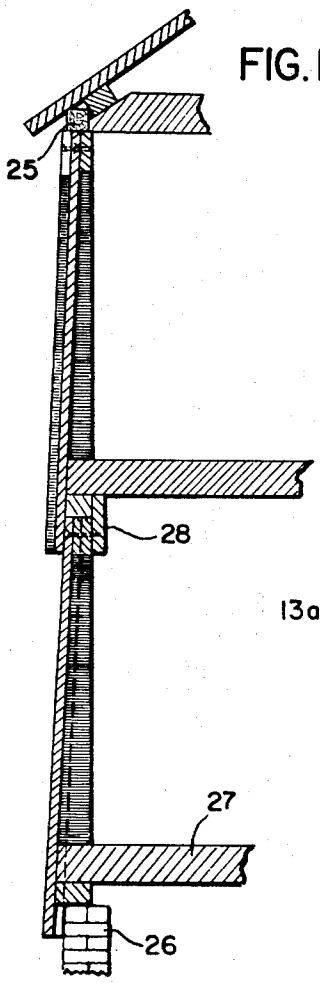
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FIG. 15



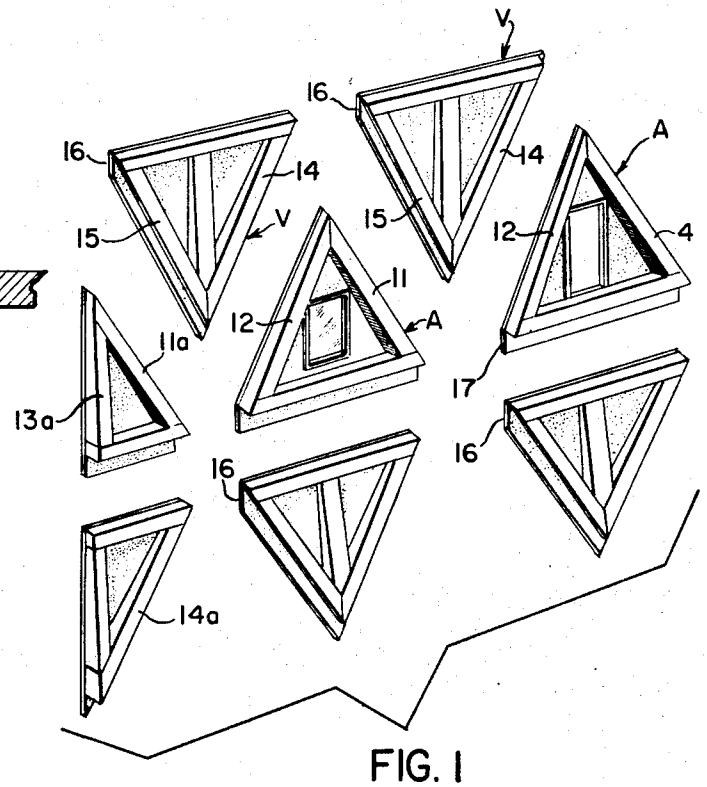


FIG. 1

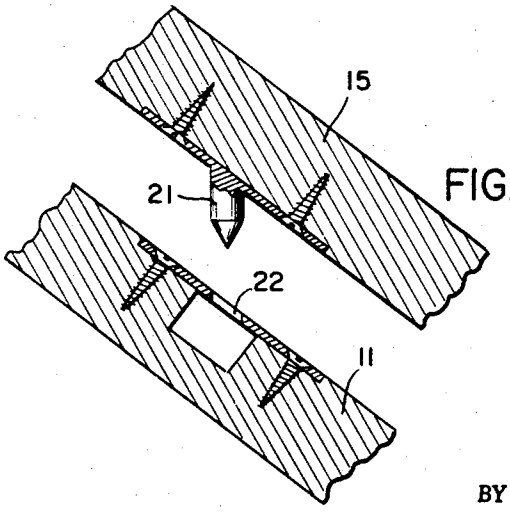


FIG. 14

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