

June 15, 1937.

C. F. DAVIS

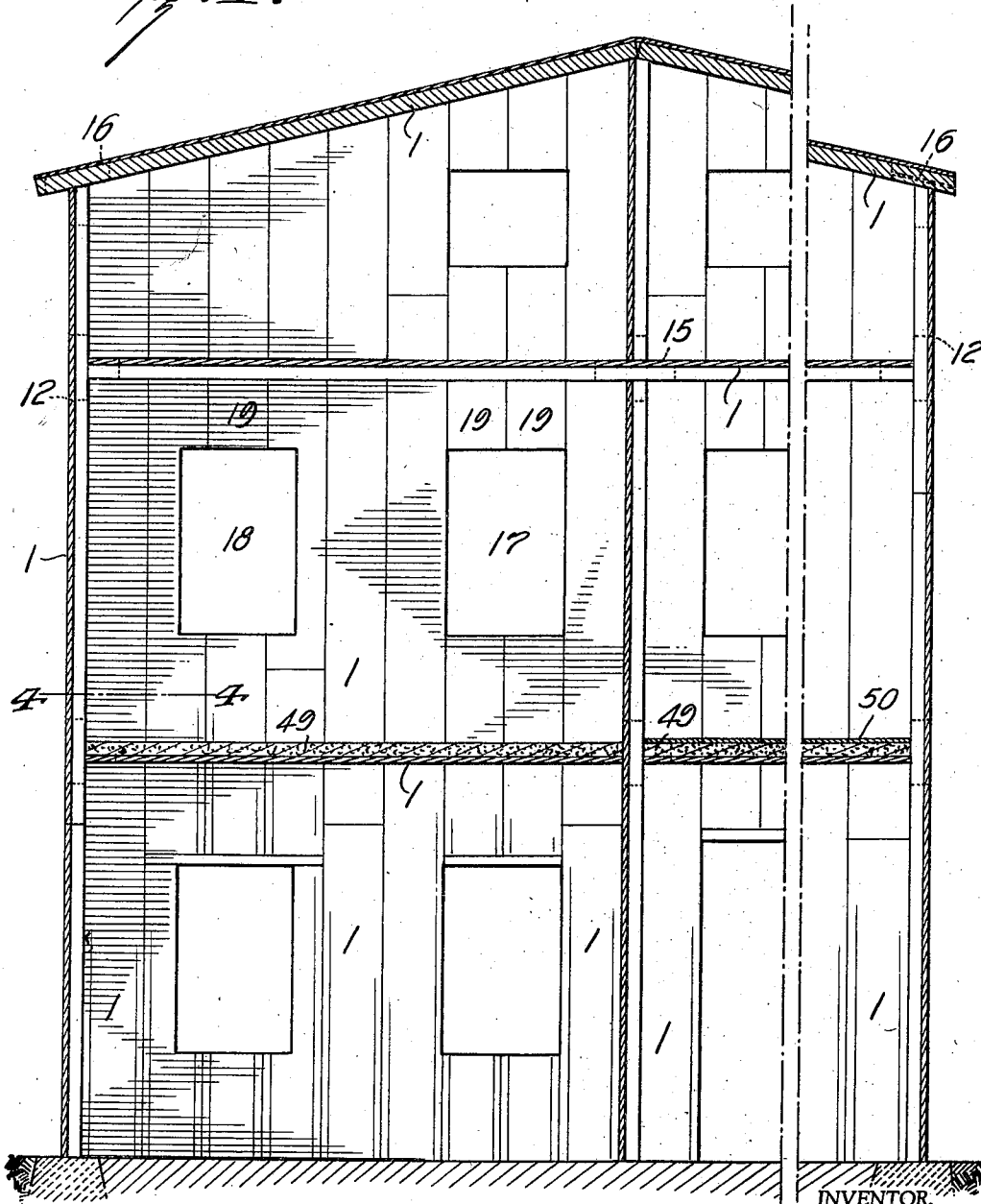
2,083,987

SLAB AND BUILDING CONSTRUCTION

Filed Feb. 7, 1933

8 Sheets-Sheet 1

Fig. 1.



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June 15, 1937.

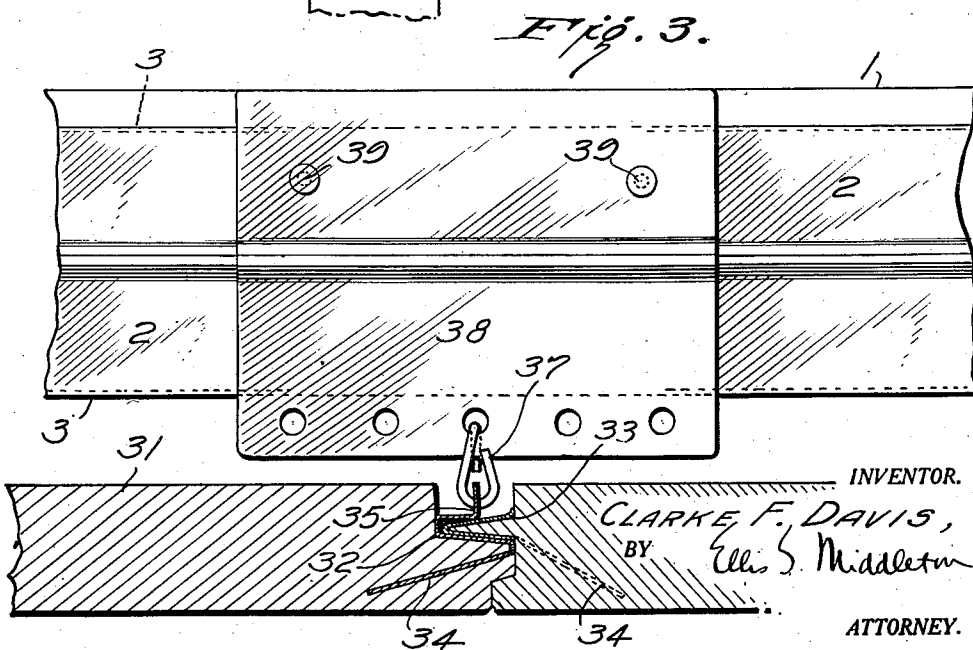
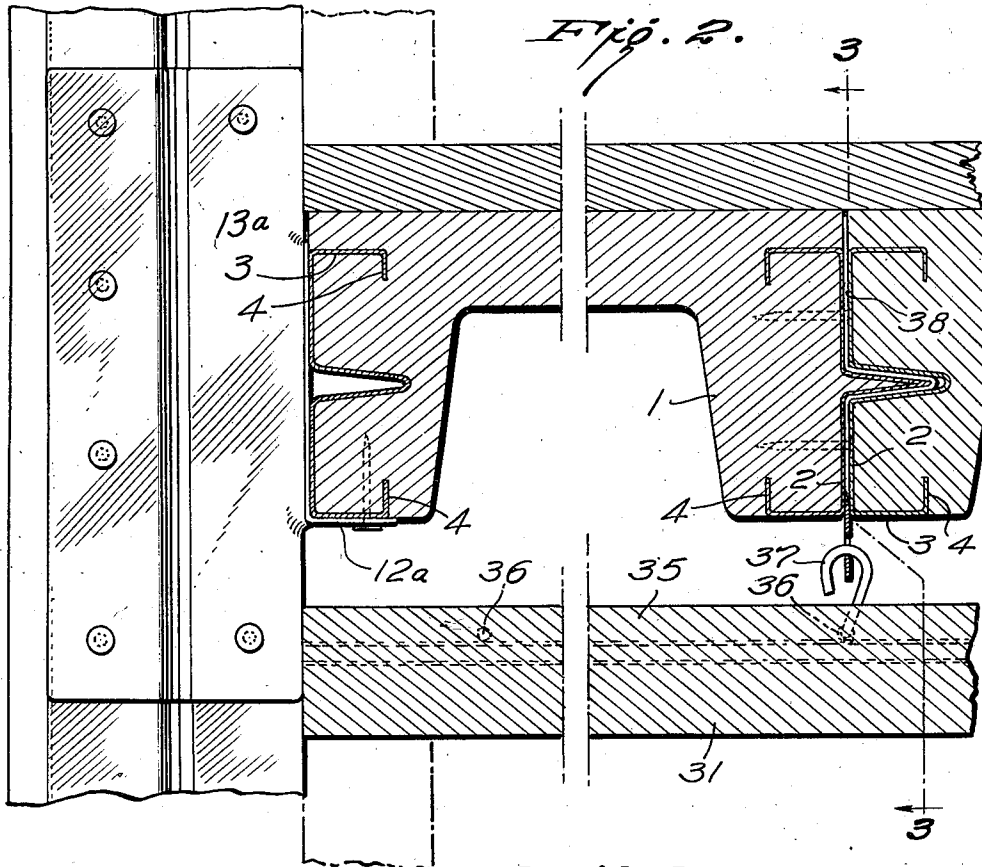
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8 Sheets-Sheet 2



