July 11, 1939. G. F. KOTRBATY 2,166,097

BUILDING CONSTRUCTION

Filed Aug. 9, 1937 2 Sheets-Sheet 1

Fig. 1.

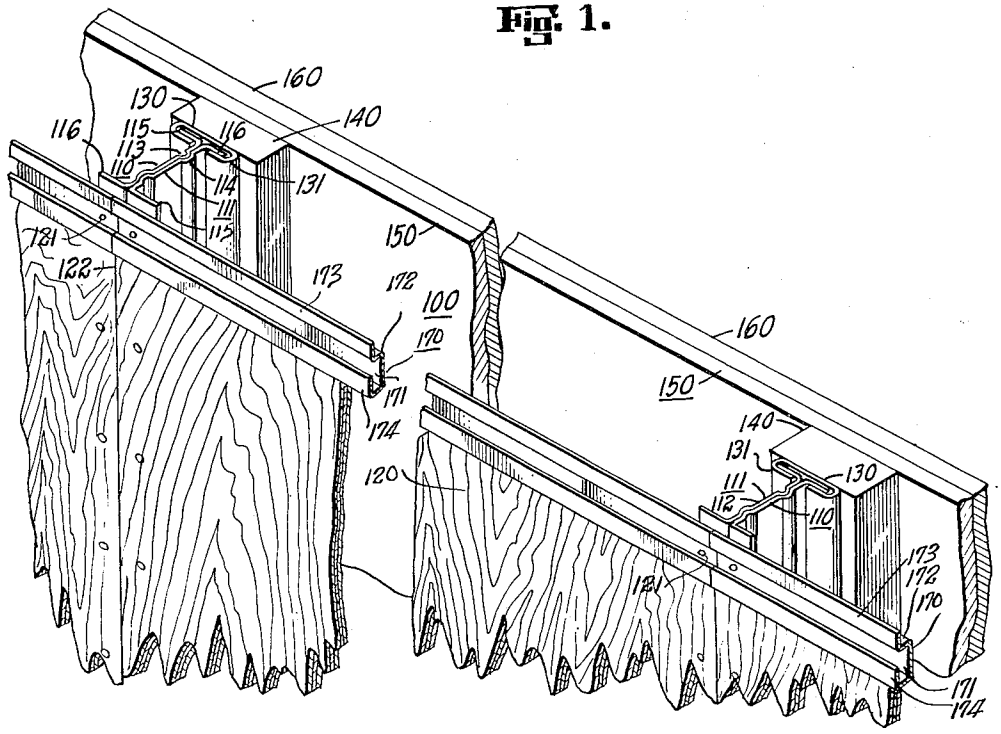
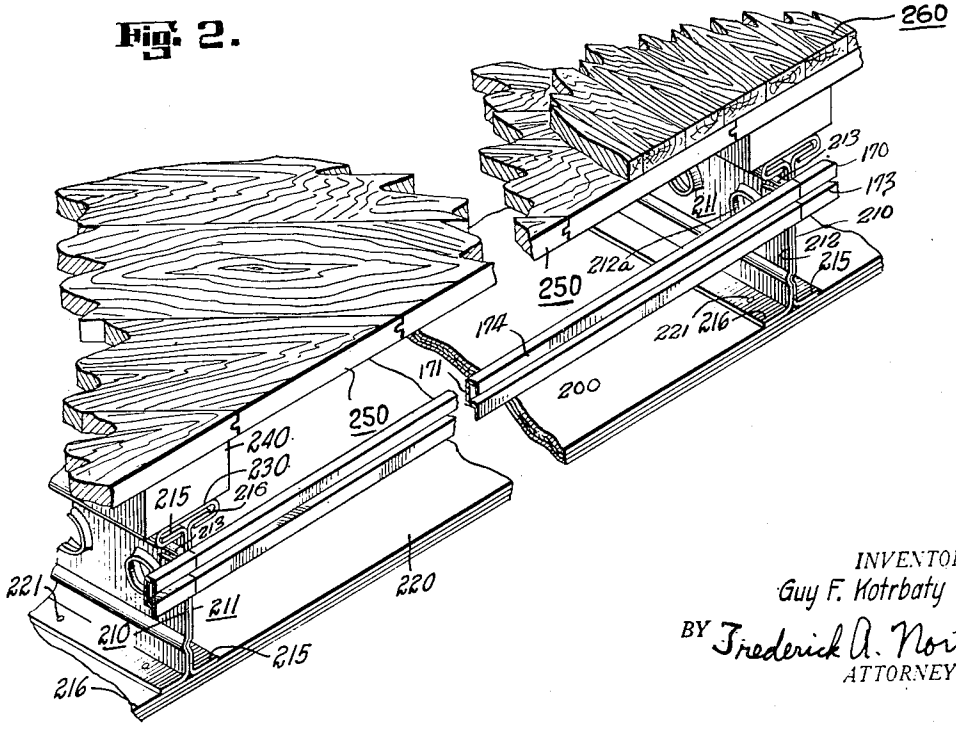


