Nov. 15, 1966 G. M. ROEDER 3,284,978

COMPOSITE FLOOR PANEL

Filed April 16, 1964 4 Sheets-Sheet 1

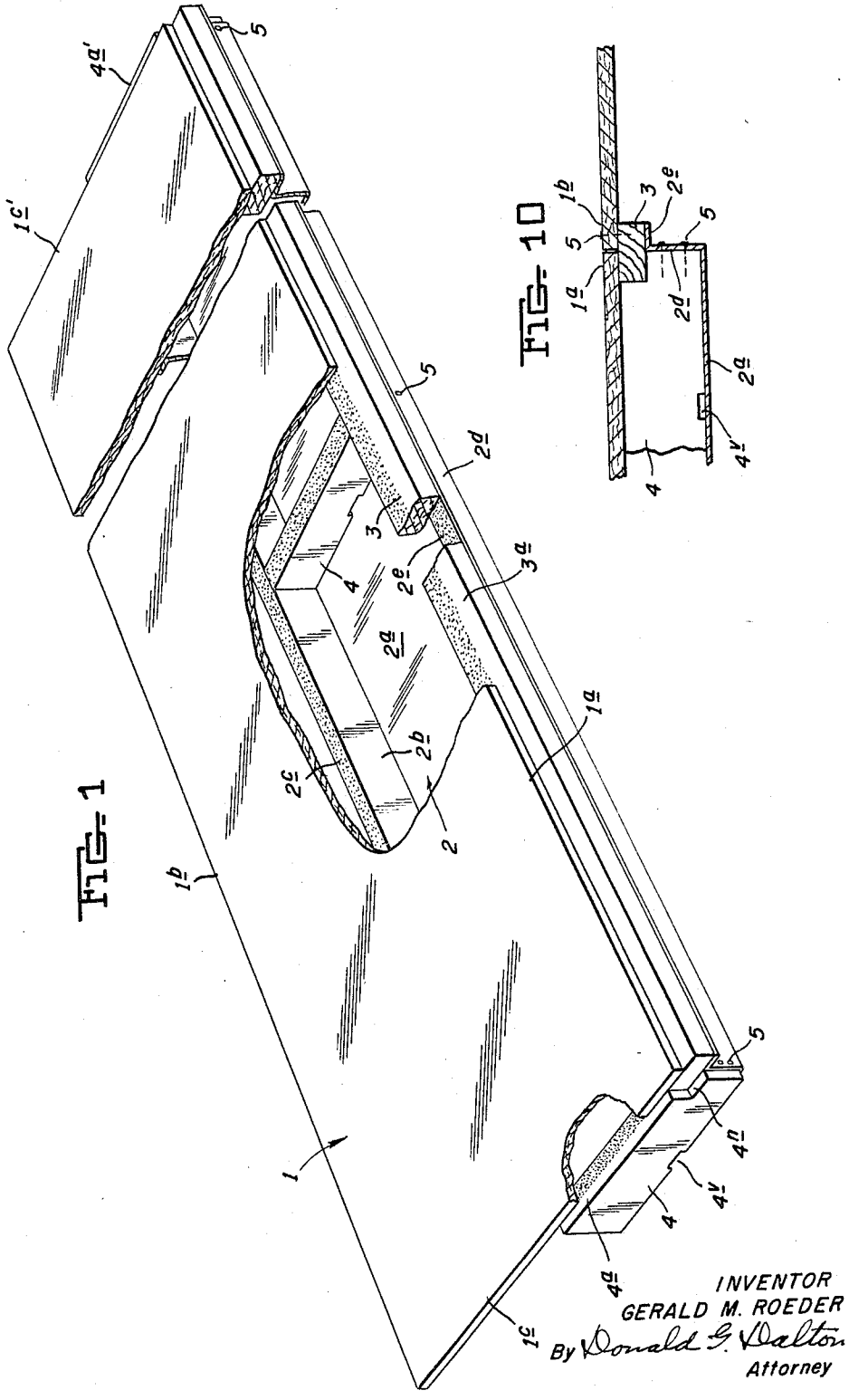


FIG. 1

FIG. 10

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COMPOSITE