIG. 12.

The juncture of the side and roof panels, shown best in FIG. 6, is reenforced by a gusset 35, shown best in FIGS. 6 and 15. The gusset is fixed preferably to the to the joist by suitable fastening means 36 through the holes 36'' in the gusset and is likewise secured to the side sections of the wall and roof panels by staples, adhesive, etc. (not shown).

The end panels are formed along the same general lines of the side and roof panels (see FIGS. 10 to 14). The upper end of each of the sheets is shaped and scored as shown in FIG. 13 and formed into a panel section as shown in FIG. 14 to conform to the edge of a slanting roof. Therefore, the end panel is provided with a central section 40, side sections 42 and 44 having scored lines 40*a*, 40*b* and 40*c*, and a foldable end portion 40'. The side section 42 is provided with a portion 42' foldable along the scored line 42*a*. The portion 42' is adapted to fit beneath the side section 14 of the roof panel, which is also the rafter, as shown best in FIG. 12.

The side section 44 of the roof panel is provided with a portion 44' foldable along the score line 44*a* for folding the portion 44' to the position as shown in FIGS. 12 and 14 to lie along the under side of the roof panel and side wall as shown in FIG. 12, similar to that shown and described for the portion 42'. The side walls of the roof panel are also provided with a portion 42'' foldable along the score line 42*b* and are adapted to be folded as shown in FIG. 14 to allow the joist 30 to be extended to the inner surface of the central section as shown in FIG. 12. The portions 42'' and 44'' are also folded as shown in FIG. 14 and are adapted to extend along the joist 30 as shown in FIG. 12 for supporting the end and roof panels. The members 42', 44', 42'' and 44'' are fixedly secured to the respective rafters and joists in any convenient manner.

The bottoms of both the side wall and end panels are formed in substantially the same manner and are similarly secured to a floor or footing 45. Briefly, the end panel is provided with a base shown best in FIGS. 10 and 14. The lower end 40' of the central section is folded at right angles to the portion 40, and the lower ends 42''' and 44''' of the side sections 42 and 44 are folded as previously described for the side section and secured to the footing 45 with securing blocks 62 by suitable fastening means 63 and 63'.

All the joined sections of the panels are preferably coated with a reenforced plastic compound which may be applied to both the inner and outer sides of the structure.

On the inside of the structure an insulated material may be placed between the extended side sections (not shown). Tyings 66 may be placed at intervals between the side sections of the panel members providing a support for the sections and additional nailing surface for the inner wall, if desired. There may also be provided furring strips 68 for wall strengthening and for additional fastening surface for securing the inner wall thereto.

Openings are provided in the side and end panels for frames 69 for windows 70; also for door frames 71 for a door 72. Any size and number of window and door openings may be provided.

The building may be provided with a suitable floor 74, and a roof 76, after which the sides and ends are covered with a siding 78. The siding is preferably of a plastic resin reenforced by fiber glass, or other suitable reenforcing material. This type structure provides a very low cost building, and while primarily designed for a dwelling, it may be utilized for any type of housing.

This building construction lends itself to low cost mass production in that the sheets may be cut and scored at a central plant and shipped to the point where the building is to be erected. The panels may then be formed on the premises and the building erected with a minimum of effort and skill.

While a specific form of the invention has been described in detail, it is not intended as a limitation as the appended claims are limited only by the state of the prior art.

We claim:

1. An improved building structure comprising a plurality of adjacent vertical side wall panels and a plurality of roof panels having one end of each side panel adapted to engage one end of a corresponding roof panel,

a. each side wall panel and roof panel being provided with a central section and two side sections, the said side wall sections formed at right angles to the central section, said central section of each of the side wall and roof panels having substantial greater width than the side sections and being of the same width;

b. the upper end of each the central section of the side wall panels being turned inwardly between the side sections and extending downwardly and outwardly and supported by the side sections along predetermined angles cut in the side sections, the outwardly extending portion of the inturned central section being substantially at right angles to the unturned-in portion of the central section of the side wall panels, at least a portion of the side sections of each of the side wall panels formed at right

angles to the side section adjacent the outer edge thereof to form a support to the outwardly extending portion of the central section of the side wall panel;

c. the corresponding end of the roof panel having its central section formed inwardly between its side sections at an acute angle corresponding to the angle formed by the central section on the upper end of the side panels and adapted to engage the turned-in portion of the central section of the side panels throughout the area thereof, the turned-in portion of each of the central section of the roof panel being supported by their respective side sections along predetermined angles cut in their said side sections;

d. means for securing the ends of the corresponding side and roof panels to each other, and separate means extending laterally between each of the upper ends of each opposite side wall panels for holding the side and roof panels in a predetermined relationship.

2. An improved building structure as claimed in claim **11** wherein each of the roof panels extending upwardly and toward the opposite side wall of the building structure from its end attached to the upper end of the side wall panel at an obtuse angle from the inner surface of the side wall panel to a point substantially one-half the distance between the opposite side wall of the building to form a roof ridge, a continuous tie member against which the ends of the roof panel adjacent the roof ridge are abutted, said tie extending throughout the length of the roof ridge, having means for attaching each of the roof panel ends to the tie member for securing the roof panel in close fixed relationship.

3. An improved building structure as claimed in claim **1** wherein the upper ends of the opposite wall of the building are connected by joists and separate means at each end thereof having a portion secured to the joists and two other portions secured to the side sections of the side section panel and the side wall of the roof panel respectively.

4. An improved building structure as claimed in claim **1** including a plurality of end panels including a central section and two side sections, the side sections of the end panels being slotted vertically and scored horizontally and formed to extend adjacent and parallel to the under edge of the outer side sections of the end roof panel and means for securing the central section of the end panel to the outer surface of the outer side section of the roof panel.

5. An improved building structure as claimed in claim **4** wherein each side section of each end panel is slotted to form a portion adapted to extend along the joist and means for securing the same to the joist.

6. An improved building structure as claimed in claim **1** wherein the side wall, end and roof panels are coated with a reenforced plastic material.

7. An improved building structure as claimed in claim **6** wherein the coating material is of fiber glass and a plastic resin.

8. An improved building structure as claimed in claim **1** wherein the ends of the roof panels adjacent the roof ridge are tied together with a continuous strip.

9. An improved building structure as claimed in claim **1** wherein means are provided for preventing the joined area of the side wall panels and the roof panels from relative lateral movement.

10. An improved building structure as claimed in claim **1** wherein means are provided at least adjacent the outer edges of the side sections of the wall and end panels for attaching thereto a second wall.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,747,290 Dated July 24th, 1973

Inventor(s) John M. Barrell and Michael L. Moreland

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

Claim 1 b. line 1, cancel "the" before "central"

c. line 8, make "section" read —sections —

d. line 4, make "panels" read —panel —

Claim 2, line 4, before "attached" insert —is —

Signed and sealed this 20th day of November 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.