Aug. 4, 1936. C. F. DAVIS 2,049,733

SUPPORTED DECK CONSTRUCTION

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Fig. 1.

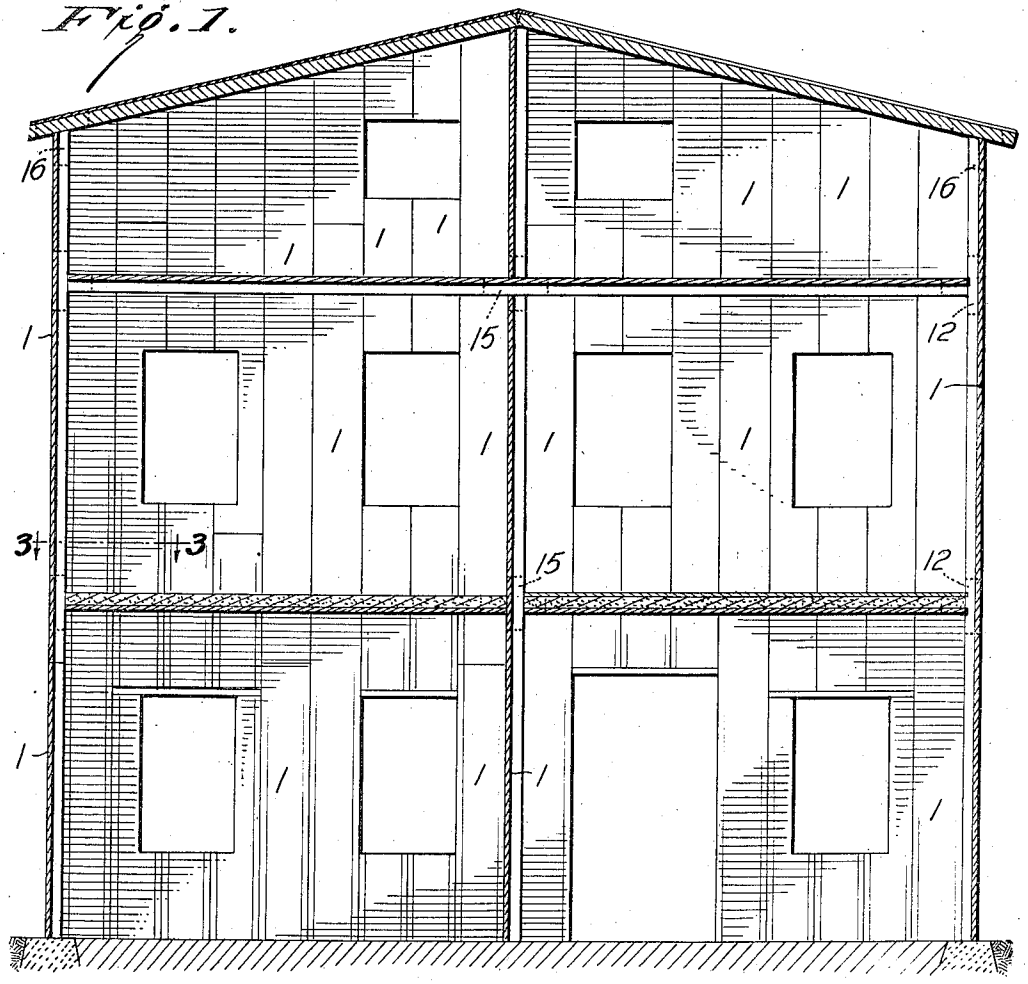
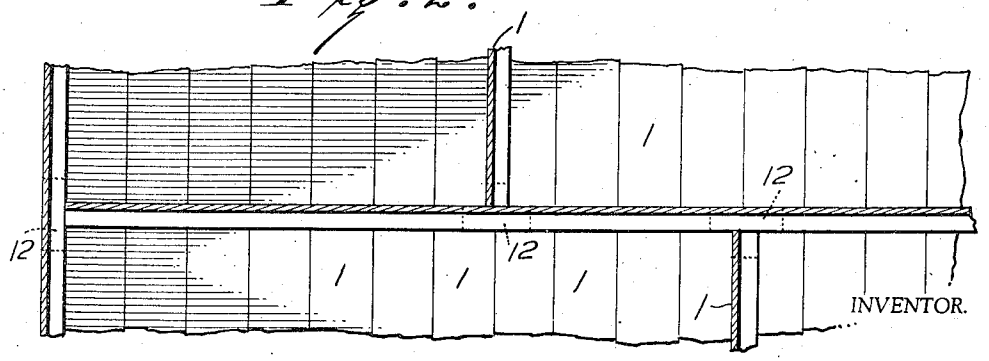