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8 Sheets-Sheet 3

Fig. 4.

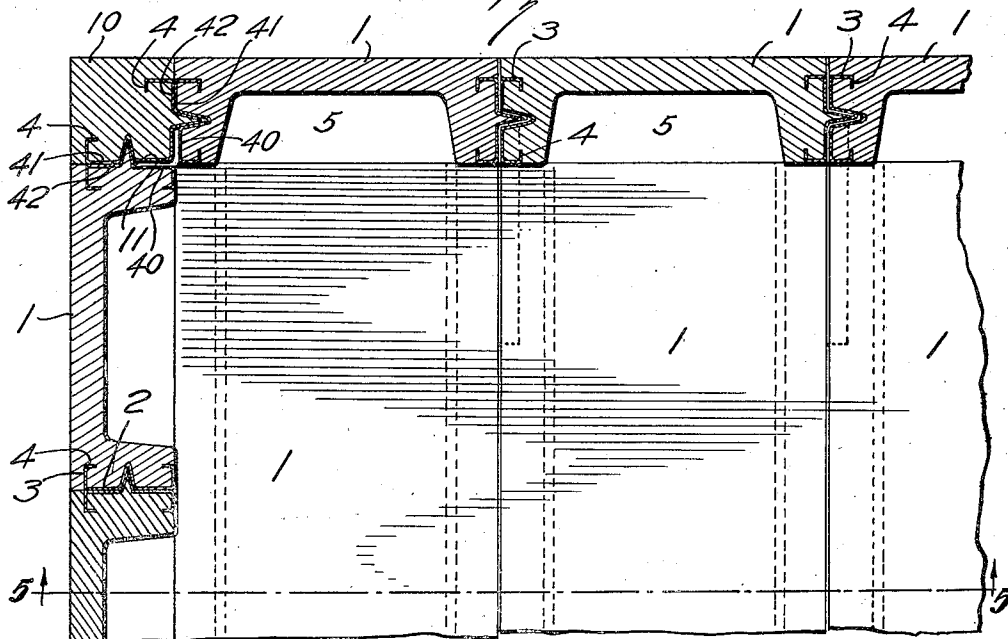
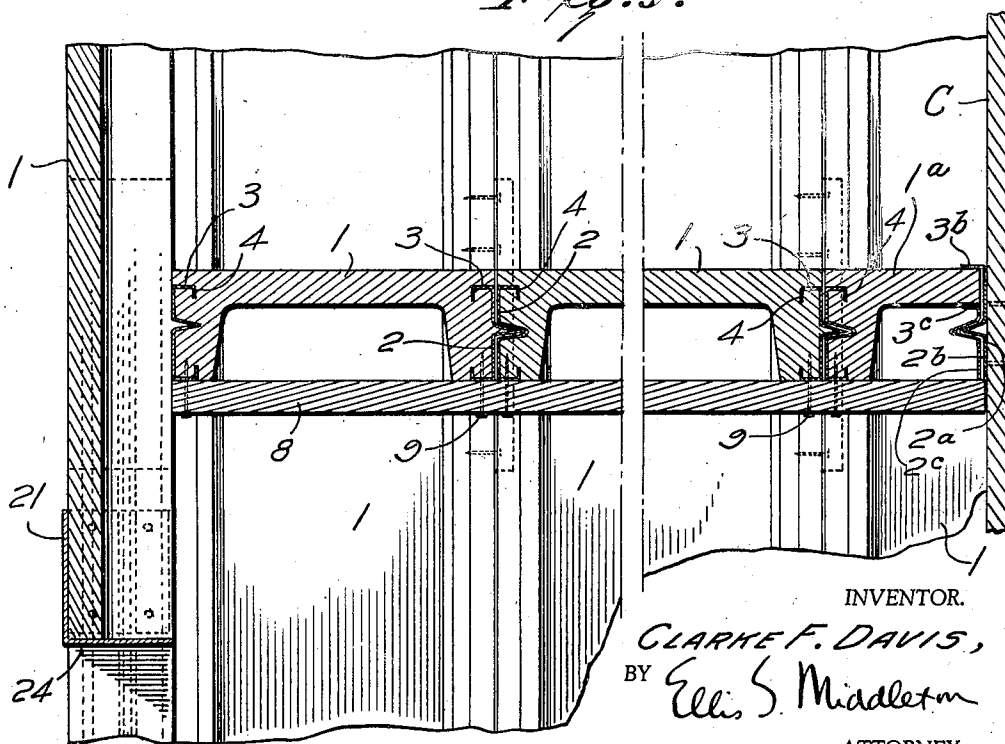


Fig. 5.