Fig. 2.



INVENTOR.
Guy F. Kotrbaty
BY Frederick A. Norton
ATTORNEY

July 11, 1939. G. F. KOTRBATY 2,166,097

BUILDING CONSTRUCTION

Filed Aug. 9, 1937 2 Sheets-Sheet 2

Fig. 3.

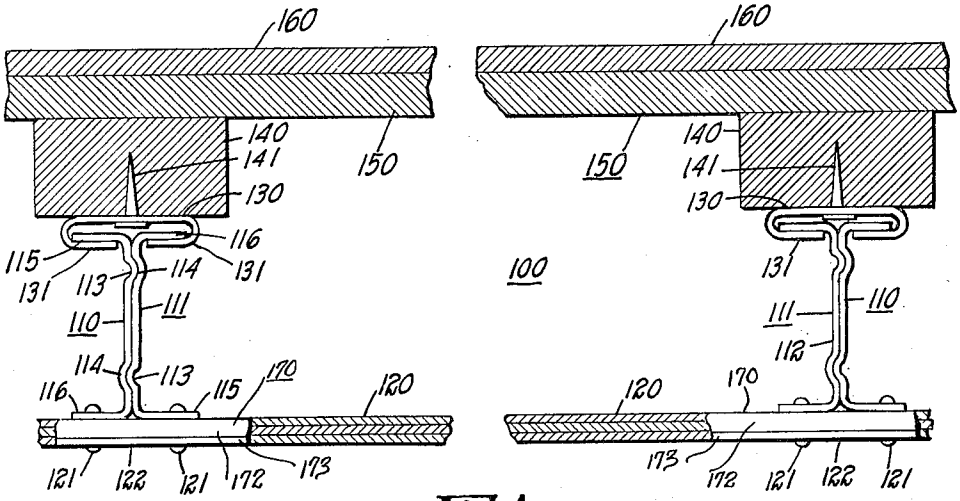
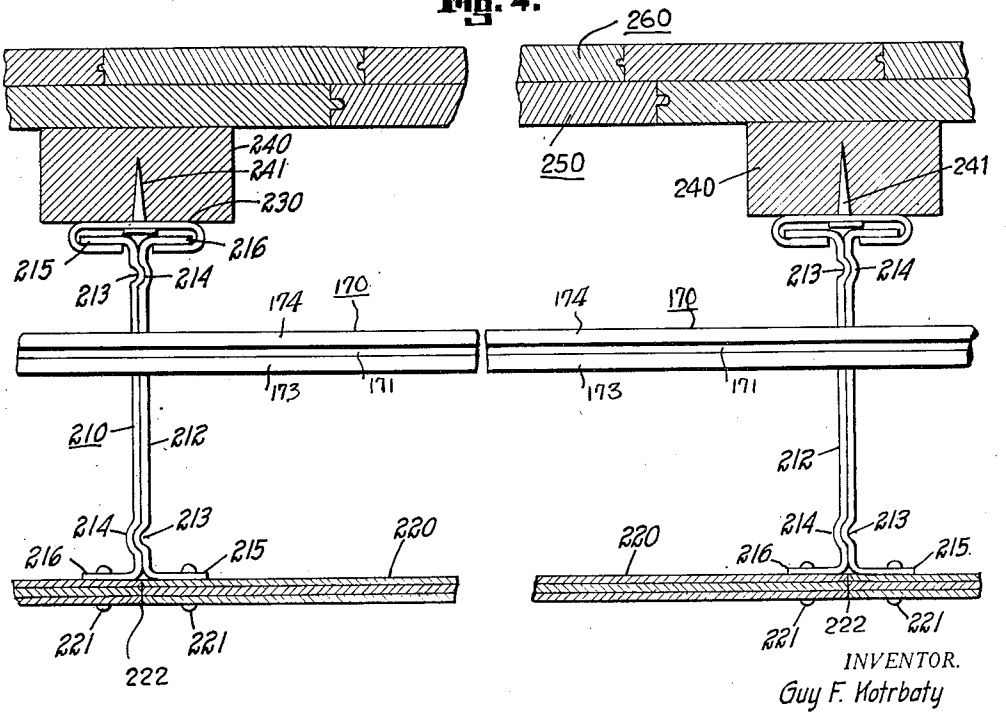


