

[54] WALL FRAMING SYSTEM USING
PREFABRICATED PANELS

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[58] Field of Search 52/741, 745, 747, 204,
52/206, 127, 581

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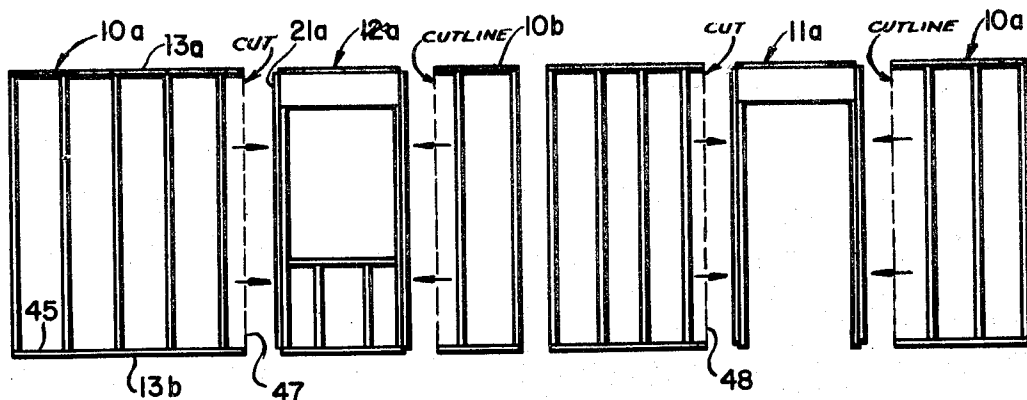
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[57] ABSTRACT

A system for framing the walls of a building structure using three basic types of prefabricated panels including wall panels, door panels and window panels. The wall panels are dimensionally identical one with another. The window and door panels are provided in a limited number of widths to accommodate a variety of standard window and door frame structures.

Erection of the panels is begun by securing the window and door panels in place atop an existing floor structure. The wall spaces between the door and window panels are then framed by installing wall panels one at a time, cutting each to length as required. Wall panel scrap is minimized, where practicable, by using each trimmed-off wall panel portion as the next-installed framing component.