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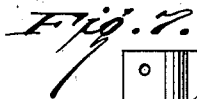
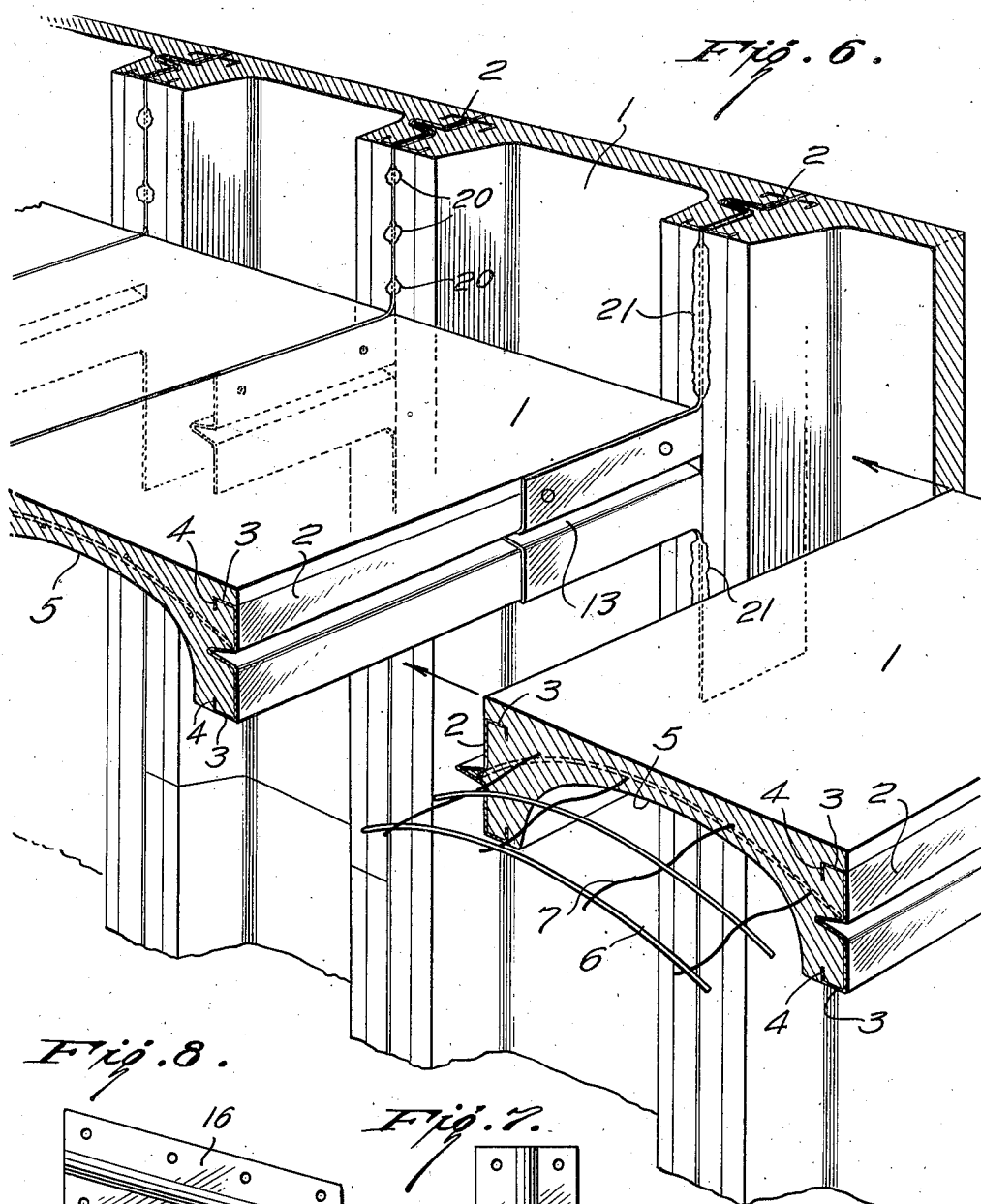
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SLAB AND BUILDING CONSTRUCTION