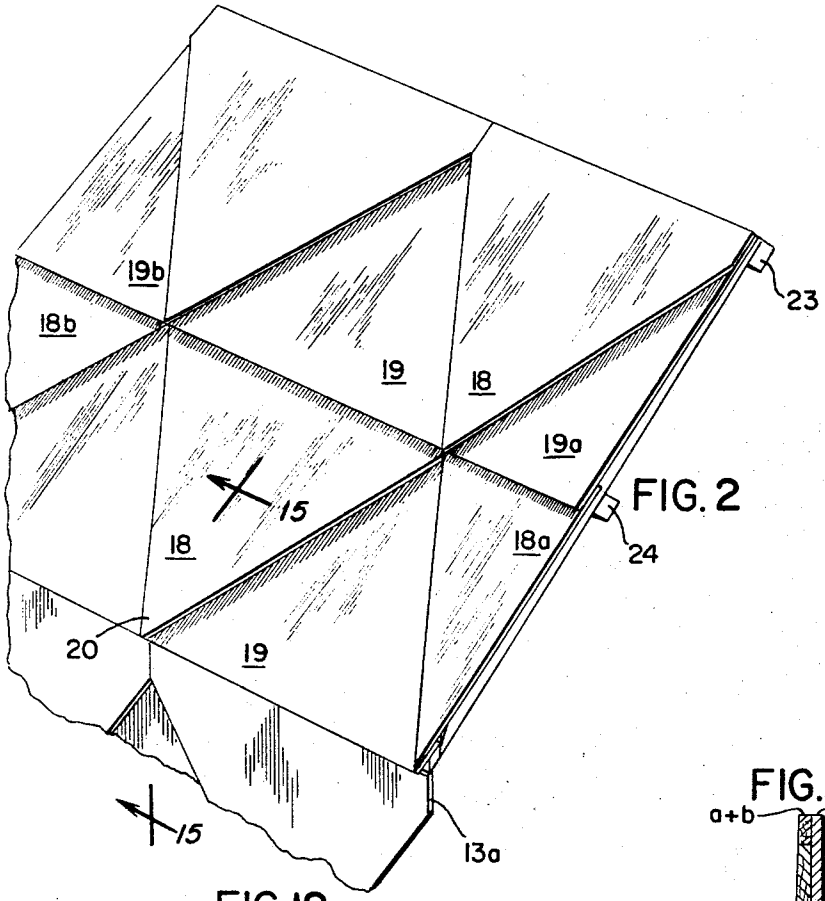


FIG. 2

FIG. 12

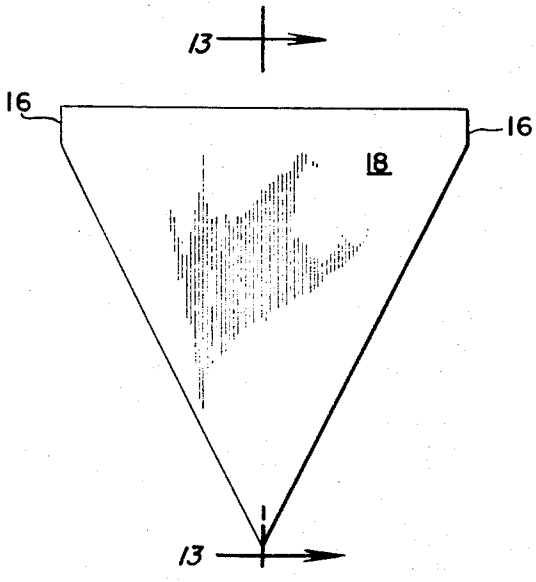
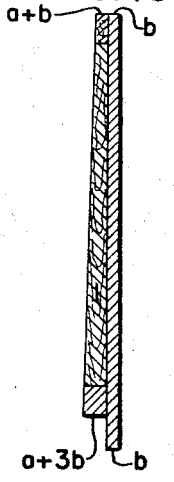


FIG. 13



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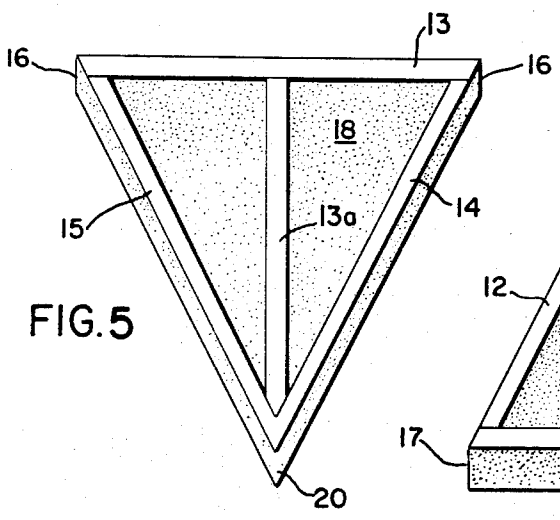