15 Claims, 6 Drawing Figures



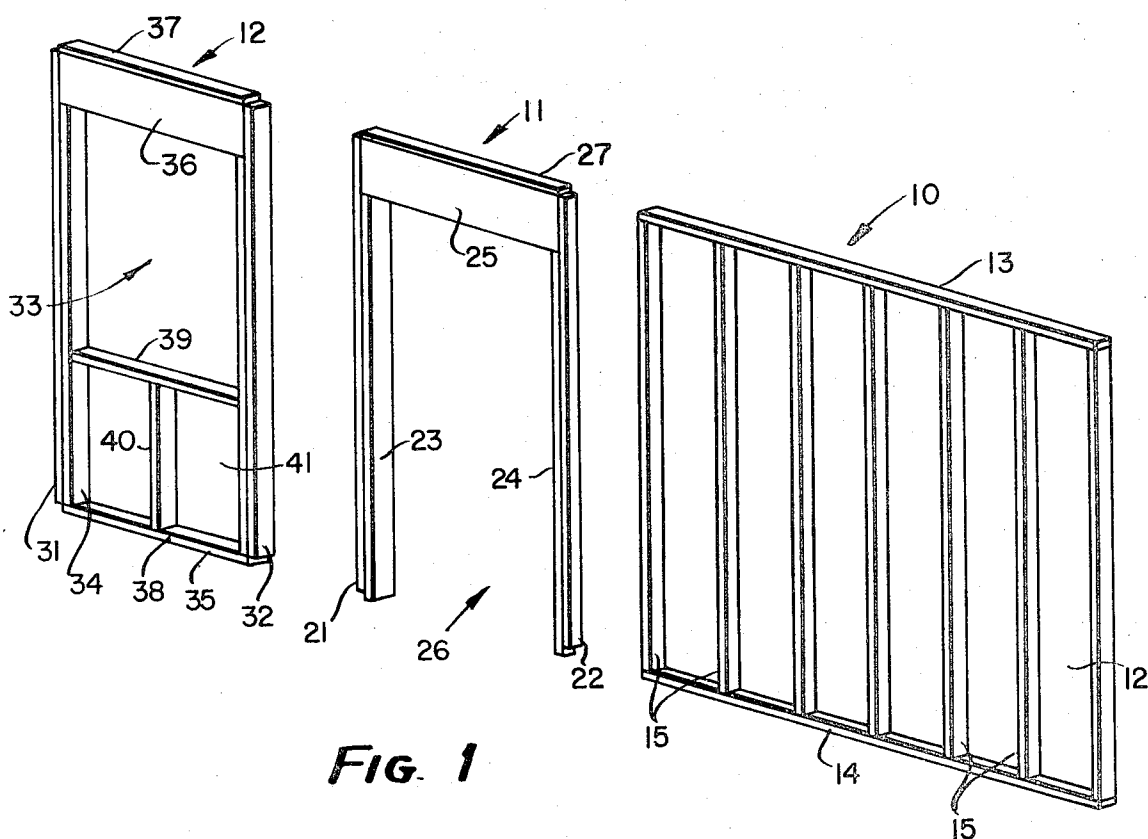


Fig. 1

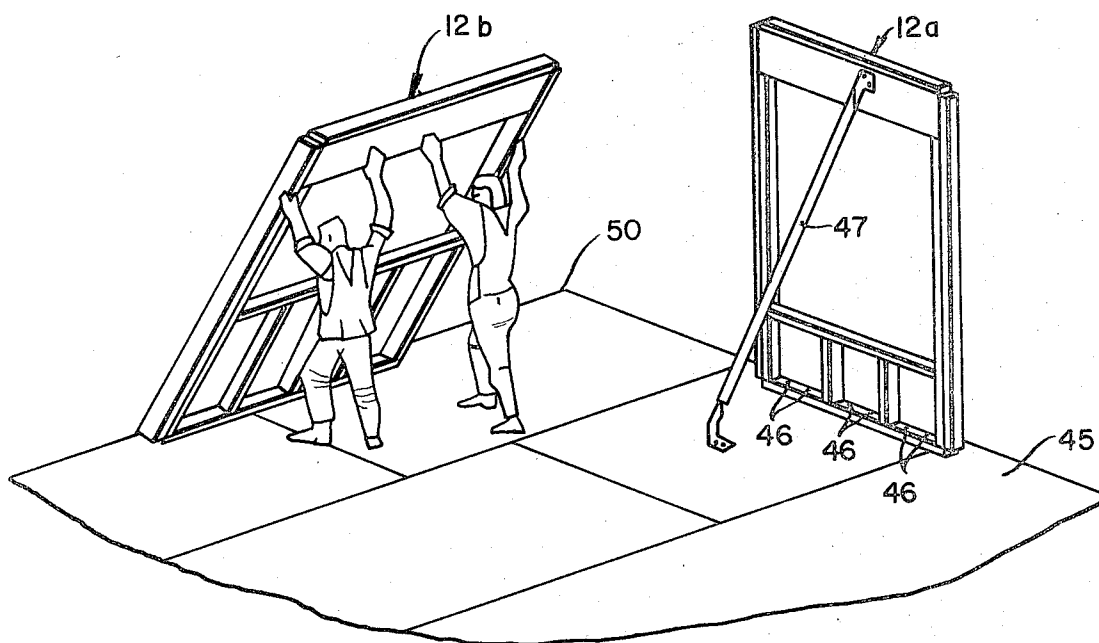


Fig. 2

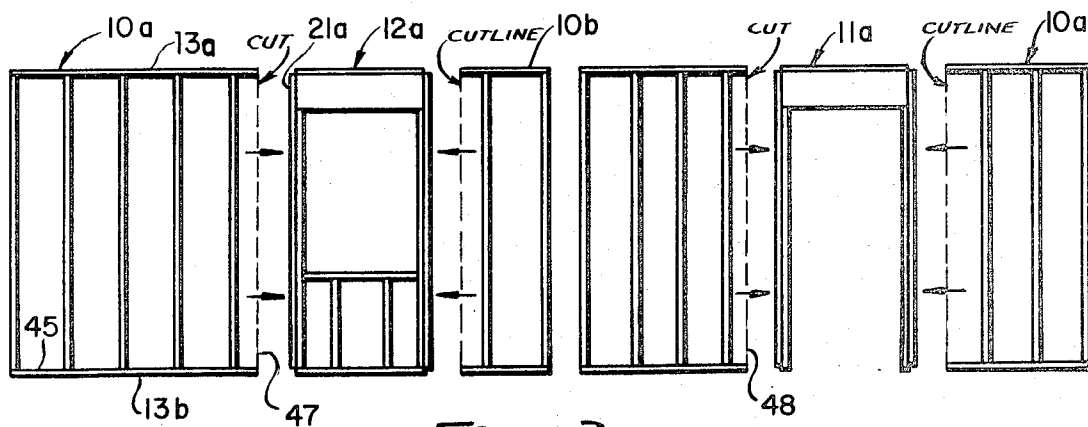


Fig. 3

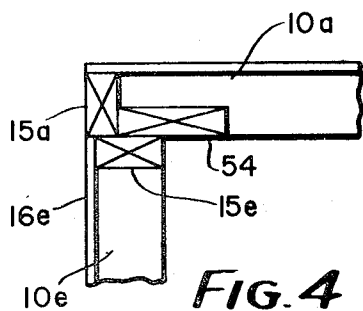


FIG. 4

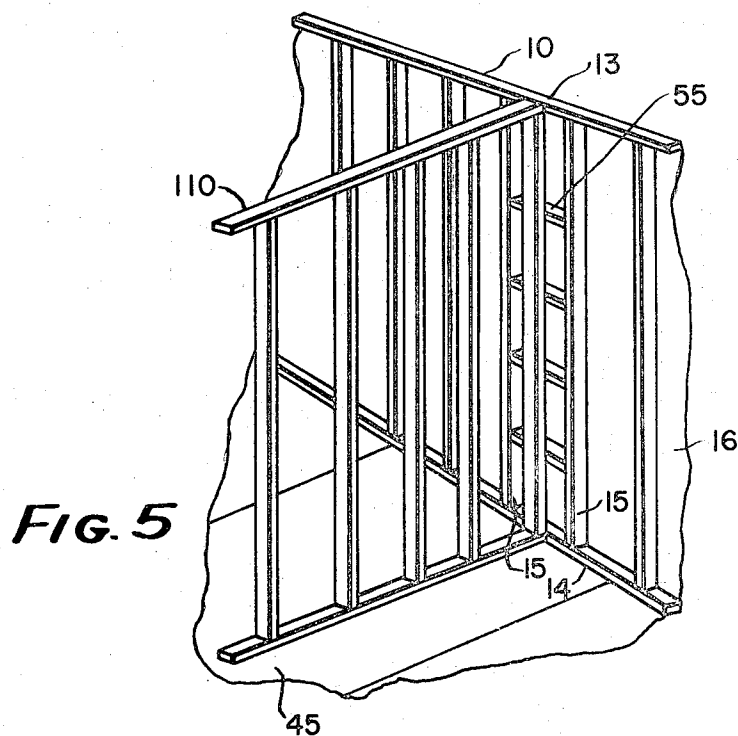


FIG. 5

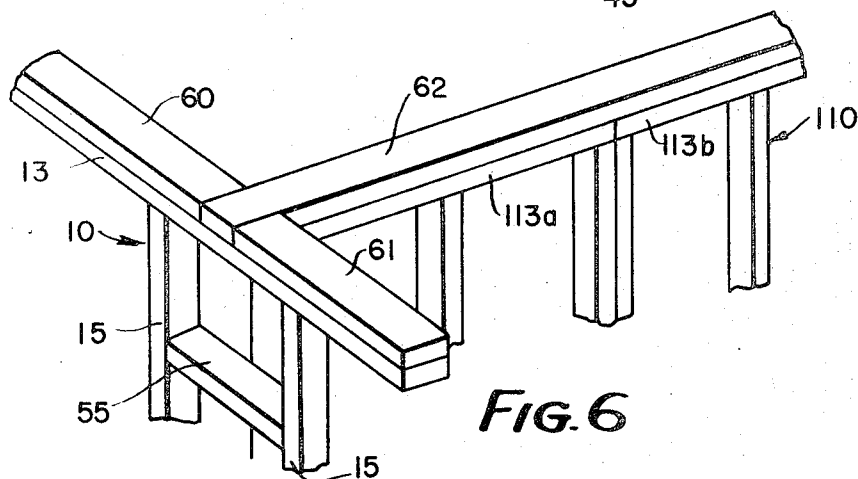


FIG. 6

WALL FRAMING SYSTEM USING PREFABRICATED PANELS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a system of framing the walls of a building, and more particularly, to a wall-framing system employing three basic types of prefabricated framing panels; namely, door panels, window panels and wall panels.