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8 Sheets-Sheet 4



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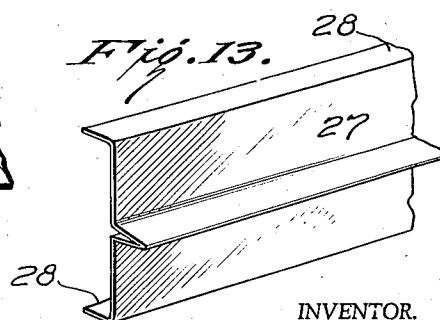
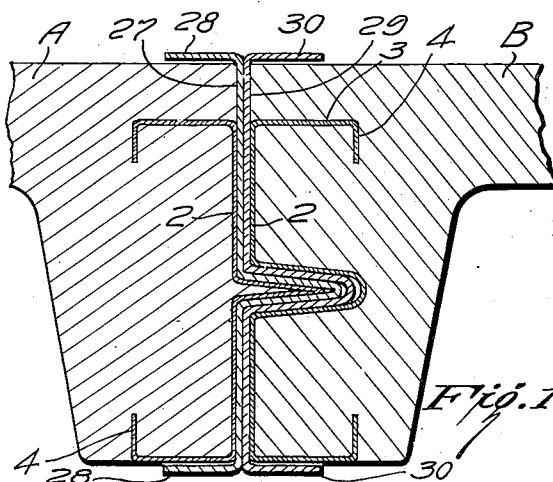
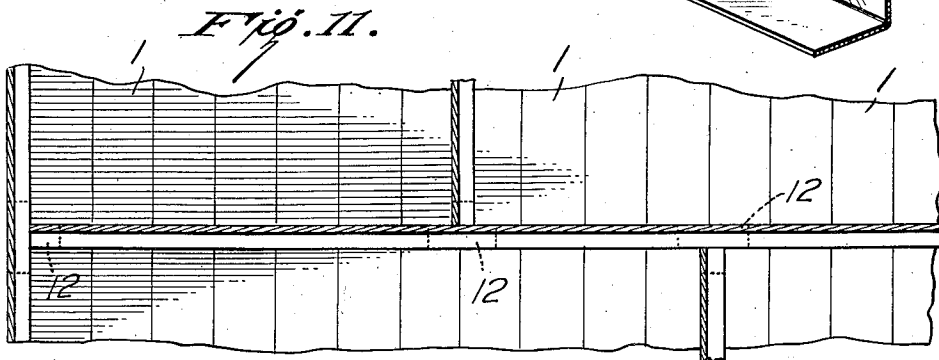
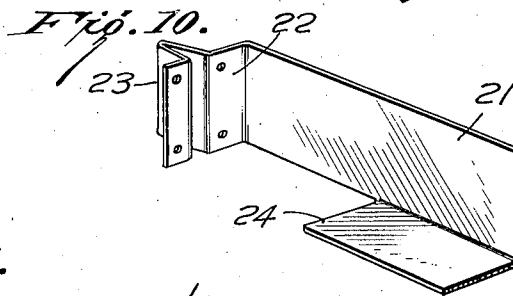
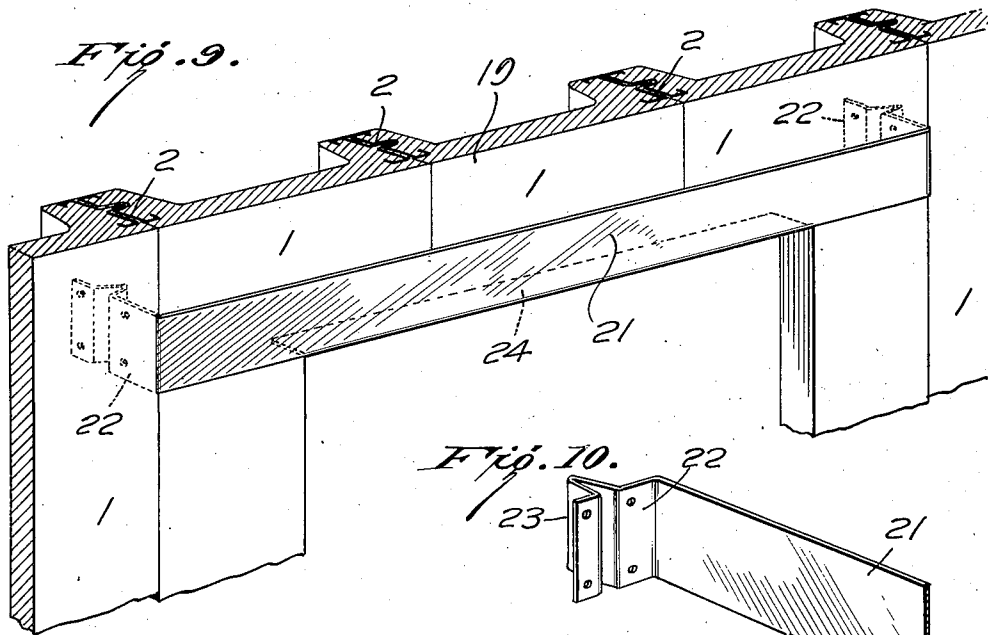
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SLAB AND BUILDING CONSTRUCTION

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8 Sheets-Sheet 5



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2,083,987

SLAB AND BUILDING CONSTRUCTION

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8 Sheets-Sheet 6

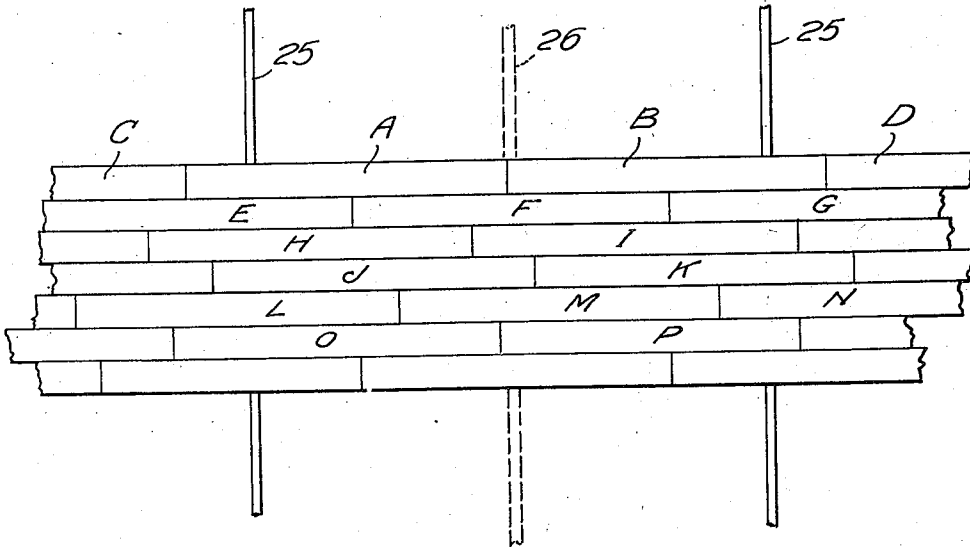


Fig. 14.

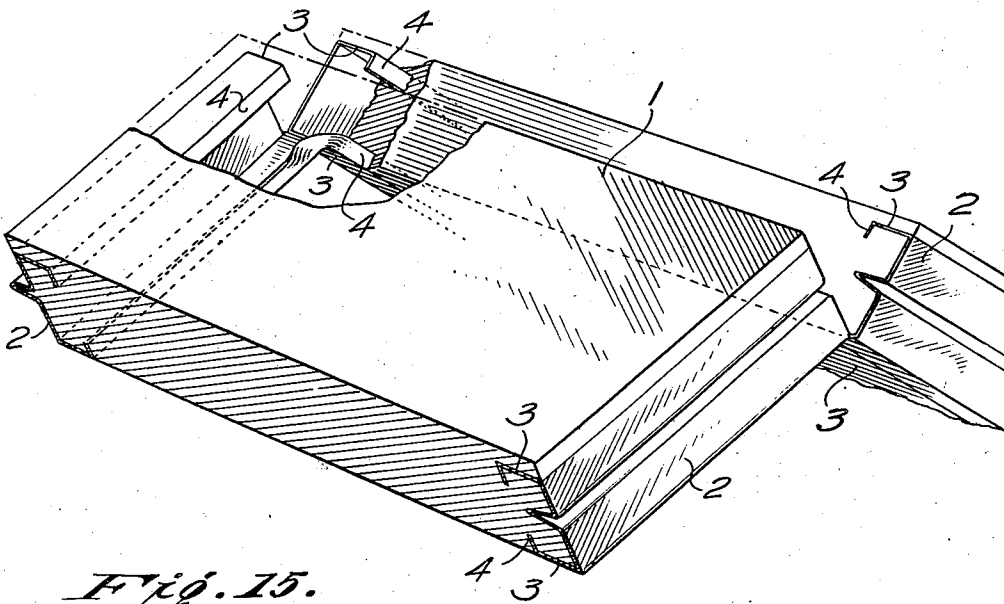


Fig. 15.