FIG. 5

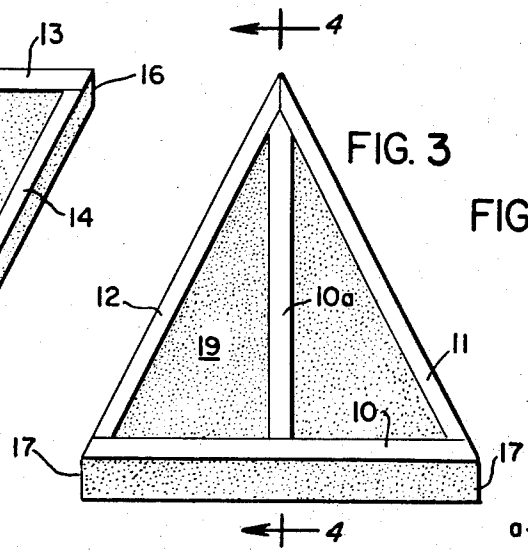


FIG. 3

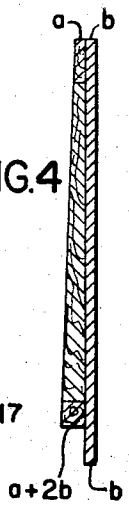


FIG. 4

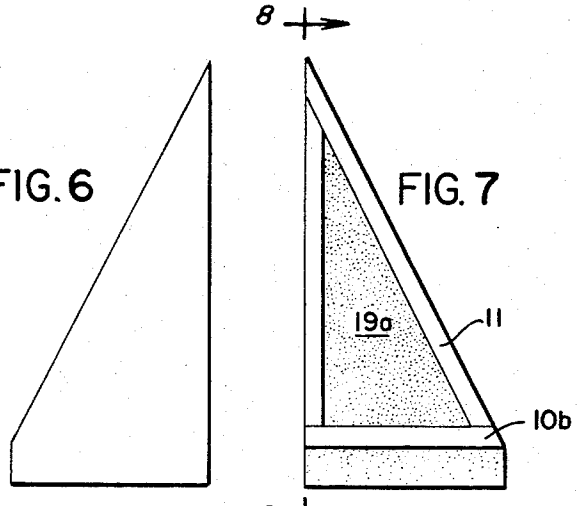


FIG. 6

FIG. 7

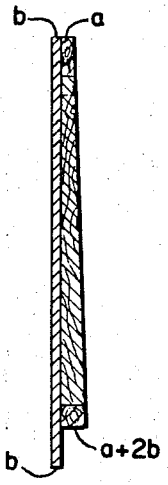


FIG. 8

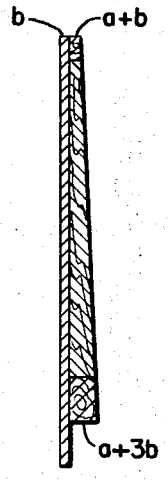


FIG. 11

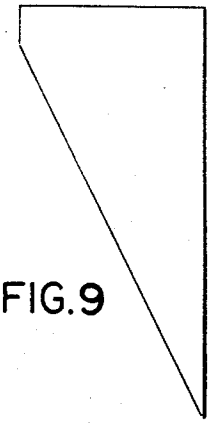


FIG. 9

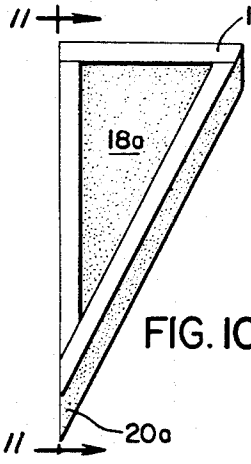


FIG. 10

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BUILDING PANELS

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Filed Apr. 27, 1967, Ser. No. 634,253
5 Claims. (Cl. 52—520)

ABSTRACT OF THE DISCLOSURE

A set of generally triangular structural panels from which the sides and roof of a one or plural story building may be constructed. Two basic types of panels are provided, both having isosceles triangular frames and overlying sheet material. The frames of one type of panel are thicker at the triangle bases, and those of the other type are thicker at the triangle apices, so that the facing sheets may overlap while the backs of the frames lie in the same plane.