FLOOR PANEL

Filed April 16, 1964 4 Sheets-Sheet 2

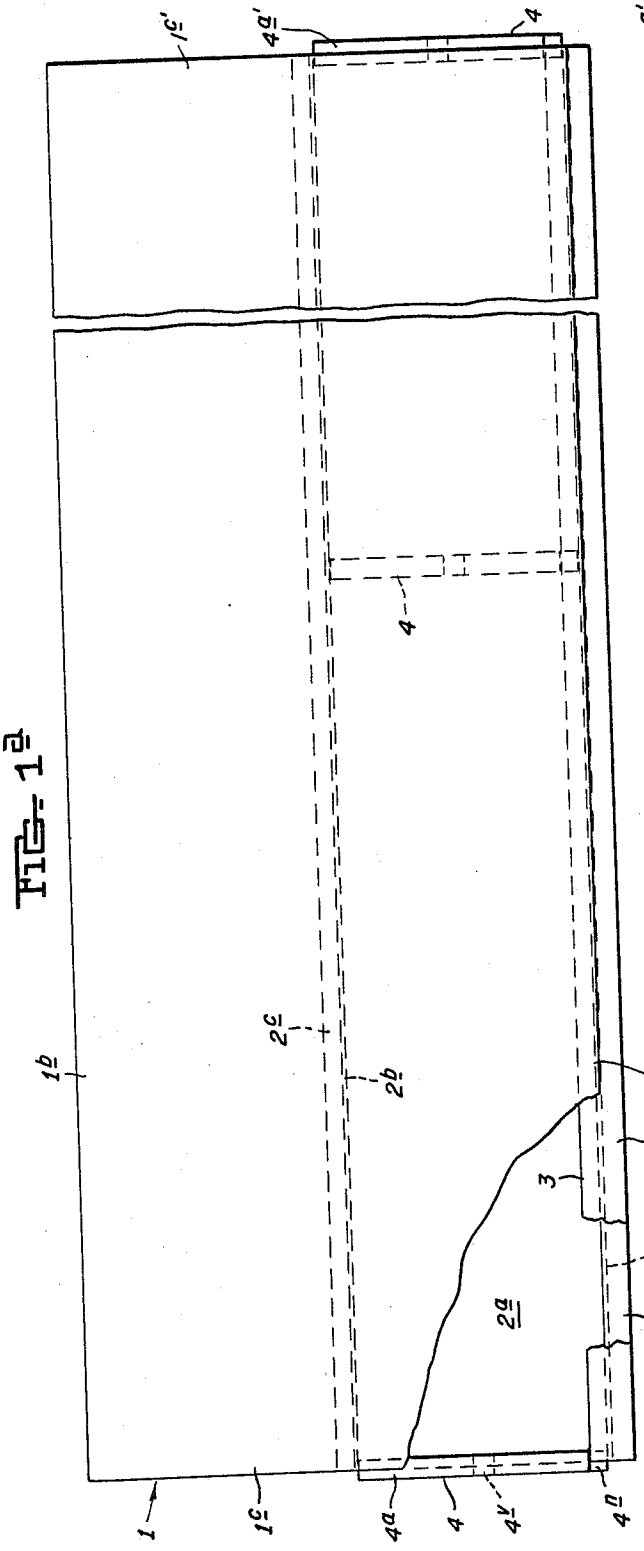


FIG. 1a

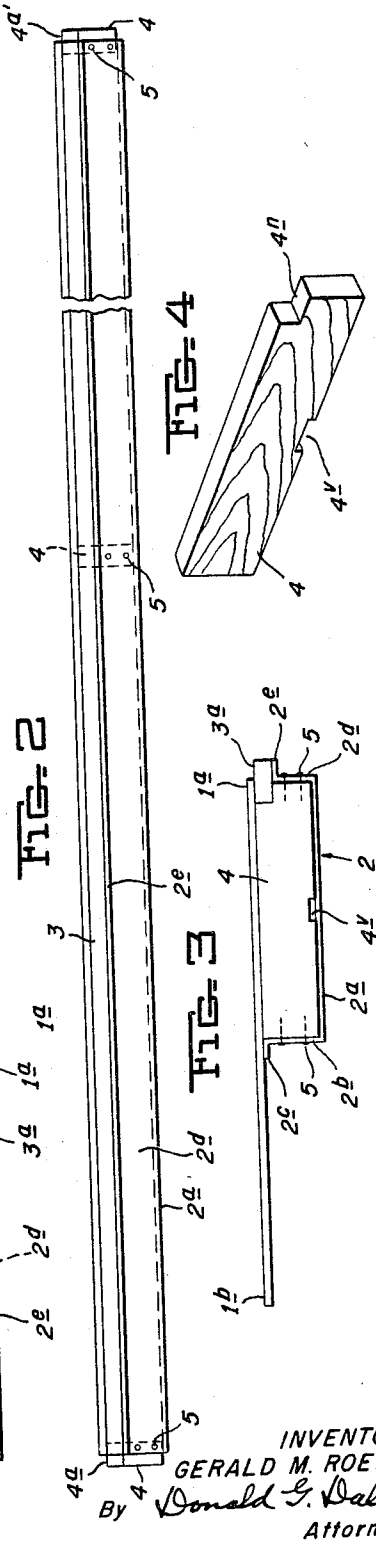


FIG. 2

FIG. 4

FIG. 3