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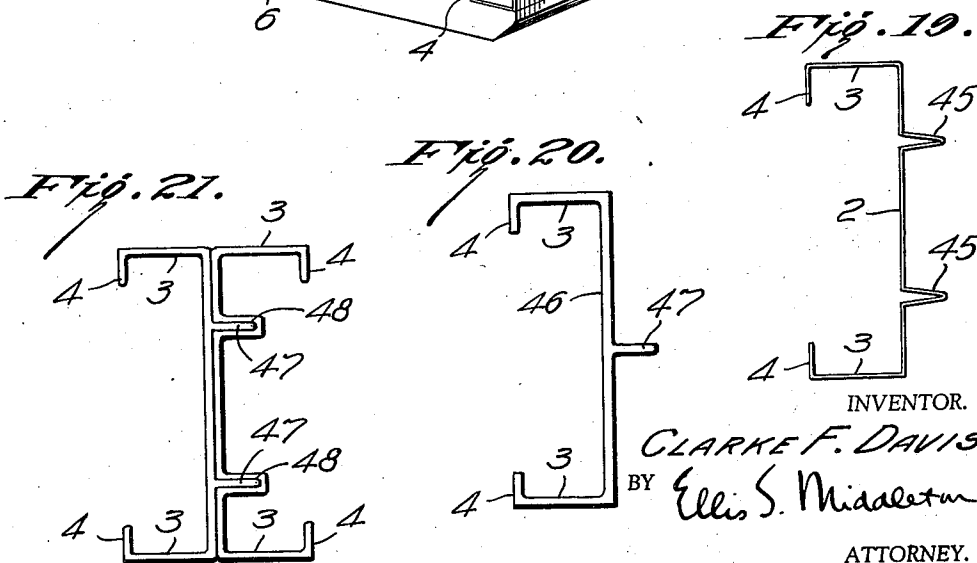
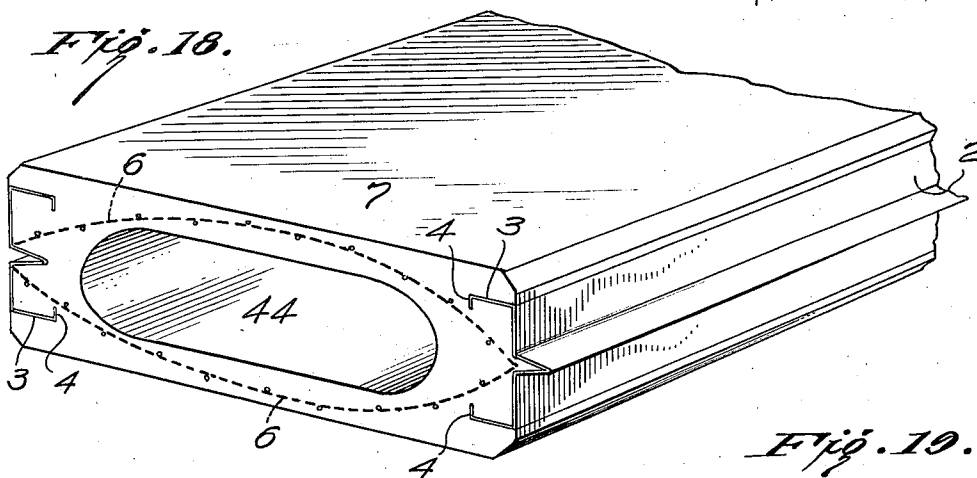
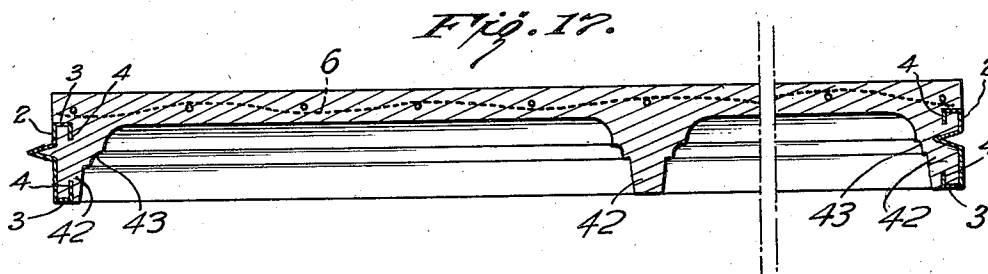
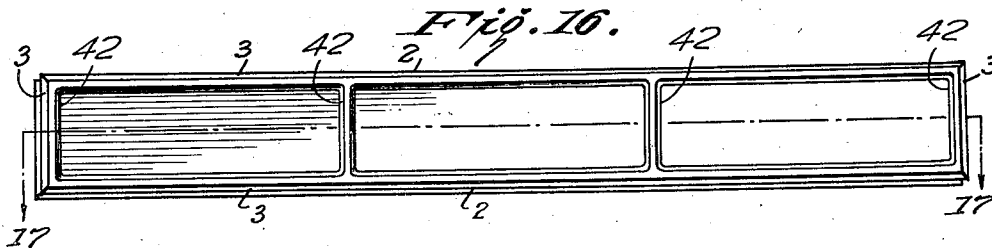
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SLAB AND BUILDING CONSTRUCTION

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8 Sheets-Sheet 7



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2,083,987

SLAB AND BUILDING CONSTRUCTION

Filed Feb. 7, 1933

8 Sheets-Sheet 8

Fig. 22.

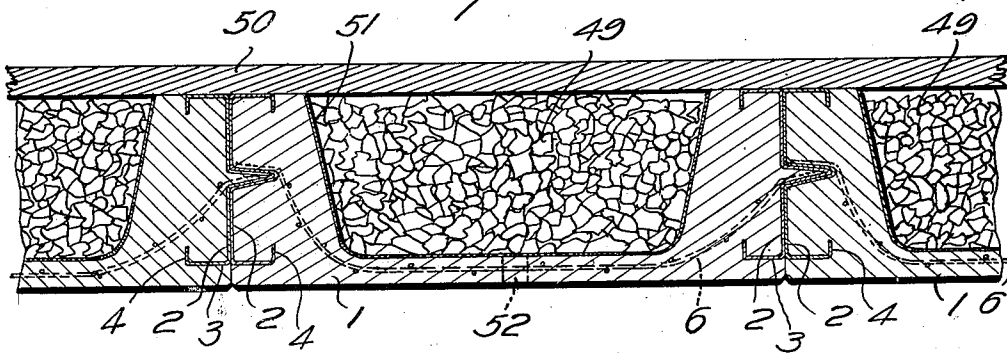


Fig. 23.