It has long been known to make rectangular panels which may be bolted or otherwise secured edge to edge to make side walls for "portable" buildings. These known panels, meeting edge to edge must have additional elements in order to make the joints between adjacent panels rain tight.

The known panels, too, must be supported from a floor platform and do not lend themselves to two story structures as the walls, when assembled, do not have truss strength since their sides are parallel so that the bolts or other securing means are placed in shear, and since this is not the most favorable loading for the bolts, the wood, of which the panel elements are made, will be heavily loaded by the shear stress on the bolts on a very small area of the wood.

It is an object of the present invention to provide panels that will be easily assembled, will provide a very strong structure in which the securing means will be favorably positioned, and which will have rain shedding characteristics without requiring ancillary elements to cover the joints between panels.

It is a further object to provide a set of panels that may be used for either side walls or roof of a building and may be used to fabricate a two story building.

Other and further objects and advantages will appear from the following specification taken with the accompanying drawing in which like reference characters refer to similar parts in the several views and in which:

FIGURE 1 is an exploded view of a plurality of panels according to the invention;

FIGURE 2 is a perspective view of a roof made of the panels;

FIGURE 3 is a view from the interior or back of an A panel;

FIGURE 4 is a section on line 4—4 of FIGURE 3;

FIGURE 5 is a view from the interior or back of a V panel;

FIGURES 6 and 7 are weather and back views of a half A panel respectively;

FIGURE 8 is a view of the panel of FIGURES 6 and 7 from line 8—8 of FIGURE 7;

FIGURES 9, 10 and 11 are weather, back and edge views of a half V panel similar to FIGURES 6, 7 and 8.

FIGURE 12 is a view of the weather side of a V panel;

FIGURE 13 is a section on line 13—13 of FIGURE 12;

FIGURE 14 is a fragmentary section showing a joining means; and

FIGURE 15 is a sectional view of a two story building using the panels of the present invention.

Basically the device of the present invention includes a plurality of panels A and V, as seen in FIGURE 1. These designations are used because the A panels are triangular like an A with the apex upward and the V panels are also triangular with the apex downward. The two basic panels are isosceles triangles and, while many different apex angles may be chosen, it is preferred to use 60° apex angles on the basic panels for purposes of illustration.

Secondary panels are provided which correspond to the A and to the V panels, but are half panels which, when mounted in place, will give a side at 90° to the bases of the A and V panels.

Assuming each panel A is formed of two four foot by eight foot plywood sheets assembled to form a square eight feet by eight feet, a triangular frame **10**, **11**, **12** is provided as seen in FIGURE 3 with vertical strip **10***a* backing up and sealing the vertical joint between the two sheets. It will be noted that the apex of the triangular frame **10**, **11**, **12** is at the upper edge of the eight by eight sheet of plywood and the base of the A will be above the bottom of the eight by eight sheet. The sheet edges below the lower corners of the frame **10**, **11**, **12**, are vertical and, while the edge of the panel is flush with the frame elements **11** and **12**, a considerable overhang is provided below the base of the A triangle.

The sheet material has been stated to be preferably of plywood, but other materials may, of course, be used even including metal. Similarly the frame elements are preferably of wood and may conveniently be secured to the sheet material by adhesives and/or any convenient conventional securing means. Here again metal shapes could be used as frame elements.

The V panels are made in a manner similar to the A panels. The eight by eight sheet is provided with a triangular frame **13**, **14**, **15** just as the A panels are with frame **10**, **11**, **12**, the base **13** of the triangular frame of V panels, however, are at the extreme top of the panel and extends downwardly to its apex which will not be at the extreme bottom edge of the eight by eight sheet of plywood. Since the size of triangle frames **10**, **11**, **12** and **13**, **14**, **15** are the same, and since the point of the V panel is at the extreme bottom of the eight by eight sheet, the plywood will extend beyond the sides of the V frame along elements **14** and **15** and will have parallel sides as seen at **16** at the top of the panels that are of the same length as parallel sides **17** of the A panels.