Fig. 4.



INVENTOR.
Guy F. Kotrbaty
BY Frederick A. Norton
ATTORNEY

Patented July 11, 1939 2,166,097

UNITED STATES PATENT OFFICE

2,166,097

BUILDING CONSTRUCTION

Guy Felix Kotrbaty, Chestnut Hill, Pa.

Application August 9, 1937, Serial No. 158,178

12 Claims. (Cl. 189—34)

This invention relates to improvements in self-supporting building units adapted for use in walls and floorings, as well as in roofings, and the application relates more particularly to such units having semi-stud and beam sections as the structural elements, spaced apart and held by a single panel, abutted semi-stud or beam sections being secured together as structural composites, and the open faces of the units being surfaced with individual or continuous sheathing and other surfacing materials.

The present invention is concerned with structural units in which the side members are abutted, in mating engagement, with like members, and the abutted units secured together, and wall surfacings nailed, or otherwise secured, over the units. The units, as above intimated, have two structural side members spaced apart and secured by a single paneling forming one face of a unit, the side members being secured to the panel as by bolt rivets, and secured to each other at the free edges by key members engaging the locking flanges thereof. Furring strips, sleepers, or other nailable members, may be secured to the key members or to the side members at the open faces of the units, and nailable surfacings may be secured to the nailing members. Such a construction permits the use of the customary nailable surfacings, such as sheathings and clapboarding, plywood or other paneling, and the like, to structural units including my self-supporting units generally, and the composite structural stud, stanchion, and beam members of walls and floorings. Floor hanger and support members may be secured between and across the stanchion or beam sections of the units and serve to permit the interlocking or hanging of floors on walls or the walls upon floors. This provides a desired and practicable extension of the building principles and structures set out in my prior patents, or based upon common fundamental constructional principles.

The above outlined desirable features and advantages of the present invention will be described hereinafter with respect to the drawings accompanying the present specification and forming a part thereof, it being understood that the examples set forth are given by way of illustration only, for, since the underlying principles may be incorporated in other specific structures, it is not intended to be limited to the structures here shown, except as such limitations are clearly imposed by the appended claims.

In the drawings, like numerals refer to similar parts throughout the several views, of which

Fig. 1 is a transverse section of abutted three-sided wall units with applied surfacings;

Fig. 2 is a perspective, partly in broken section, showing abutted floor units with floor surfacings;

Fig. 3 is a plan view, partly in broken section, of the structure of Fig. 1, and

Fig. 4 is a transverse view of the structure of Fig. 2.