Fig. 2.




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Fig. 3.

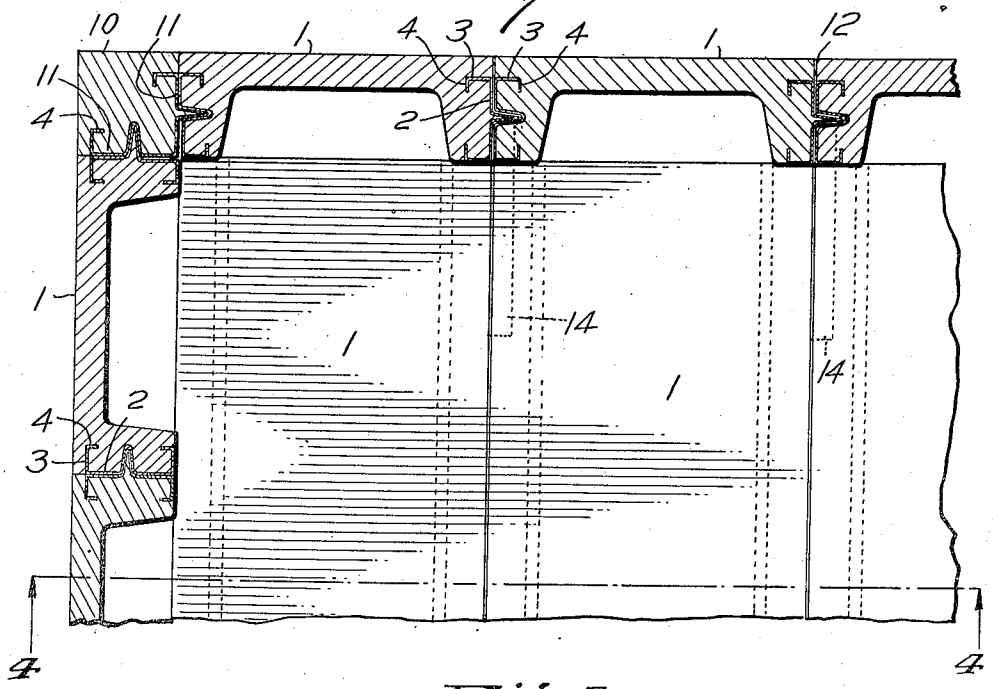
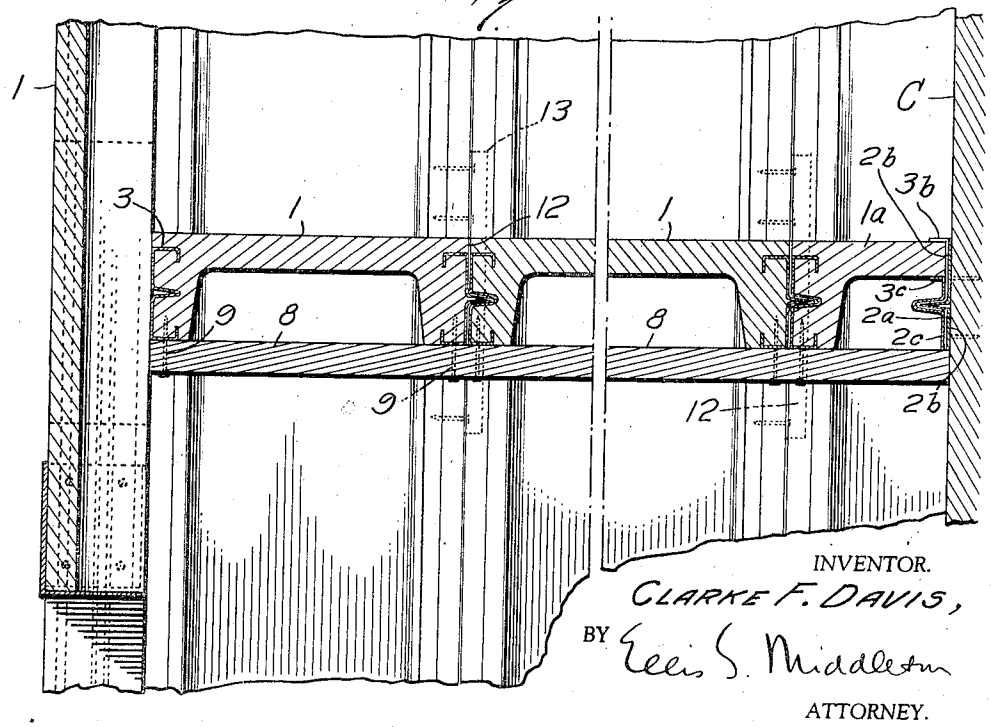