If, then, the frame elements **12** of an A panel and **14** of a V panel are brought into contact, the edges of the sheet **18** on the V panel will overlie the edges of the sheet **19** on the A panel. Similarly when a further A panel is joined to the same V panel on the other side, frame **11** of the A panel to frame **15** of the V panel, the sheet material of the V panel will overlie this A panel also. It will further be noted that the point of the V panel at **20** will overlie the vertical side edges **17** of the lower ends of the A panels.

If now a second V panel is placed adjacent the second A panel, the edge of the sheet of the second V panel will overlie the A panel. At the top, it is clear that the edges of the adjacent V panels butt along a vertical line.

If a second rank of A panels are put in place with the bases of the A frames against the bases of the V frames, the lower edges of the second rank of A panels will overlie the V panels on which they are mounted, and if a V panel is placed in this second rank of panels, its edges will overlie the A panels of the second rank and the point **20** of the V panel will overlie the vertical joint between the edges **17** of the A panel sheet material of the second rank.

It will be noted that it is desirable to have the back

sides of the frames of all of the A and V panels flush, this can not be done if the face of the sheet material is parallel to the plane of the backs of the frame elements. Nor can the thickness of the frame elements of the A and the V panels be the same.

If the thickness of the frames at the apex of an A frame is *a* and the thickness of the sheet material or plywood is *b*, the thickness of the frame at the base (i.e., at the top) of a V panel must be (*a* plus *b*) as the edge of the sheet material on the V panel must be spaced a distance *b* farther from the plane of the back of the frame. The frame at the bottom of each A frame must space the sheet material of the A panel far enough from the back plane of the frame to receive under it the top edges of a set of A and V panels, so the thickness of the frame at the bottom of each A panel will need to be (*a* plus 2*b*), and, since with the back of the V panel frame being still flush with the back of the A panel frame, the sheet of the V panel overlies the sheet of the A panel, the thickness of the frame at the apex of the V panels is (*a* plus 3*b*).

Referring to FIGURE 1, alternate A and V panels are shown in exploded position with the sheet material of the panels on the remote side. From this view it will be noted that the sheet material of the upper rank of V panels will overlie the sheet material of the A panels when the frame elements **14**, **15** of the V panels seat on the **12** and **11** frame elements respectively of the A panels. Also it will be seen that the lower edge or skirt at the bottom of the A panels, when lowered onto the subjacent V panels of the lowest rank in FIGURE 1 will overlie the sheet material of these panels. It wi'l be seen too that the A panels need only to be supported on a piece at the ends of frame elements **10** to give a sturdy rigid wall structure.

When the A panels are placed with their edges **17** abutting and the V panels are placed therebetween, the frames **14**, **15** of the V panel are supposed to contact frames **12** and **11** of the subjacent A panels. In order to assure such contact, the apices of the frames **14**, **15** of the panels are cut off so that before the apex of the V frame could reach the plane of the bottom of the frame **10** of the adjacent A panels, the A panels would be spaced apart by the wedging action. The points of the frames **11** and **12** are similarly cut off.

In order to overcome the problems that would arise if the V frames were permitted to wedge the A frames apart, a simple securement as seen in FIGURE 14 may be provided. This securement may be a vertically directed stud **21** on frame **15** in FIGURE 14 that engages in an aperture or socket **22** in frame **11**. It is proposed to provide two or more such studs **21** on each frame element **14** and **15** and corresponding elements including apertures **22** on each frame element **11** and **12**. Ordinary bolts and nuts may be used in addition to, or in lieu of, elements **21** and **22**.

Two ranks of panels are seen in FIGURE 2, forming a roof area of a building. A frame providing a ridge **23** and a purlin **24** wi'l, of course, be required. The eaves edge of the roof may be supported on a sill **25** as seen in FIGURE 15 at the top of a wall consisting of A and V panels.

It will be noted that half panels are seen in FIGURES 6, 7 and 8 that correspond to A panels, and half panels as seen in FIGURES 9, 10 and 11 that correspond to V panels are provided to finish the end of a wall or roof surface at 90° to the top and bottom edges. Both right hand **18***a* and **19***a* and left hand **18***b* and **19***b* half panels will be required as will be understood from a study of FIGURE 2.