2. Prior Art

A variety of prefabricated framing systems have been proposed to facilitate the framing of such building structures as houses, residential garages, and the like. Most known prefabricated systems employ panels which are specially tailored to a specific building plan. This approach results in most, if not all, of the panels being different one from another. Such a system has many disadvantages, including:

1. The manufacture of the unit is expensive because the variation in panel construction and sizes:

- A. Prevents true production efficiencies that can only be achieved by repetitively producing identical panels;
- B. Requires substantial engineering and drafting time for each building;
- C. Necessitates that all panels be carefully and individually marked for identification so that each can be installed at its appropriate location;
- D. Necessitates that panels be made to order rather than produced at an optimum time and then stocked for prompt delivery; and,
- E. Increases the probability of mistakes occurring during production of the panels.

2. The erection of a building structure is unduly costly because:

- A. Time is lost in searching for panels so they can be erected in the appropriate sequence;
- B. Where the differences between some of the panels are small, or if there has been an error in marking, the panels can easily be confused and improperly installed during construction. Once an improper panel has been put in position, it is often difficult and expensive to fully correct the mistake which may, by the time of its discovery, already have resulted in the cumulative dimensional displacement of several subsequently-positioned wall panels.
- C. If a panel is damaged in transit, or at the construction site, expensive delays can occur while a replacement panel is fabricated.
- D. Many specialized wall panels are heavy and typically require the use of a crane in order to position the panels. The need for a crane and a crane operator increases the expense of installation of the panels. The complexities involved in interconnecting the panel portions similarly serve to increase the level of skill required for panel installation.

SUMMARY OF THE INVENTION

The present invention overcomes the foregoing and other drawbacks and provides an extremely simple, prefabricated-panel framing system employing lightweight panels which are easily positioned and installed by two workmen. The construction of a building according to the present invention requires only minimal skills for proper installation.

Three types of panel structures are used; namely, door, window and wall panels. The wall panels are dimensionally identical one with another and are accordingly completely interchangeable. The window and door panels vary in width in accordance with the width of the window and door openings they define, each of these panels being essentially as narrow as the required opening-defining framework will permit. By providing a limited number of the dimensionally different window and door panels, the problems attendant the use of highly-specialized panel designs are obviated while still permitting a wide variety of window and door structures to be used in the resulting building.

Spaced studs defining the widths of the door and window panels are preferably received between and secured to top and bottom plates of an adjoining wall panel portion. This overlapping of wall panel plates with window and door panel studs facilitates the formation of rigid panel connections.

In framing a building structure such as a home or residential garage, the three types of panels are used with a minimum of panel waste. After the wall, window and door panels have been fabricated, the window and door panels are secured in place on a floor structure. The spaces between adjacent window and door panels are then framed with wall panels. The wall panels are cut to length, as required. Wall panel scrap is minimized by framing the wall area on one side of a window or door panel with one part of a cut panel and by using the other part on the other side of the window or door panel.

Framing the spaces between the upstanding door and window panels is ordinarily begun by positioning a first wall panel with one end forming a corner of the building structure. If the distance from this corner to the first door or window panel is less than the length of the first wall panel, the first wall panel is cut to length. If the distance from the corner to the first door or window panel is greater than the length of the first wall panel, the first wall panel is simply nailed in place. One or more additional wall panels are then positioned in the space between the first wall panel and the first door or window panel, as required, to form a continuous wall structure. The last of the panels to fill this space is then cut, as required, and the cut-off wall panel portion used to continue the framing process on the opposite side of the first window or door panel.

This framing process is continued around the entire exterior wall of the building structure. The only scrap which need remain at the completion of the wall framing process is the remaining cut-off portion of the last-installed wall panel. All the other wall panel scraps have been used in the framing process. Even this remaining panel portion need not be wasted as it can be taken to the next job and used there.

Interior walls are erected in a similar fashion using a combination of wall panels which preferably have no exterior sheathing, together with door panels. The cut-off wall panel portion remaining from the framing of one interior wall is used in the initial framing of the next interior wall.

The framing system of the present invention features many advantages, including:

- 1. The panels are all of standard size, obviating the customary practice of providing special panels for each house design, and the attendant problems of damage in

shipment and improper identification prior to installation.

2. The panels can be jig-made by machine, thereby minimizing labor costs and assuring that the panels are square and interchangeable.

3. The panels are light in weight and can easily be positioned and secured in place by two workmen. No crane or other lifting mechanism is needed.

4. Waste is limited to some fraction of one standard external and one standard internal wall panel. These "waste" panels can be taken to the next job and used in toto, thereby essentially eliminating panel waste.