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COMPOSITE FLOOR PANEL

Filed April 16, 1964 4 Sheets-Sheet 3

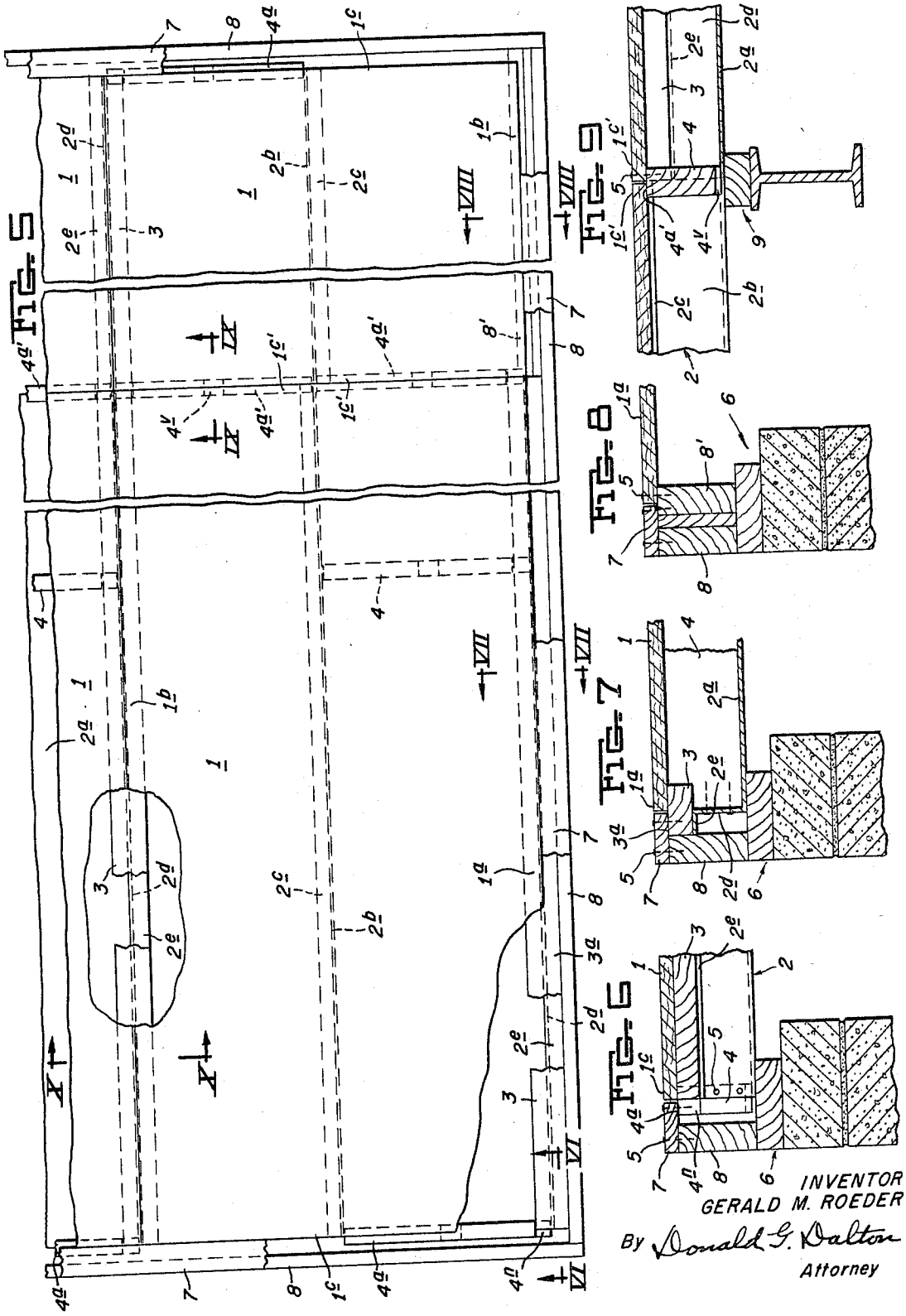


FIG. 5

FIG. 6

FIG. 8

FIG. 7

FIG. 9