For purposes of convenience, the wall units and assemblies will be separately designated, as will the floor units and assemblies, although, as already noted, the structural features are generally similar as to matters of design while differing in the size and strength of the individual elements and of the composite structures.

Referring more particularly to Figs. 1 and 3, the novel structural wall unit **100** may comprise composite stud or stanchion members or sections **110**, made up of abutted half sections **111** of generally channel shape, which are secured to and spaced by a wall surfacing or paneling **120**. As shown, the panel **120** may be made of plywood, of suitable material and thickness, or other surfacings, such as metal lath, wood, asbestos sheet, and the like, may be used. The half stud sections **111**, as indicated, are of generally channel shape and comprise a flat bottom or body portion **112**, with or without stiffening domed apertures **112a**, and having spaced longitudinal ribs, **113**, **114**, of mutually opposite curvature, adjacent the sides or edge flanges, and severally defining exterior ribs and channels adapted to receive mating sections of like members when abutted thereagainst. The sections **111** are provided further with edge flanges or sides **115**, **116**. The panels **120** may be secured to the stud sections **111** as by means of bolts or rivets, indicated generally at **121**. Where metal panels are used, the securing means **121** may comprise spot welds, as well as the mechanical securing means above described. Where plastic or other surfacings are to be applied over the panels **120**, the securing members **121** are formed flat headed or are sunk flush with the outer surface or face of the panels. The panels may be secured to the flanges **115**, **116**, of the stud sections **111** so as to form a hair line joint **122** with panels of abutted units. Batten members may also be secured over these joints, or they may be cemented to the flanges and the panels cemented to the batten members or cementing strips.

The gauge of the metal used in the semi-stud sections or elements **111** will be varied according to the construction to be erected, and will, in every case, be governed by sound building practice.

As already discussed, the semi-stud sections **111** may be bolted, riveted, or welded together after abutted units **100** have been assembled into wall structures, access being had from the open faces of the units. Desirably, and as shown in the drawings, the flanges on the open sides of the abutted units may be locked together by flat key members **130**. These key members **130** are

flat strips or bands of metal of suitable gauge thickness, and are provided at their edges with rolled flanges inturned towards each other on the same side of the member to form hook flanges 131. The hook flanges will engage the flanges 115, 116 of abutted semi-stud sections and lock the sections together to form a composite stud member. The mating engagement of the several ribs and channels 113, 114, and the locking of the flat flanges 115, 116, by the flat keys 130 gives a permanent composite unit, and one in which there is little or no tendency to rock or rotate about the key. This is particularly true in wall assemblies, as the successive units mutually cooperate to provide a stiff, and strong wall structure. The hook flanges 131 can be hammered down against flanges 115, 116, to prevent sliding and to insure positive interlocking of the assembled parts.

While the structural strength of wall assemblies may be predicated upon and designed with respect to the strength of the composite studs, described immediately above, further and added elements of structural strength and efficiency are comprehended in and built in the structural units and assemblies here under consideration. The key members 130 may be used as supports for furring strips or structural joist members 140, of wood or other nailable materials. The size and shape of these members will depend to a certain extent on the use to which they are to be put. Where they are to be used merely as nailing members or furring strips, the stock may be relatively small. On the other hand, where they are to be relied on to furnish appreciable structural strength to the assembly, as stud or joist members, they will be of the size usually taken for like structural work in wooden building constructions. The studs or joists 140 may be secured to the keys 130 in any practical manner, as by means of nails, screws, screw nails, bolts, or rivets, all as indicated generally at 141.

While the stud or furring strip members 140 are generally of building unit length, and are secured to the keys 130 of equal length, it will, of course, be understood that the keys and attached furring strip members or sections may be formed of segments or short lengths. In addition, while the present invention discloses and contemplates the sliding of the keys over and in locking engagement with the cooperating flanges of the composite studs 110, the keys and cooperating flanges may be respectively tongued and/or slotted to permit the direct engagement of the parts and the interlocking of the same by a slight longitudinal movement of the key member.