Accordingly, it is a principal object of the present invention to provide a novel and improved building and method of building construction.

Other objects and a full understanding of the invention may be had by referring to the following description and claims taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating the three basic types of panel structures used in the framing system in the present invention;

FIG. 2 is a perspective view illustrating the initial steps involved in erecting the panel structures on a sub-floor;

FIG. 3 is an exploded side-elevational view illustrating the trimming of the wall panels during framing of the spaces between the window and door panels;

FIG. 4 is a cross-sectional view of a corner juncture between two wall panels;

FIG. 5 is a perspective view illustrating the initial steps involved in installing an interior wall; and,

FIG. 6 is an enlarged perspective view illustrating the upper portion of a completed connection between an interior and an exterior wall.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the three basic types of panels used in the framing system of the present invention are illustrated at 10, 11, 12.

The panel 10 is a wall panel and includes top and bottom plates 13, 14. A plurality of spaced studs 15, extend between and are connected to the top and bottom plates 13, 14. In the preferred embodiment, the plates 13, 14 and the studs 15 are two-by-fours such as are ordinarily used in the framing of a home. The plates 13, 14 are typically 8 feet in length. Since standard two-by-fours are now actually 1½ inches by 3½ inches, and studs 15 are preferably of 7 feet, 9 inches in length to produce a panel which is 8 feet square.

If the wall panel 10 is to be used in framing the exterior wall of a building structure, the exterior surface of the panel is covered with a sheathing material 16. The sheathing material 16 preferably comprises a lightweight sandwich including such materials as cardboard and aluminum foil. Such material minimizes the weight of the sandwich while maximizing its strength and rigidity as well as thermo-insulating and vapor barrier characteristics. The preferred currently-available sheathing material is sold under the trademark "THERMO-PLY" by Simplex Industries, Inc., Adrian, Michigan.

The panel 11 is a door panel and includes a pair of spaced upstanding two-by-four studs 21, 22. A framework, including a pair of two-by-four jacks 23, 24 and

a two-by-twelve header 25 is interposed between and connected to the studs 21, 22. This framework defines a door opening generally indicated by the numeral 26 of such size as will accommodate a standard door structure. A two-by-four plate 27 is nailed in place along the top of the header 25.

The panel 12 is a window panel and includes a pair of spaced, upstanding two-by-four studs 31, 32. A window-defining framework is interposed between and connected to the studs 31, 32 to define a window opening 33 of such size as will accommodate a selected standard window structure. The window-defining framework includes a pair of two-by-four jacks 34, 35 which support a two-by-twelve header 36. A two-by-four top plate 37 is nailed along the top surface of the header 36. A two-by-four bottom plate 38 underlies and is nailed to the bottom ends of the jacks 34, 35. A two-by-four sill 39 extends horizontally between the jacks 34, 35.

A two-by-four crippler 40 extends vertically between the bottom plate 38 and the sill 39. A sheathing panel 41 is secured to the exterior surface of the window panel 12 in the region defined by the bottom plate 38, the sill 39 and such portions of the jacks 34, 35 as extend between the bottom plate 38 and the sill 39. The sheathing panel 41 is of the same construction as the sheathing panel 16.

The window and door panels 11, 12 can be constructed to define door and window openings 26, 33 of a variety of sizes to accommodate a variety of different standard door and window assemblies. Two typical variations of the window panels 12 are shown at 12a and 12b in FIG. 2.

Referring to FIG. 2, the initial steps of framing a building structure is shown. Beginning with a floor deck 45 which has been carefully constructed so that it is square, level and flat, lines to locate panels of interior and exterior walls are chalked on the floor. All door and window panels 11, 12 are located and their centers are marked on the floor deck 45. The door and window panels 11, 12 are then positioned and nailed in place on the floor deck with nails 46. A brace 47 is secured at the floor deck and to the door or window panel being installed to hold this panel in position until the adjoining wall structure has been framed.

Referring to FIG. 3, the installation of exterior wall panels 10 is illustrated schematically. A first wall panel 10a is cut to length along a line 47 such that the panel 10a can be positioned to extend from a corner 50 (FIG. 2) of the floor deck 45 to one side of the window panel 12a. The position of the cutting line 47 is chosen such that the top plate 13a and the bottom plate 13b of the panel 10a will overlap the ends of the window panel stud 21a. The panel 10a is positioned in the space between the corner 50 and the window panel 12a and nailed to the floor deck 45.