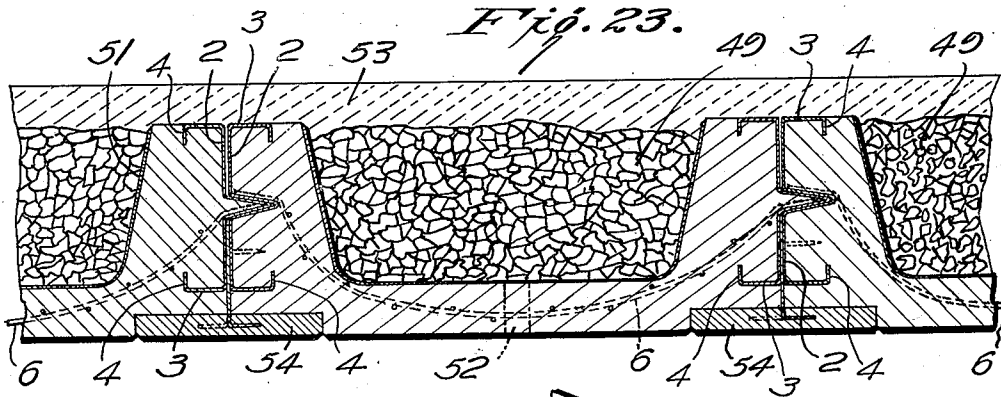


Fig. 24.

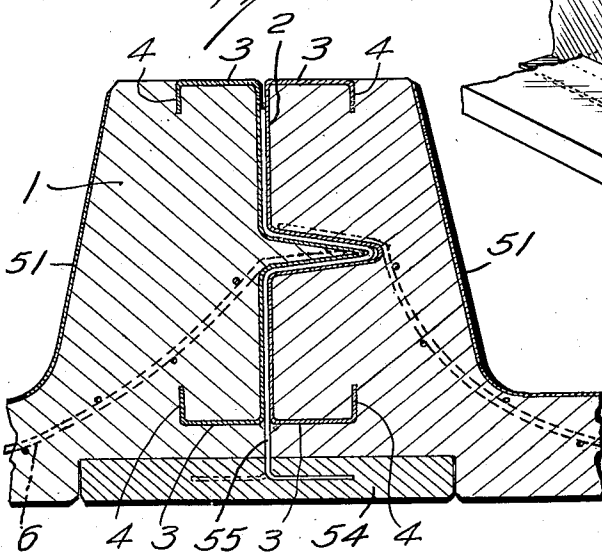
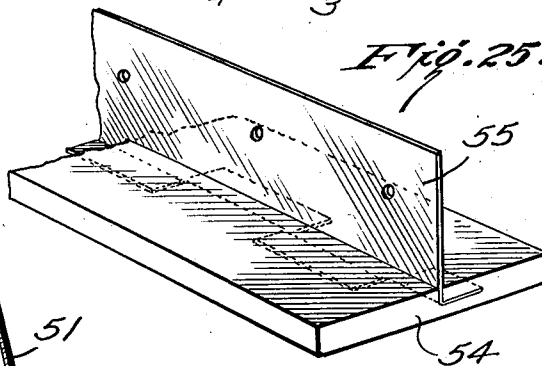


Fig. 25.



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UNITED STATES PATENT OFFICE

2,083,987

SLAB AND BUILDING CONSTRUCTION

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Chemical Corporation, a corporation of Dela-
ware

Application February 7, 1933, Serial No. 655,591

9 Claims. (Cl. 72-1)

The present invention relates to 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 shipment, erection or other handling, but which also lend strength to building constructions involving the use of such slabs to the end that load carrying ability is developed in such constructions far in excess of anything which could be expected without such edge reinforcements.

The invention is not only concerned with such slabs per se but also contemplates a building construction involving such slabs together with the plates or fastening devices for securing the individual slabs together, the mechanism for hanging such slabs from overhead supports and other devices as will be more fully described hereinafter.

The principal object of the invention is the provision of a slab which may have universal application to building constructions whether in a wall, floor, roof, partition, or the like.

One of the important objects of the invention is the provision of a rectangular slab in which a channel runs longitudinally on one face thereof, that is, where the extreme edge portions of the slab are of greater depth than points intermediate the edges.

It is another important object of the invention to provide a building construction involving the use of such slabs where the metallic elements on adjacent slabs so interlock and inter-engage that such combined metallic elements will in effect form a sustaining beam when said slabs are used together to form floors, roofs, walls, partitions or the like, without in many cases the need for supplying other beams, girders, purlins, columns or the like.

It is another important object of the invention to provide a slab which while of inherently weak material is so reenforced at the edge portions with metallic structural members that greater supporting element spacing may be used over and above anything which has gone before and which in some cases may even exceed the total length of the individual slabs.

A still other important object of the invention is the provision of a building construction whether a wall, floor or roof, in which the individual slabs making up the composite structure are provided with channels in one face thereof, and the utilization of these channels to receive water, gas or heating pipes, electrical conduits or the like and in some cases utilizing such channels as conduits

for air conditioning or heating or cooling fluids, or even floor fills.

Another important object of the invention is the provision of slabs having metal members at or on their edge portions, so that they may be applied to building constructions without definite heed being paid to the slab lengths, that is, such slabs may be applied at random and cut into the proper length to fit the particular location to which they are applied. In the case of floors, such slabs may be laid without regard to beam spaces, either with or without additional reinforcements between slabs. In the case of walls, they may be applied with entire disregard to eventual openings such as windows and doors, which can later be cut out in the proper location without in any way affecting the strength of the wall in which the opening occurs. In the case of roofs, it is proposed to lay such slabs in the direction of slope thereof in random lengths, and where a slab would normally project beyond the roof ridge or peak, the slab may be cut partially therethrough, without completely severing the metal edge element, bent down over the other side of the peak and continued at random. Such a construction has the advantage of making a definite tie over the ridge or peak without a break on each side thereof, which greatly enhances the entire strength of the structure.

Other advantages and objects will appear as the description proceeds.

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, the edge portions of which are of greater thickness than the point intermediate such edges. It is preferred that these edges should have embedded therein or carried thereon, metal elements adapted to engage and co-operate with a complementary metallic member on an adjacent slab edge. In the preferred form such co-operative interlocking parts may be of a tongued and grooved type so that 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 or their load sustaining capacity but which on the contrary will develop strengths therebetween far in excess of that inherent in the slabs themselves.

The invention further contemplates that in the case of such slabs being incorporated into walls whether inside or out, having openings therein such as windows or doors, in many cases such walls may be erected in toto and then the openings made therein wherever desired, by merely cutting through the slab body and the metal edge with a suitable severing device. The severed slabs at the top of such openings may be additionally secured together as by soldering or welding of their adjacent metallic portions, or may be positively supported by plates bridging such opening and tied into the joint between the slabs on each side of said openings.