Fig. 4.




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Fig. 5.

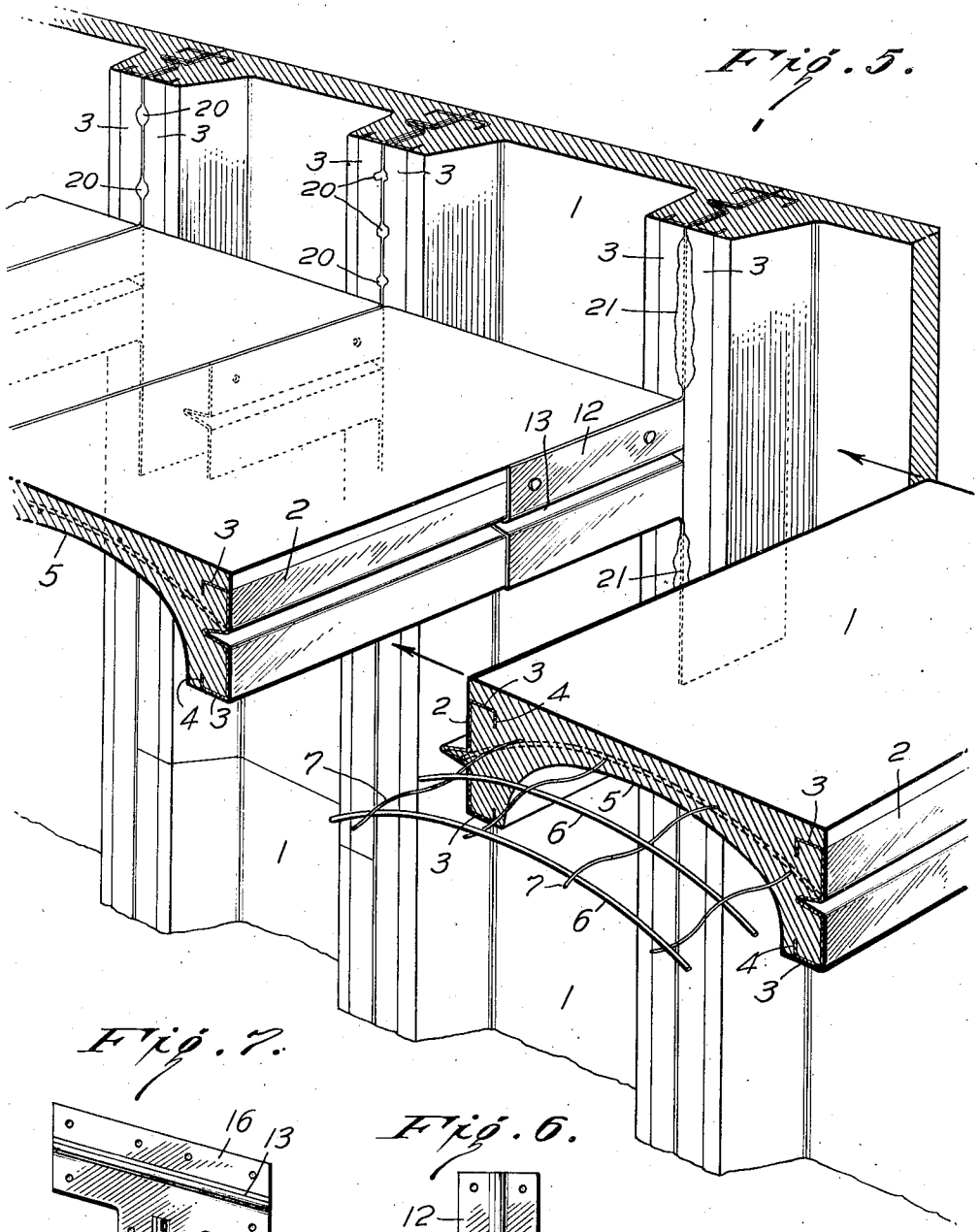



Fig. 7.

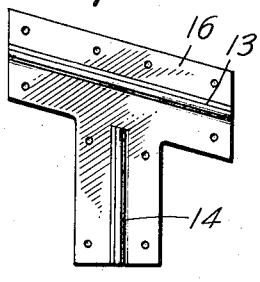
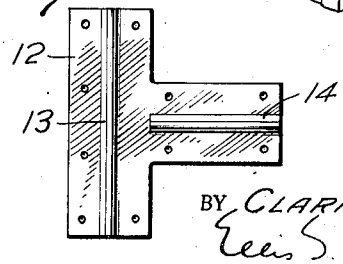



Fig. 6.




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Patented Aug. 4, 1936

2,049,733

# UNITED STATES PATENT OFFICE

2,049,733

## SUPPORTED DECK CONSTRUCTION

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Application January 24, 1936, Serial No. 60,551

7 Claims. (Cl. 72—1)

This application is related in subject matter to that of co-pending application Serial No. 655,591.

The present invention relates to building constructions involving precast slabs having a body of set cementitious material of which gypsum is typical, and carrying at the edges of such bodies, metal elements which serve not only to protect the edges during handling, shipment and erection but which also lend strength to building constructions involving such slabs to an extent that their load carrying ability is far in excess of anything which could be expected without such edge reinforcements.

The invention is further concerned with building constructions involving such slabs together with plates or fastening devices for securing the individual slabs together and one surface of slabs to another.

The invention is also concerned with building constructions involving such slabs where the metal edge members interlock together in such a way as to form effective I-beams between the slabs.