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COMPOSITE FLOOR PANEL

Filed April 16, 1964 4 Sheets-Sheet 4

FIG. 11

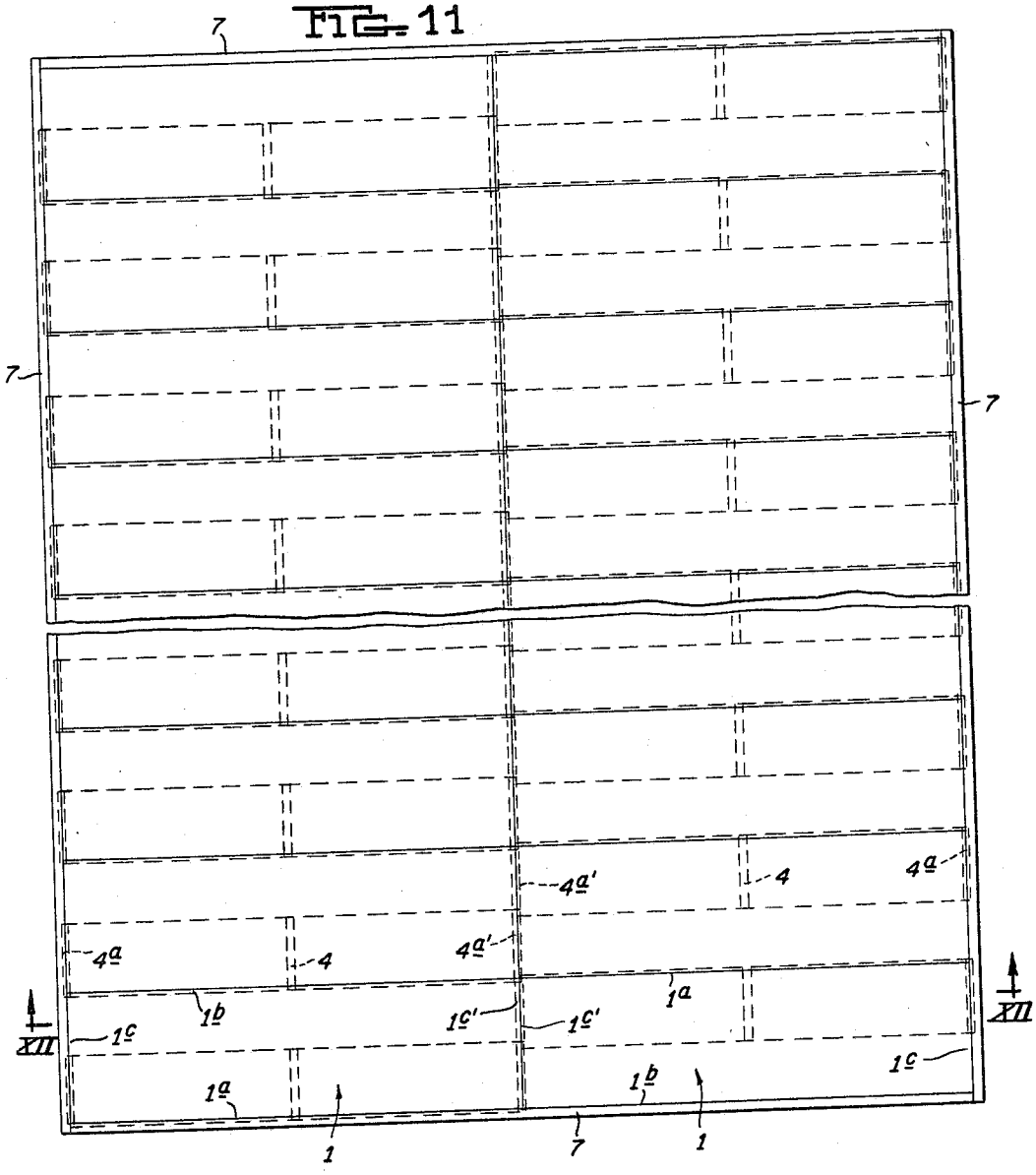
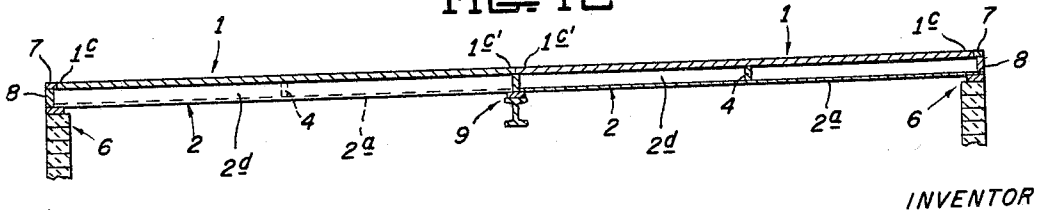