The invention further contemplates suitable tongued and grooved plates having portions adapted to intermesh and inter-engage between joints between walls and the floors and/or roofs respectively, so that said floors and/or roofs may be entirely supported from the metal elements of the adjacent wall slabs.

The invention further contemplates the use of face channels in such slabs to carry gas, water or electrical conduits and heating or cooling fluids for conditioning heating or cooling the houses or rooms constructed of such slabs, or floor fills for insulation purposes or to support a floor finish of any desired type.

In some instances it will be found desirable to laterally reinforce such slabs as by ribs or metallic elements extending or sprung between the metallic edge members, and the invention contemplates the use of such lateral reinforcements whether such slabs are of gypsum or any other material, but for the sake of lightness gypsum is preferred. Such ribs or metallic reinforcements may occur in one or more places in each slab.

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

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

Fig. 2 is an elevation partly in section through a wall and adjacent floor and ceiling.

Fig. 3 is a view along the line 3—3 of Fig. 2.

Fig. 4 is a sectional plan view of two adjacent walls and including a plan view of a floor section.

Fig. 5 is a sectional view along the line 5—5 of Fig. 4 slightly modified.

Fig. 6 is a fragmentary perspective view of a wall showing the method of supporting a floor therefrom and showing a stripped floor slab to indicate its interior reinforcement.

Fig. 7 is a view of a combined wall and floor plate.

Fig. 8 is a view showing a combined wall and roof plate.

Fig. 9 is a perspective view of a wall showing a method of supporting an interrupted or severed slab over a window or door opening.

Fig. 10 is a partial perspective detail of the supporting plate of Fig. 9.

Fig. 11 is a sectional elevation showing the details of joining a floor and supported and supporting walls.

Fig. 12 is a sectional view through a reinforced floor.

Fig. 13 is a perspective detail of the reinforcement of Fig. 12.

Fig. 14 is a plan view of a floor or roof in which the span between beams is greater than the total length of the slabs.

Fig. 15 is a perspective view of a slab extending with two planes as over a roof peak.

Fig. 16 is a plan view of a modified slab.

Fig. 17 is a sectional view along the line 17—17 of Fig. 16.

Fig. 18 is a perspective view of a modified slab showing its interior reinforcement.

Fig. 19 is an end view of a sheet metal edge member.

Fig. 20 is a similar view of a cast or hot rolled metal member.

Fig. 21 is a similar view of a modified form of cast or hot rolled metal member.

Fig. 22 is a sectional elevation of a floor using channeled slabs in an inverted position.

Fig. 23 is a view similar to that of Fig. 22 showing a modified form of floor with a fireproofing soffit.

Fig. 24 is an enlarged fragmentary end sectional elevation showing the insertion of a fireproofing soffit.

Fig. 25 is a perspective detail of the soffit of Fig. 24.

Referring now with particularity to the embodiments illustrated in the drawings, a preferred form of slab as shown in Fig. 6, consists 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 inter-engage with corresponding complementary metal members on the edge portions of contiguous slabs as shown in Figs. 5 and 6. For instance, in the former figure one of these members is provided with a tongue and the corresponding member on adjacent slab provided with a complementary groove adapted to receive the tongue in a tight frictional joint. As a result, the two adjacent metal members co-operate 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 metal members.

The metal members 2 are provided with flanges 3 at the top and bottom thereof with inwardly turned end portions 4 embedded in the cementitious body 1. These angular ends 4 prevent the metal members from accidentally pulling away from the slab during handling or erection and at the same time add a material stiffening effect thereto.

While in Fig. 6 the slabs 1 are provided with metal edge members at their longitudinal edge portions only, yet obviously these parts may be duplicated on all four edges where desirable or necessary. Obviously the flanges 3 may be either flush with or located between the slab faces.

In the preferred form of slab as shown in Fig. 6, one slab face is channeled as at 5 completely 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 if this thickness or height corresponded 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.

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. 6. 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 elements between definite points on the metal members 2 and in Fig. 6 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 particular load to be sustained on the slabs in the direction of its thickness, as for instance in the wall of Fig. 6, 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. 4, 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 substantially unbroken exterior surface to which any type of finishing 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 or sheet material nailed or otherwise applied directly to the wall slabs as well as lath and plaster. In Fig. 5 such a finished material is indicated as a ceiling 8 nailed directly to the slabs 1 above the same by means of nails 9 which penetrate the flange of the metal members 2. By driving the nails or fastening devices 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 itself is made but likewise by the reinforcing edge material. While in Fig. 5 this finished sheet material is shown as a ceiling, it may be likewise applied to the wall of Fig. 4 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 the 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 spaces for any particular use as well as effectively insulating the house from heat or cold.

A corner post is shown at 10 in Fig. 4 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 of the metal 4 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 inter-engaging complementary means to receive the adjacent slabs in a continuous series.

From the above it will be apparent that inasmuch as the metallic members on the edge portions of adjacent slabs form an effective I beam, the walls are particularly stiff without the interposition of columns or 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. 6. 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 thereof from the walls, it is preferable to provide a joint or supporting plate 12 as shown in detail in Fig. 7. This plate consists of a substantially 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 arranged between joints in the wall slabs of Fig. 6 that the groove 13 is enclosed between the adjacent edge members on two contiguous wall 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. 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 to the floor slabs as shown. By providing such a joint or supporting member between each edge of the 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 construction. The end floor slabs whether longitudinally cut or uncut may be given additional support intermediate the slab ends by the step 12* in the plate 13* held or secured between wall slabs as shown in Fig. 2.

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. 5.

Where 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*. 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 tongues of 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 then 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 or down movements. 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 under surface 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. 4 for instance, the part 2^a may be omitted as the corner post 10 is already provided with a 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. 5 to support the cut wall slab.

Where interior walls are to be supported directly upon the floors, the construction of Fig. 11 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 of the house, the plate 12 may also be used as shown in the right hand portion of Fig. 11.

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 formation having the same type of grooves as illustrated in Fig. 7. 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. 8 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. In position this element is shown in Fig. 1, the body of the T being clipped in the same manner as the device of Fig. 7 between the adjacent metal edge members of the wall slabs and the top of the T is joined to the roof slabs arranged at an angle to the wall.

It is contemplated that the roof slabs will be laid on the roof supports with their length running in the direction of the slope of the roof, that is, from eaves to peak. Due to the fact that these slabs are made in substantial lengths, that is, from 6 to 15 feet, dependent upon the thickness and desired load sustaining value thereof, they may be laid at random lengths whether for walls, floors, partitions or roofs, it being only necessary to abut the ends of such slabs and continue until the entire area has been covered. It is preferable, of course, to break joints in order that no particular weakness may be developed at any one location.