The principal object of the invention is the production of a building construction as above set forth where the individual slabs going to make up that construction are themselves of essentially relatively weak material but which, through the medium of the edge reinforcement and also through the medium of the interlocking devices between surfaces including the slabs and making up the building construction, are self supporting.

To this end, the invention in one of its forms contemplates the provision of a slab having a body of set cementitious material of which gypsum, either with or without admixtures, is typical. It is preferred that the edges of such body should have embedded therein or carried thereon, metal elements adapted to engage and cooperate with a metal member on an adjacent slab face, preferably in a complementary manner, although this is not essential. In the preferred form such cooperative interlocking parts may be of a tongued and grooved type and the two parts when meshed or interlocked together shall form a substantial I-beam. While one approved form of interlocking joint has been shown in the drawings, yet obviously many other forms will occur to those skilled in the art and the invention is, of course, to be construed to cover any interlock between adjacent slabs which will not detract from the strength of the units individually or collectively or their load sustaining capacity but which, on the contrary, will develop strength therebetween in excess of that inherent in the slabs themselves.

The invention contemplates the use of such slabs as walls, floors, roofs, or the like, where the deck or surface including such slabs is supported from other decks or surfaces preferably by means of interlocking plates or devices engaging the slabs of both surfaces or planes, all as more fully hereinafter set forth.