With the improvements discussed above, the finishing or surfacing of the wall and floor units will now be described. As shown, sheathing or paneling 150, of wood or other suitable nailable material, and in appropriate sizes, is nailed on to the furring strips 140 or sleepers 240. In this work the sheathing 150 may extend over a single unit or a plurality of the open sides or faces of the units, as is the usual practice in nailing sheathing over wooden studs or joists. Here, the nailed sheathing completes the stiffening effect of the wall and makes the units truly self-supporting and structurally rigid. While the sheathing has been described as nailed to the furring strips or sleepers, it is apparent that the same result can be secured by the use of screws, screw nails, bolts, or other mechanical means. Over and on the sheathing, a finish surfacing 160 of clapboards, shingles, or stucco and brick veneer, may be applied, and preferably with the interposition of the usual waterproofing and insulating sheetings and the like.

The flooring members are generally similar to the wall members, both in design and construction. The size of the individual members may be varied to take care of specific structural needs. The floor units are designated generally by the numeral 200. The composite beam members are numbered 210, and the individual beam elements 211. The elements 211 form channels 212 having stiffening and strengthening domed apertures 212a and mating locking and stiffening ribs 213, 214 on the sides of the base of the channel adjacent the sides or locking flanges 215, 216. Underflooring 250 is secured or nailed on to sleepers 240, which are secured to double-hook flange keys 230, which, in turn, engage flanges 215, 216, of the open sides of the units in locking engagement. Floor surfacings 260 are applied on and over the underflooring in the usual manner.

The wall units may be set in channel members adapted to receive the composite stud members and the floor units may be associated therewith. Mechanical connections may be used to secure the parts together or concrete or the like may be used to give a desired joint and base foundation. Where floor hanger members having double locking flanges are used, the walls may be hung on the first floor structures, or the floors may be hung from the walls, or both may be directly secured to the foundation members. The structural units, as noted, may be set in channel members and the panel members 120 and 220 may be cut away a sufficient distance at the ends or tops and bottoms of the units, to permit the composite structural members to extend therebeyond and fit into the channels at the bottom and to receive wall cap members at the top, as well as to receive floor hanger members 170 at the top and bottom of the units. These hanger members comprise a generally continuous body section 171 secured to the stud elements at their flanges 116, as by means of spot welds 172, and are provided at the top and bottom thereof with an offset flange 173 and a hook flange 174, which are generally and substantially in vertical alignment. The flanges 173, 174 of the hanger member 170 are adapted to be received in and locked by like members placed in reverse position on floor sections and other structural building members, which are to be hung on the wall.

As more particularly set forth and claimed in my companion application, Serial No. 156,756 filed July 31, 1937 for Building construction, a desirable feature in the designing and erection of so-called prefabricated or planned houses is the provision of stencillings on the inner surfaces of the wall panels, 101, which stencillings indicate the exact position and layout of all plumbing, heating, air-conditioning ducts, wiring and telephone and other maintenance services required in a house. These several stencillings may vary from one unit to another, depending upon the parts which are to be secured therein or thereto and which insure absolute accuracy of fit and correctness of performance. It is to be noted further that all holes may be predrilled or pre-punched, and, where necessary, the holes receiving screw-fastening members may be thread-tapped. The pre-punched or predrilled holes will provide for the passage of pipe

ducts, wires, and other elements, through the panels, thereby cutting down the time normally required for such work to be done in the field, and doing away with the botchy appearance of such work. All of this lends to uniformity of design, fabrication and erection, and, at the same time, insures to all parties involved, maximum speed in erection and fitting, while, at the same time, insuring absolute correctness in the assembly, which, from the sanitary point of view, as well as of efficiency and safety, is of prime importance. Standardization of erection, consequent upon the standardization of parts permitted by this novel method, also permits standardization of replacement members and absolute and complete accuracy in their identification and replacement. The plumbing and other services may have their outlets on either surface of the units and may extend through several units horizontally, passing through the apertures, 110*a* or 212*a* in the wall and floor supporting members.