One feature of the framing system of the present invention is that only a straight-line panel cut is required to establish an overlapping-type connection between the cut wall panels and the adjoining window and door panels. The trimmed-off top and bottom plates 13, 14 of the wall panels, as well as sheathing 16, overlap the upstanding studs of the window and door panels.

Wall-panel waste is minimized by using the cut-off portion 10b of the panel 10a to continue the framing of the exterior wall on the opposite side of the window panel 12a. As is shown in FIG. 3, no additional trim-

ming is required before the panel 10b can be positioned in abutting relationship to the window panel 12a and secured to the floor deck 45.

The wall-framing procedure continues, using a second wall panel 10c which is cut along the line 48 as required to fill the space end of the panel 10b and a door panel 11a. The cut-off portion of 10d of the panel 10c is then used to frame the wall region on the opposite side of the door panel 11a. This framing procedure proceeds around the entire perimeter of the house.

Before any of the wall panels are nailed to the floor deck 45, they are driven tightly together at their joints and are checked with a level to assure that the various window and door openings are plumb. If, during the cutting and fitting of the wall panels, it becomes necessary to cut a wall panel at a location occupied by a stud, the stud is removed and retained for use as required in other framing procedures.

Referring to FIG. 4, a typical corner juncture is shown between two wall panels 10a, 10e. Assuming the panel 10a to have been the first to be installed on the floor deck 45, the corner juncture is formed by abutting the end of the panel 10e against the end stud 15a of the panel 10a with the outer surface of the sheathing panel 16e flush with the outer surface of the end stud 15a. Where the panel 10e must be cut to length, the end stud 15e shown in FIG. 4 represents a stud which has been added to the panel 10e along the line of cut before the panel 10e has been erected.

A two-by-six 54 is then positioned in abutting relationship with both the end stud 15a of the panel 10a and the end stud 15e of the panel 103, and nailed in place to secure the corner connection.

Referring to FIG. 5, the initial step of framing an interior wall is illustrated. Interior walls are framed using a combination of interior wall panels 110 and the door panels 11. The interior wall panels 110 essentially differ from the exterior wall panels 10 only in that the sheathing material 16 is preferably omitted from the interior wall panels, although suitable sheathing may be used. Starting at one end of the exterior wall panels 10, an interior wall panel 110 is positioned in place at a predetermined location on the floor deck 45 with one end of the panel 110 abutting the top and bottom plates 13, 14 of the panel 10. The panel 110 is then nailed to the floor deck 45 and to the top and bottom plates 13, 14. A plurality of bridging blocks 55 are then installed between the exterior wall panel studs 15 which are nearest to the end of the panel 110, and the end of the wall panel 110 is nailed to the bridging blocks 55.

When all the panels, both exterior and interior, have been erected and nailed in their final position, a second top plate is nailed atop the top plates of all the panels in such fashion as will bridge the junctures between the panel top plates and thereby strengthen the framed walls.

Referring to FIG. 6, top plate two-by-fours 60, 61, 62 are shown nailed in place to strengthen the juncture between an exterior wall and interior wall. The bridging of wall panel junctures by the top plates is illustrated in that the top plate 62 bridges the juncture between interior wall top plates 13a, 13b, and also overlaps the exterior wall panel top plate 13.

As will be apparent from the foregoing description, the present invention provides an extremely simple system for framing the exterior and interior walls of a building structure using only three basic types of light-

weight framing panels. The only cutting and fitting required in the framing process is a simple, straight-line cut employed in cutting the wall panels to length. Wall panel waste is minimized by framing the region on one side of a window or door panel, where practicable, with the cut-off portions of the wall panel used to frame the other side of the window or door panel.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form had been made only by way of example and numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. The method of fabricating a frame building comprising:

- a. forming a floor structure;
- b. fabricating window and door panels of desired sizes and apertured to receive respectively window and door assemblies;
- c. fabricating a plurality of wall panels free of window and door openings and of substantially uniform dimension;
- d. marking the floor to provide locating lines for walls and locating marks for windows and doors; and,
- e. positioning panels along said lines and securing the panels in place in aligned and abutting relationship, selected ones of the wall panels being positioned after cutting to lengths appropriate to permit positioning of the door and window panels at desired locations.