The invention further consists in the novel arrangement, combination and construction of parts more fully hereinafter described and shown in the drawings, of which—

Fig. 1 is a diagrammatic sectional view of a house constructed according to this invention;

Fig. 2 is a sectional elevation showing the details of joining a floor and supported and supporting walls;

Fig. 3 is a view along the line 3—3 of Fig. 1;

Fig. 4 is a view along the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary perspective view of a wall showing the method of supporting a floor therefrom and showing a stripped slab to indicate its interior reinforcement;

Fig. 6 shows one form of supporting plate, and Fig. 7 another form of supporting plate.

Referring now with particularity to the embodiment illustrated in the drawings, a preferred form of slab is shown in Fig. 5 consisting of a precast body of set cementitious material 1 of gypsum or the like, either with or without fillers and admixtures such as wood chips or similar material. The set cementitious body is provided with edge metallic members 2 which are adapted to interlock and interengage with the corresponding complementary metal member on the edge portions of a contiguous slab as shown in this figure and in Figs. 3 and 4. For instance, in these figures one of these members is provided with a tongue and the corresponding member on the adjacent slab with a complementary groove adapted to receive the tongue in a tight frictional joint. The metallic members 2 are provided with flanges 3 at the top and bottom thereof and with inwardly turned-in portions 4 embedded in the cementitious body 1. These angular ends 4 prevent the members from accidentally pulling away from the slab during handling or erection and at the same time add a material stiffening effect thereto.

As shown, the two adjacent metallic members cooperate with each other to form an effective I-beam, thus developing strength and load sustaining capacity in the structure involving such slabs far in excess of anything which could be

expected by the use of such slabs without these metallic members.

While in Fig. 5, the slabs 1 are provided with metal edge members at their longitudinal portions only, yet obviously these parts may be duplicated on all four edges where desirable or necessary. Similarly, the flanges 3 may be either flush with, or located between, the slab faces. In the preferred form of slab as shown in Fig. 5, one slab face is channeled as at 5 longitudinally thereof so that the slab itself has a depth or thickness at its edge portions greater than at a point intermediate thereof. Inasmuch as the load sustaining value of the slab is practically the load sustaining value of the metal members, it may be and is frequently desirable to utilize such metal members in dimensions particularly height which is this thickness or height corresponding entirely to the thickness of the slab itself, the latter would be so heavy as not to be readily handleable. As a result, it is proposed to hollow out or channel one face of the slab as indicated at 5, which thereby reduces the total weight of the slab without detracting from the load sustaining value thereof although this is not an essential element of the present invention.

In order to give the necessary strength to the relatively weak body of cementitious material between such edges, reinforcements may be provided as shown in Fig. 5. These reinforcements consist primarily of lateral members 6 sprung between the metal edge members 2 prior to casting the body 1. These lateral reinforcements 6 may be individual rods, straps, mesh or the like, or in fact any material which will lend the requisite strength as desired. It has been found convenient to spring such material between definite points on the metal members 2 and in Fig. 5 these points are shown to be the top of the metal defining the groove at one end and the interior of the hollow tongue at the other end. This definitely locates the series of lateral reinforcements uniformly so that when the body 1 is cast or poured, they will occur at uniformly predetermined points in the body. In order to prevent any displacement of these lateral members 6 during the casting operation, lighter longitudinal reinforcements 7 may be provided. As a result of this construction, a definite structural arch is provided so that even though the minimum thickness of the body 1 at the top of the arch is of very small dimensions, say one inch, and of such weak material as gypsum or the like, its load sustaining value is excellent due to this interior reinforcement. When the slabs are placed together, the arch is prevented from becoming deformed or flattened by the slabs at each side thereof, which is a particularly advantageous construction.

It will, of course, be apparent that in instances where there will be no partiiular load to be sustained on the slabs in the direction of their thickness, as for instance, in the wall of Fig. 5, these interior reinforcements may be omitted.

In Fig. 1 a diagrammatic layout of a two-story and attic house is illustrated which may be constructed almost exclusively of the precast metal edged slabs above described.