FIGURE 15 illustrates the use of the panels of the present invention to form the outer walls of a building, in this case, of two stories. Foundations, or piers **26** are put in place to support frame elements **10** of the required number of A panels and A half panels as required for the length of the building contemplated. These A panels are put in place and the complementary V panels are placed between them dropping each pin **21** into its socket **22**. The joists **27** may rest on frame elements **10** or may be secured by joist hangers thereto or for a farm shed may be omitted using the surfaces of the ground as the "ground floor." At the top of the "First floor" wall it is preferred, for a two story building, to provide a doubler **28** to give additional stress distribution. Again a plurality of A panels are erected with their skirts overlying the lower rank of panels and the V panels are mounted as before. A plate **25** is seen extending along the top of the walls, the roof may be as shown in FIGURE 2. A further element similar to element **28** may be added here also if desired.

Studs similar to studs **21** may be provided on frames **10** and apertures or sockets similar to **22** may be provided on frames **13** where two story structures are contemplated, but such studs and sockets are not considered to be necessary. Little use of nails or spikes is contemplated in the use of the panels of the present invention but they would be appropriate to secure elements **28** and **25** in place and to secure the joists in place.

In FIGURE 1, a door, and a window are indicated in A panels. Windows could conveniently be placed in V panels. Specific structures of such common elements as door and windows are not shown herein, and they may be of any conventional design.

It will be noted that the panels of the present invention may be erected with a minimum of tools and with a minimum of ancillary lumber or framework. Side walls for a building of any length may be assembled rather than built and unlike ordinary studed siding walls, will have great rigidity due to the truss like structures formed of frames **10**, **11**, **12**, **13**, **14** and **15**, that are further strengthened by the plywood or sheet material of the panel.

A simple shed for use on the farm would require only poles to support a ridge pole, sufficient panels to form the side walls, and an equal number of panels to form the roof, an open ended shed about sixteen feet by twelve feet would require

A panels	6
Half A (2 right, 2 left)	4
V panels	6
Half V (2 right, 2 left)	4

Only the barest minimum of a frame need be erected to support a ridge pole and to support the side panels in vertical position, the roof panels would be secured to the ridge pole and to the top of the side wall panels.

What is claimed is:

1. A plurality of cooperating first and second building panels, to form supporting walls and roof of a building, each first panel consisting of a triangular first frame and an attached generally triangular skin, the base of said frame being disposed downwardly, the said attached skin extending downwardly with parallel ends from and beyond the base of said frame, and the edges of the other two sides of the said generally triangular skin being flush with the outer edge of the other two sides of the said frame, the thickness of said first frame tapering from a minimum thickness at the apex of said frame to a thickness at the said downwardly disposed base equal to the said minimum thickness plus twice the thickness of said skin, each second panel consisting of a second frame of the same triangular size as the frame of a corresponding first panel, the base of said second panel being disposed upwardly, and an attached skin of the same size and shape as the skin of said first panel the upper edge of the skin being the base of said generally triangular skin of said second panel and lying flush with the upper edge of the said second frame, the other two sides of the said skin extending downwardly from and beyond the other two sides and the apex of said second frame, the thickness of the said second frame at the said upwardly disposed base being

equal to the said minimum frame thickness plus one thickness of said skin, and tapering to a thickness at the downwardly disposed apex of said second frame, equal to the said minimum thickness plus three times the thickness of the said skin.

2. The building panels of claim 1, the first and second frames being of two shapes, isosceles triangles and right triangles, the bases of the right triangular frames being half of the bases of the isosceles triangular frames and the altitudes of all of said triangular frames being the same, whereby at the ends of assembled first and second isosceles triangular frames a right triangular frame panel may be used to form an end at right angles to the bases of the assembled isosceles triangular frames.

3. The building panels of claim 1 in which the said other two sides of said second frame is provided with downwardly extending studs, and the said other two sides of said first frame is provided with sockets to receive said studs when said first and second frames are assembled to form a wall or roof of a building.

4. The cooperating building panels according to claim 1 in which the said frames are equipped with complementary seating means such that the framework of said

second panel will seat securely on the frames of two said first panels.

5. Cooperating building panels according to claim 1 the said frames of which are equipped with securing means to attach them to the roof framework of a building.

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CHARLES G. MUELLER, *Assistant Examiner.*

U.S. Cl. X.R.

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