FIG. 12



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3,284,978

COMPOSITE FLOOR PANEL

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Filed Apr. 16, 1964, Ser. No. 360,238
3 Claims. (Cl. 52—589)

This invention relates to a composite floor panel, adapted to prefabrication, which eliminates the necessity for the wood-frame floor system traditional in residential construction and the like.

An object of the invention is to provide a simply constructed modular floor panel of considerably more width than that of individual usual flooring boards, which panel is capable of spanning, with only end support, relatively large unsupported beam to beam expanses.

A concomitant object is to obtain this spanning capability with a floor panel of modest depth.

An additional object of the invention is to provide a floor panel which may be prefabricated with a minimum of capital equipment investment, thereby permitting its fabrication by small shops.

The panels may be readily installed, in either prefabricated or wood-frame houses for example, with a minimum of training of installation personnel.

More particularly, the invention contemplates construction of building floors utilizing the relatively broad and long modular panels commercially available in plywood, by adding a composite metal bracing understructure, and providing panel joining features.

The invention will be more fully described in conjunction with the drawings, wherein:

FIGURE 1 shows the panel of the invention in perspective with parts broken away to illustrate interior construction;

FIGURE 1*a* is a top view of the panel of FIGURE 1, further depicting the relative positioning of components;

FIGURES 2 and 3 are side and end views, respectively, of the panel, and complement FIGURE 1*a*;

FIGURE 4 is a perspective view of an element of the composite panel;

FIGURE 5 is a partial plan view of four panels installed in a building, including certain adjacent building structure;

FIGURES 6, 7, 8, 9 and 10 present enlarged details, in section, of structure shown in FIGURE 5, taken along lines VI—VI, VII—VII, VIII—VIII, IX—IX and X—X respectively. These figures are concerned with panel-to-panel joining and joining of panels to building structure;

FIGURE 11 is a plan view showing the general layout of a floor using the panels of the invention; and

FIGURE 12 is a sectional view taken along line XII—XII of FIGURE 11.