The walls of this house are shown in sectional plan view in Fig. 3, which consists of a series of slabs as above set forth interlocked together and extending in a vertical direction. Such slabs as shown form a smooth and exteriorly unbroken surface to which any type of finish material may be applied, such as stucco, clapboards, tile, paint or the like. The interior of the wall which may constitute the wall of the room may be finished with any desired type of slab, sheet material or lath and plaster, nailed or otherwise applied directly to the wall slabs. In Fig. 4 such a finishing material is indicated as a ceiling 8 nailed directly to the slabs 1 above the same by means of nails 9 whiih penetrate the flange of the metal member 2. By driving the nails or fastening device directly through the metal members, they are prevented from becoming loosened as they are gripped not only by the cementitious material of which the slab is made but likewise by the reinforcing edge material. While in Fig. 4 this finishing sheet material is shown as a ceiling, it may be likewise applied to the wall of Fig. 3 in exactly the same manner.

The channels 5 in the slab walls may be used to conceal water, gas, or soil pipes, electrical conduits or the like, or may even be used as heating, cooling or conditioning fluid conduits as the case may be. It will be apparent that inasmuch as these slabs run continuously from top to bottom of the house, the slabs abutting each other at their end portions, these channels 5 run continuously from top to bottom and, hence, form effective conduits or enclosing space for any particular use as well as effectively insulating the house from heat and cold.

A corner post is shown at 10 in Fig. 3 to consist of a substantially rectangular body of cementitious material having on two adjacent edges thereof a metallic member 11 formed to include both a tongue and a groove, the ends 4 of the metal member being embedded in the cementitious material in the same manner as the corresponding parts of the slab 1. This corner post, therefore, provides interlocking and interengaging complementary means to receive the adjacent slabs in a continuous series.

From the above, it will be apparent that inasmuch as the metal members on the edge portions of adjacent slabs form an effective I-beam, the walls are particularly stiff without the interposition of columns or other strengthening elements. The elimination of these parts is particularly desirable where a comparatively cheap yet efficient house construction is desired.

The floors of the house of Fig. 1 are shown in detail in Fig. 5. These floors consist of a horizontal series of these same slabs 1 arranged with their ends abutting the slabs of the walls, their longitudinal edges engaging each other in an interlocking and mating joint as above described. In order to support the individual slabs and the floor made therefrom from the walls, it is preferable to provide a joining or supporting plate 12 as shown in detail in Fig. 6. This plate consists of a substantial T-formation of sheet or cast metal of the requisite strength having grooves 13 and 14 arranged therein as shown. In erection, the plate is so located between joints in the wall slabs of Fig. 5 that the groove 13 is enclosed between the adjacent edge members on two contiguous slabs. Where the frictional contact between these three parts is not sufficient to completely sustain any load which might be put on the floor, the member 12 may be nailed, or otherwise secured to the edge portions of the wall slabs.

One modified form of integrally securing the three parts together is shown in Fig. 5 to consist of spots 20 of solder or the like or the entire joint may be filled for a substantial extent with solder as at 21. This may conveniently be done because

at this point the edge of the plate 12 as well as the bottom flanges 3 of the metal members 2 occur adjacent each other. On the other hand, this joint may be accomplished by welding either in spots or along a substantial extent sufficient to securely tie the parts together and prevent any dropping or accidental displacement.

When in this position the floor slabs are erected to enclose in the same manner the groove 14 in the supporting plate 12 which may also be nailed or otherwise secured to the floor slabs as shown. By providing such a joining or supporting member between adjacent edges of each two floor slabs and the adjacent wall slabs, the floor is effectively and completely supported from the walls and from the I-beams therein constituted by the mated metal members thereof. This construction makes a particularly stiff and immobile floor and wall arrangement.