2. A method of framing the exterior walls of a building structure by using preformed panel sections, comprising the steps of:

- a. prefabricating wall, window and door panel sections;
- b. positioning the window sections and door sections in predetermined locations on an existing sub-floor structure;
- c. securing the positioned window sections and door sections to the sub-floor structure; and,
- d. framing the wall regions between the window sections and door sections by using said wall sections and cut-off portions thereof as required, and minimizing wall section waste by constructing wall regions on one side of said door and window sections, from such wall section portion as may have been cut off the wall panel section on the other side of the respective door and window sections.

3. The method of claim 2 wherein said step of prefabricating said window sections and said door sections includes the step of providing said window sections and door sections with members adapted to extend interiorly of such trimmed-off wall sections as are used to abut the window and door sections in the framed construction, whereby only a straight cut is required in trimming said wall sections to effect an overlapping connection with the window and door sections.

4. The method of claim 2 additionally including framing the interior walls of the building structure in accordance with the steps of:

- a. prefabricating two basic types of interior panels including wall panels and door panels;
- b. positioning the door panels in predetermined locations atop the sub-floor structure;

- c. securing the positioned door panels to the subfloor structure; and,
- d. framing the interior wall regions between the door sections and the exterior walls by using said wall panels, and minimizing wall panel waste by using a wall panel portion which has been cut off a previously installed wall panel to frame a later-installed section of interior wall.
- 5. The method of claim 2 additionally including the step of strengthening the framed wall structure after all interior and exterior walls have been framed by installing a top plate around the top of the framed walls bridging the junctures between the various wall sections and panels and portions thereof.
- 6. A method of framing the exterior walls of a building structure using preformed panel sections, comprising the steps of:
 - a. prefabricating three types of panel sections including:
 - i. wall panels each being of substantially the same height and of repetitive widths and including a wall panel top plate, a wall panel bottom plate, a plurality of spaced wall panel studs extending between said plates and connected thereto at opposite ends of said wall panel studs, and wall panel sheathing secured to said wall panel plates and said wall panel studs;
 - ii. window panels each being of substantially the same height and of a width determined in accordance with the width of the window structure to be supported in each particular window panel, said window panels each including a pair of spaced window panel studs defining the width of the window panel, a window panel framework interposed between and connected to said window panel studs defining a window opening therein adapted to receive a window structure of predetermined size, a window panel top plate and a window panel bottom plate, said window panel plates being connected to said window panel framework; and,
 - iii. door panels each being of substantially the same height and of a width determined in accordance with the width of the door structure to be supported in each particular door panel, said door panels each including a pair of spaced door panel studs defining the width of the door panel, a door panel framework interposed between and connected to said door panel studs defining a door opening therein adapted to receive a door structure of predetermined size, and a door panel top plate connected to said door panel framework;
 - b. erecting a sub-floor structure having planar, upwardly facing surface portions adapted to receive and support exterior walls thereon; and,
 - c. erecting said panel sections to form exterior walls comprising the steps of:
 - i. positioning said door panels and said window panels in their proper predetermined positions on said sub-floor surface portions and securing said door and window panels to said sub-floor surface portions;
 - ii. framing the exterior wall regions between said door and window panels with said wall panels.
- 7. The method of claim 6 wherein:

- a. said window panels are constructed such that the top and bottom plates thereof do not extend fully across the ends of said window panel studs;
- b. said door panels are constructed such that the top plates thereof do not extend fully across the ends of said door panel studs;
- c. the top and bottom plates of such wall panels as abut the window panels and door panels are fitted to at least partially overlap the ends of the window panel studs and door panel studs; and,
- d. the wall panels are secured to the window panels and the door panels in the regions of overlap of the wall panel plates and the window and door panel studs.
- 8. The method of claim 7 additional including the step of rendering the exterior wall structure more rigid by securing a second top plate to the top plates of adjacent panel sections to bridge the junctures between the top plates of adjacent panel sections.
- 9. A method of framing the exterior walls of a building structure using preformed panel sections, comprising the steps of:
 - a. prefabricating three basic types of panel sections adapted to be secured together in side-by-side relationship to form exterior walls of uniform height, the panel sections including:
 - i. a plurality of dimensionally identical wall sections each having a top plate, a bottom plate, spaced studs extending between and secured to the plates, and sheathing secured to one side of the stud and plate assemblage;
 - ii. a plurality of window sections each having a framework defining an opening of such size as will receive a window structure of predetermined size;
 - iii. a plurality of door sections each having a framework defining an opening of such size as will receive a door structure of predetermined size;
 - b. erecting the panel sections on an existing subfloor structure in accordance with a predetermined plan defining the position of the various door and window sections, the erection procedure including the steps of positioning said door sections and said window sections in their predetermined positions and securing these sections to the sub-floor structure; and,
 - c. framing the wall regions between said door and window sections with said wall sections and minimizing the wall section waste by constructing the wall region in part with cut wall section portions.
- 10. The method of claim 9 wherein the erection procedure further includes the steps of:
 - a. cutting the wall section portions which abut the various door sections and window sections such that the top plate and bottom plates of said wall section portions overlap the abutting door and window sections; and,
 - b. securing said wall section portions and said abutting door and window sections together in the regions of overlap of said plates.
- 11. The method of claim 10 additionally including the step of strengthening the erected exterior wall structure by fastening a second top plate to the top of said sections to bridge the splices therebetween.