Referring in more detail to the drawings, particularly FIGURES 1 and 1*a*, it may be noted that the composite panel has a top surface member **1** which may be plywood sheet for example. However, other materials capable of providing substantial floor area coverage in a desired module size may be employed. In general, the top surface member, advantageous in the present invention, is very much broader than conventional flooring boards, as will be apparent from an example to be presented hereinafter.

Spanwise bracing of top surface member **1** is accomplished by means of a shallow, generally U-shaped pan-like member **2**, with a generally flat bottom **2***a*. Member **2** runs the entire length of the underside of top surface member **1**. A multiplicity of these bracing elements may be employed, if suitably spaced to provide the endwise panel interlocking feature, involving the staggered pan-to-pan installation, hereinafter described. However, a single such bracing element is preferred for conventional

conveniently handled plywood sheet sizes. With a single U-shaped bracing member, it is preferred, for maximum strength of panel, that leg **2***b* bear upon the underside of top surface member **1**, lengthwise, at about the middle thereof, as shown in FIGURES 1*a* and 3. Leg **2***b* is provided with flange **2***c* for rigidity and ease of attachment to top surface member **1**.

Leg **2***d* of pan **2** preferably provides support to top surface member **1** along a line about directly beneath edge **1***a* thereof. It will be noted that leg **2***d* does not bear upon top surface member **1**, but is separated therefrom by panel joining strip **3**. Accordingly, leg **2***d* is compensatingly shorter than leg **2***b*. Panel joining strip **3** bears in part upon the underside of top surface member **1**, extending along edge **1***a* thereof. Strip **3** protrudes beyond edge **1***a* to provide a ledge **3***a* adapted to provide bearing support for an abutting mating panel along its edge **1***b*. The ledge is adapted to receive means for joining the panels. Leg **2***d*, similarly to leg **2***b*, has flange **2***e* at its tip, which flange preferably extends outwardly beneath the ledge **3***a*, to provide bearing support therefor.

Transverse member **4**, depicted in FIGURE 4, preferably conforms generally in shape to the inside configuration of U-shaped pan member **2** and the underside of top surface member **1**, to impart maximum stiffness to the pan. Notch **4***n* thereof accommodates the portion of panel joining strip **3** extending inboard of leg **2***d*, and preferably is adapted to bear upon the joining strip at its vertical and horizontal notch surfaces as shown in FIGURE 3. Member **4** is desirably provided with ventilation notch **4***v*.

A transverse member **4** is installed in at least one end of U-shaped member **2**, as shown in FIGURES 1 and 1*a*. As will be observed, this member **4** protrudes beyond end **1***c* of top surface member **1** to form ledge **4***a*, similarly to the aforementioned edgewise protrusion **3***a* of joining strip **3**, which projection is adapted to provide bearing support for, and to receive joining means for, an unsupported end portion of top surface **1** of an additional panel, when said top surfaces are in pan-staggered endwise abutting relationship, as shown in FIGURES 5, 9, 11 and 12. It will be noted that the end-abutting pan-staggered relationship contemplates the joining of complementary panels in an interlocking manner so that each panel contributes a supporting ledge for the other abutting panel. Accordingly, with pan legs **2***b* at about the midpoints of the panels, each top surface member finds substantially continuous end support from the interlocking positioning of transverse members **4** located at panel ends.

Transverse members **4** are desirably installed in both ends of U-shaped member **2**, as shown in FIGURES 1 and 1*a*, with ledge **4***a*′ protruding beyond top surface member edge **1***c*′. This increases pan stiffness, and permits the employment of a single type panel, since pan-staggered matching may be achieved by simple end-to-end reversal of panel position during installation.

An additional transverse member **4** is desirably installed about mid-way along the pan, as shown in FIGURES 1 and 1*a*, for imparting additional pan stiffness.