It will now be appreciated that there have been provided novel structural building members, including unitary constructions having a paneling and structural end members secured thereto, abutted end members of adjacent sections forming composite structural members, which have mating and aligning sections with stiffening domed apertures, and which are locked in place by keying members having means associated therewith to receive individual or continuous wall surfacings, closing the open faces of the units and completing a wall, floor or roof assembly. In addition, floor and wall hanging and securing members are associated with the assembly of units to secure floors thereto, and, at the same time, to provide a desirable lateral bracing to the structure made therefrom. Additional features of novelty herein include the provision of insignia and indicia associated with wall and floor members to indicate the amount, disposition and method of securing a wide variety of building services in place.

What is claimed is:

1. A composite structural member forming a generally I-beam construction, comprising a pair of half-sections, each section including a flat web portion and angular flanged edges forming a channel; double mating tongues and grooves in the web sections and substantially adjacent the edge flanges, the edge flanges forming flat rail sections; flat keying members disposed on and over the edge flanges at one side of the composite member, locking the parts and forming a composite I-beam; the other flanges of the abutted members being adapted to receive panel sections of building members.

2. In the construction claimed in claim 1, the improvements comprising stiffening and strengthening domed apertures in the web sections and intermediate the tongues and grooves.

3. A self-supporting building unit comprising a panel section secured to and spacing end structural sections, the end structural sections being elements of a composite I-beam construction, each section including a stiffened web portion and angular flanged edges forming a channel, double mating tongues and grooves in the web sections and substantially adjacent the edge flanges, the edge flanges forming flat rail sections; flat keying members disposed on and over the edge flanges at one side of the composite member, locking the parts and forming a composite I-beam, the other flanges of the abutted members being adapted to receive panel sections of building members.

4. In the construction claimed in claim 3, the improvements comprising nailing members on the flat keying members.

5. In the construction claimed in claim 3, the improvements comprising hanger members secured on and between the end structural sections.

6. In the construction claimed in claim 3, the improvements comprising hanger members secured on and between the end structural sections on the panel side of the unit.

7. A continuous building section comprising an array of self-supporting building units, each unit including a single face or panel section secured to and spacing end structural elements of composite I-beams, each I-beam element being a channel shape having longitudinal double mating tongues and grooves in the web section in mating engagement with juxtaposed elements of abutted units, the channel sides forming rail sections or flat flanges of the composite member, the flanges of one rail section being engaged and secured by cooperating flat keying members, and the other rail flanges being respectively secured to unit panel sections.

8. A continuous building section comprising an array of self-supporting building units, each unit including a single face or panel section secured to and spacing end structural elements of composite I-beams, each I-beam element being a channel shape having longitudinal double mating tongues and grooves in the web section in mating engagement with juxtaposed elements of abutted units, the channel sides forming rail sections or flat flanges of the composite member, the flanges of one rail section being engaged and secured by cooperating flat keying members, and the other rail flanges being respectively secured to unit panel sections, and nailable members on the flat keying members.

9. In a building construction of the type claimed in claim 8, the improvements comprising wall surfacings over the open faces of each unit and severally secured to the nailable members.

10. In a building construction of the type described in claim 8, the improvements comprising a common wall surfacing over the open faces of the said assembly of units and secured to and on the nailable members.

11. In a building construction of the type described in claim 8, the improvements comprising a common wall surfacing over the open faces of the said assembly of units and secured to and on the end stuctural members, and structural hanger members secured to and on the panel side of the structural members at floor levels and forming lateral bracing elements for the building units.

12. In a building construction of the type described in claim 8, the improvements comprising a wall surfacing over the open faces of each unit of the said assembly of units and secured to and on the nailable members, and structural hanger members secured to and on the end structural elements at floor levels and forming lateral bracing elements for the building units.

GUY FELIX KOTRBATY.