In some instances, the dimensions of the floor, roof or wall will be such that more than a number of whole and uncut slabs will be needed to completely form the same. Such a circumstance is shown in the floor of Fig. 4 at the right hand side thereof. There the space between the wall C and the last full slab is less than a slab width. Under these conditions, it becomes necessary to cut a slab longitudinally and such a cut slab is shown at 1*a*. In order to properly support the cut end of the slab, it is proposed to nail or otherwise secure the metal part 2*a* to the wall C, and superimpose thereon the metal member 2*b*, with the hollow tongue of the two parts arranged together. As shown, the part 2*b* is provided with a flange 3*b* at the top thereof adapted to overlie the top of the cut slab 1*a*. After the slab has been put in place, the element 2*c* is erected beneath it so that its hollow tongue is superimposed upon the similar tongues of the parts 2*b* and 2*a* with the flange 3*c* underlying the cut part of the slab 1*a*. In this manner, the cut edge of the slab is adequately supported against both up and down movement. Obviously, nails or the like may be used to secure the parts 2*a*, 2*b* and 2*c* together or any or all of them to the wall C. Also, the flange 3*c* may be so located on the part 2*c* that it will have to be wedged against the undersurface of the cut edge of the slab. This makes for a more rigid support.

In like manner, if the wall slabs do not completely fill out the space of a wall, they too may be cut longitudinally, in such a case, as in Fig. 3, for instance, the part 2*a* may be omitted as the corner post 10 is already provided with the tongued member. Parts 2*b* and 2*c* are then erected in place in the same manner as shown in the right hand end of Fig. 4 to support the cut wall slab.

Where interior walls are to be supported directly upon the floors, the construction of Fig. 2 may be resorted to, in which the joining plate 12 is used to secure the vertical wall to the horizontal floor.

Where the floor extends over a partition inside the house, plate 12 may also be used as shown in the right hand portion of Fig. 2.

Where partitions exist above and below the floor at substantially the same point, a joining plate 15 (Fig. 1) may be used of substantially cross form having the same type of grooves as illustrated in Fig. 6. The walls and floors are thus braced in all directions against displacement and supported one by the other.

In the roof construction of Fig. 1, the joining or supporting plate of Fig. 7 may be used. This consists of a T-formation 16 where the head of the T is slightly at an angle to the main body, said plate also containing grooves 13 and 14. In position, this element is shown in Fig. 1, at the upper right and left hand sides, the body of the T being clipped in the same manner as the device of Fig. 6 between the adjacent metal edge members of the wall slabs and the top of the T joined to the roof slabs arranged at an angle to the wall.

As a result of the above, it will be obvious that a completely flexible system has been proposed involving slabs which may be readily manufactured in comparatively few sizes and shapes and yet which will accommodate most building conditions.

While the invention has been shown and described with particular reference to specific embodiments, yet obviously it is not to be restricted thereto but is to be construed broadly and restricted only by the scope of the claims.

I claim:

1. A building construction comprising vertical walls of precast slabs, a deck at an angle thereto comprising interengaging precast slabs and a joining plate for supporting the deck from the wall, said plate being secured between interengaging portions of the wall and deck slabs.

2. The building construction of claim 1 in which the interengaging slabs are provided with metal members on their adjacent edges.

3. The building construction of claim 1 in which the interengaging slabs are provided with interlocking metal members on their adjacent edges.

4. A building construction comprising vertical walls of vertically extending precast slabs having tongued and grooved interlocking edge portions, a deck of interlocking precast slabs abutting said walls and supported therefrom, and a joining plate having a portion conforming to the tongued and grooved joint between wall slabs and secured therebetween, and extending between the interlocked deck slabs.

5. The building construction of claim 1 in which the interengaging slabs are provided with metal members on their adjacent edges, a portion of the plate being integrally joined to the said metal members.

6. A building construction comprising a vertical wall of interlocked precast slabs, a deck of interlocked precast slabs, the wall extending on each side of the deck and vice versa, and a joining plate of substantially cross configuration secured between the wall and deck slabs.

7. A building construction comprising a vertical wall of interengaging precast slabs, said slabs carrying complementary metal members on their edge portions, a joining plate secured between the interlocked metal members of the wall slabs and having a portion extending outwardly therefrom, a deck of interengaging precast slabs having interlocking metal members on their edge portions, the extending portion of the joining plate being secured between the metal members on the deck slabs, said deck terminating at the wall.

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