Mechanical fasteners, such as nails **5**, as shown in FIGURE 3, are desirably employed to attach the ends of transverse members **4** to legs **2***b* and **2***d* of U-shaped member **2**.

A composite panel, as described above, lends itself to ready jointure to foundation-wall structure. In FIGURE 6 an end of a panel with pan **2** and transverse member **4** receives support from foundation **6**. A filler strip **7**, desirably of the same thickness as top surface member **1**, may be attached by nails or other suitable means to transverse member ledge **4***a* and top of header **8**. Similarly, along a panel edge, as shown in FIGURE 7, pan **2**

with transverse members **4** are supported by foundation **6**, and a similar filler strip **7** may effect a joint between ledge **3***a* of panel joining strip **3** and header **8**.

Where the panel top surface member **1** is otherwise unsupported, as at edge **1***b* a second header member **8'**, as shown in FIGURE 8 may be employed for jointure to foundation-wall structure.

As shown in FIGURE 9, end-to-end jointure is effected at a center support beam, or other mid-beam, as previously described, and joining is conveniently effected by nails **5**. Similarly, as shown in FIGURE 10, nails **5** may be employed to effectuate side-to-side jointure of panels.

FIGURES 11 and 12 are further illustrative of the staggered pan relationship for panel installation and illustrate the need for only a single center support beam in a residence of conventional size.

An illustrative panel of the invention, capable of withstanding conventional residential loading tests of 40 pounds per square foot, comprises a ½ inch or ¾ inch plywood top surface 4 feet by 14 feet, a 20 gauge galvanized steel pan about 23 inches wide and 5 inches deep, a panel joining strip of dressed 2 inch by 4 inch lumber, and transverse members about 2 inches thick. The latter are cut to bear upon the inner surfaces of the pan, the underside of the top surface member, and the panel joining strip.

The panel elements are preferably adhesively bonded into a unitary structure with bonds the length of the panel where strip **3** contacts top member **1**, and where flanges **2***c* and **2***e* bear upon the top member and strip **3**, respectively. Any commercially available phenolic resin adhesive may be employed, for example. Adhesive bonding may be extended to include the areas of contact between the upper surfaces of transverse members **4** and the other panel members, however, this additional bonding is not generally preferred inasmuch as it interferes with desirable straight line assembly operations. Also, a panel when installed exhibits a diaphragm action under loading, and bonding at more than the aforementioned lengthwise points tends to adversely affect this action.

Although an illustrative example has been given, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. A composite floor panel comprising

(a) a top surface member;

(b) a panel joining strip running lengthwise on the underside of said top surface member and protruding along an edge thereof to receive means for joining an additional panel;

(c) a generally U-shaped member running the length of the underside of said panel, said U-shaped member having one leg tip bearing on the underside of said panel joining strip and the other leg tip bearing on the underside of said top surface member, the leg lengths being unequal to compensate for the thickness of said panel joining strip;

(d) transverse members extending between the legs of said U-shaped member and bearing on the underside of said joint nailer strip and the underside of said top surface member, at least one of said transverse members protruding beyond the top surface member to receive means for joining an additional panel, said transverse members being adapted to promote stiffening of said U-shaped member.

2. The panel of claim **1** in which top surface member of subparagraph (*a*) is plywood sheet; U-shaped member of subparagraph (*c*) is steel sheet having flange leg tip bearing surfaces with the leg tip bearing upon the underside of said top surface member lengthwise at about the middle thereof; and tranverse member of subparagraph (*d*) is provided at both ends of said U-shaped member whereby upon endwise abutment of two panels, with U-shaped members in staggered relationship, the transverse member of one panel and the similar member of the adjacent panel afford support over substantially the entire width of the panels at their abutting ends.

3. The panel of claim **2** in which transverse members of subparagraph (*d*) are secured to U-shaped member of subparagraph (*c*) by mechanical means and the lengthwise bearing surfaces between panel members are adhesively bonded to an extent sufficient to achieve panel unitization.

No references cited.

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