12. A method of framing the walls of a building structure from prefabricated wall panel sections comprising the steps of:

- a. prefabricating a series of window panels and door panels each having a framework defining an opening adapted to receive window structures and door structures, respectively, of predetermined sizes, the width of said window panels and said door panels not substantially exceeding the width of the framed openings therein;
- b. prefabricating a plurality of substantially dimensionally identical wall panels each having a top plate, a bottom plate, and a plurality of spaced studs extending between and connected to said plates;
- c. securing the door and window panels in place on a flooring deck; and,
- d. framing the remaining wall regions by installing wall panels one at a time, cutting each wall panel for length as required, and minimizing wall panel waste by continuing the framing operation, where practicable, by installing previously cut-off wall panel portions.

13. A method of framing the exterior walls of a building structure using preformed panel sections, comprising the steps of:

- a. prefabricating three types of panel sections including:
 - i. wall panels each being of substantially the same height and of repetitive widths and including a wall panel top plate, a wall panel bottom plate, a plurality of spaced wall panel studs extending between said plates and connected thereto at opposite ends of said wall panel studs, and wall panel sheathing secured to said wall panel plates and said wall panel studs;
 - ii. Window panels each being of substantially the same height and of a width determined in accordance with the width of the window structure to be supported in each particular window panel, said window panels each including a pair of spaced window panel studs defining the width of the window panel, a window panel framework interposed between and connected to said window panel studs defining a window opening therein adapted to receive a window structure of predetermined size, a window panel top plate and a window panel bottom plate, said window panel plates being connected to said window panel framework; and,
 - iii. door panels each being of substantially the same height and of a width determined in accordance with the width of the door structure to be supported in each particular door panel, said door panels each including a pair of spaced door panel studs defining the width of the door panel, a door panel framework interposed between and connected to said door panel studs defining a door

- opening therein adapted to receive a door structure of predetermined size, and a door panel top plate connected to said door panel framework;
- b. erecting a sub-floor structure having planar upwardly facing surfacing portions adapted to receive and support exterior walls thereon; and,
- c. erecting said panel sections to form exterior walls comprising the steps of:
 - i. positioning said door panels and said window panels in their proper predetermined positions on said sub-floor surface portions and securing said door and window panels to said sub-floor surface portions;
 - ii. framing the exterior wall regions between said door and window panels with said wall panels and minimizing the waste wall panel material by forming the wall region on one side of the door and window panels from the material which was cut off a wall panel to frame the other side of the respective door and window panels.

14. A wall framing system for framing the walls of a building structure including three types of panel sections characterized by:

- a. wall sections each being dimensionally identical one with another and having flat opposed end regions extending the full height of the wall sections whereby the end region of one wall section can be abutted against the end region of another wall section and a rigid connection effected therebetween;
- b. door sections each defining an opening therein of such size as will accommodate a standard door structure, the door sections having a minimal width corresponding to the width of the openings they define;
- c. window sections each defining an opening therein of such size as will accommodate a standard window structure, the window sections having a minimal width corresponding to the width of the openings they define;
- d. said door sections and said window sections having opposed projecting end portions extending only partway along the height of the door sections and window sections, said projecting end portions being adapted to project inwardly of a trimmed-off wall section to effect an overlapping connection with trimmed-off wall sections abutting opposite sides of said door and window sections.

15. The framing system of claim 14 wherein:

- a. said wall sections each include a top plate, a bottom plate, and a plurality of spaced studs extending between and connected to said plates; and,
- b. said projecting end portions of said door sections and said window sections comprise studs of such length as will fit snugly between the top and bottom plates of trimmed-off wall sections.

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