In order to tie the roof slabs together on each side of the roof peak, the construction of Fig. 15 may be utilized where the particular roof slab which occurs at or near the peak is too long to end directly at the peak. In such cases the slab body and the metal members 2 may be partially sawed through by any suitable device and in no case through the metal constituting the

flange 3, leaving this portion intact and unsevered. Having made such a cut, the slab may then be bent into the position shown in Fig. 15 over the peak and carried down the other side of the roof. Such a construction definitely ties the portions of the slab with each side of the peak together and there is a carrying over and continuity of metal and consequent strength which makes for a particularly stiff supporting construction.

In the house of Fig. 1 where windows or door openings are desired, it is preferable for the sake of quickness and ease of erection to erect the walls solidly without regard as to where these openings will occur. After the wall has been in place, the window or door openings may then be marked out and such opening cut therefrom by hand or power. Inasmuch as the set cementitious material of which the slabs are made may be readily cut and the gauge of the metal on the slab edges may be comparatively light, this severing or cutting out of the openings may be accomplished without difficulty. Such openings may occur as shown at 17 in Fig. 1, where the width of the opening is substantially the width of two slabs or such opening may occur as at 18 where this width terminates other than at joints between the slabs.

In order to prevent any tendency of the short slab pieces 19 from dropping, where the frictional contact between the slabs is not sufficient to prevent this, the exposed metal joints may be secured together as shown in Fig. 6. There spots 20 of solder or the like may be used or the entire joint may be filled for a substantial extent with solder as at 21. On the other hand, this joint may be accomplished by welding either in spots or along a substantial extent sufficient to securely tie the short pieces 9 to their neighbors and prevent any dropping or accidental displacement.

Another form of joining the short pieces to their longer neighbors is illustrated in Fig. 9. This consists in the provision of a supporting plate 21 shown in detail in Fig. 10, having an extended body with angular ends 22 each of which is provided with a groove 23 adapted to be clipped and enclosed between the metal members on adjacent slabs. Where desired, these ends may be additionally nailed to the slab edges where frictional contact is not sufficient to prevent undue movement. Intermediate the ends of this tie or bridging piece 21, is an angular shelf or step 24 adapted to underlie the short piece of slab 19. In this manner the cut slabs are supported by means of the bridging piece 21 directly from unbroken and continuous slabs on each side thereof.

In either of the above methods of securing the short pieces of slabs against movement, the window or door bucks or frames may be nailed directly to the exposed edges of the slabs as desired with the minimum amount of effort and labor.

Due to the remarkable load sustaining value which slabs of this invention have, by reason of the mating and mated metal elements at each edge thereof, spans on supporting elements may be even greater than the total length of the slabs constituting a floor or roof. Such construction is shown in Fig. 14.

In this construction which is drawn substantially to scale, for purpose of illustration only, I beams or channels are shown at 25 erected on say 16 ft. centers. These beams 25, of course, 75

may be either floor or roof beams as the case may be. In this construction slabs substantially 10 ft. long are utilized which, of course, is less than the beam spacing. These slabs may be from 10 to 16 inches wide and of a depth or thickness particularly at their edge portions, and the material of metal members thereon of a gauge, sufficient to sustain the load which the floor is designed to take.

In erecting such a floor or roof, a temporary shore 26 is erected between beams 25 and the floor or roof slabs then laid at random, preferably breaking joints thereon as shown.

For instance, the slabs A and B are laid in place, their adjacent ends being supported by the temporary shore 26. Other slabs C and D are then laid at random, dependent upon the area of the floor or roof to be erected but inasmuch as we are only particularly concerned here with those slabs directly supported by the beams 25, further mention of slabs outside of this zone will not be made.

Slab E is then put in place, one end of which is supported by the left hand beam 25, so that the longitudinal and/or end edge metal element thereof engages the corresponding and complementary metal member of the slabs A and C. Due to the fact that a considerable length of the slab E is meshed with a corresponding metal element on the left hand side of the beam 25, the right hand projecting end thereof cantilevers over the beam with stiffness and resistance. The slab F is then erected, meshing in exactly the same manner as specified for slab E and is then followed by slab G. The temporary shore 26 effectively supports the slab F until the other and subsequently erected slabs are in place to relieve the shore of its load. The slab G cantilevers over the left end of the right hand beam 25 effectively supports the end of the slab F. In these circumstances it is, of course, understood that all of the slabs are preferably provided with metal members on all four edges rather than on merely the longitudinal edges.

In the same manner, the slabs H, I, J, K, L, M, N, O, P etc. are erected. After erection as above set forth, the temporary shore may be removed, in which event the slabs F, M and those similarly located have no direct support from the beams 25 but on the contrary are entirely supported by the surrounding slabs, which in turn derive their support from the beams. Due to the fact, however, that these indirectly supported slabs are entirely surrounded by other slabs directly supported by the beams, and that both sets of slabs are interlocked and intermeshed on all four edges, there is a continuity of I beam construction in the direction of length of the slabs from beam to beam which has been found to have tremendous and remarkable load sustaining value. It will be obvious, of course, that such a construction is particularly advantageous if wide beam spacings may be used with the elimination of many of the heretofore thought necessary intermediate beams.

It will also be apparent that instead of using the beams 25, they may be replaced by the wall construction of Fig. 6 where the individual slabs are supported directly from the wall slabs themselves.

There will be some instances, of course, where buildings or houses will be designed, and particularly heavy furniture or machinery located at definite points, and the floor or roof at these points require special reinforcement. Such reinforcement

is shown in Figs. 12 and 13. There Fig. 13 shows a particularly heavy reinforcement construction 27 conforming substantially to the tongued member 2 in the slab A. In this case the member 27 is likewise provided with top and bottom flanges 28 overlying the faces of the slab A. In Fig. 12 a complementary reinforce 29 conforming substantially to the groove in the member 2 of slab B is used to inter-engage and mesh with the reinforcement 27 in the adjacent slab. This reinforce 29 is likewise provided with top and bottom flanges 30 corresponding to its complementary part 27. These meshed reinforcements which are in fact I beams, may extend from wall to wall of the floor or roof construction or may extend from beam to beam as the case may be, or may simply extend over several end joints of slabs making up the floor or roof to add additional stiffness and strength thereto. In some instances it will not be found necessary to provide these reinforcements 27 and 29 with flanges 28 and 30 as shown, but on the contrary the gauge or dimensions of such parts will be sufficient to give the requisite strength without such flanges. This is particularly true because of the tongue and groove which occurs in the web as these parts lend stiffness and prevent undue twisting under strain.

Where it is not desired to secure a ceiling slab or the like directly abutting the under surface of the floor slabs, the construction shown in Figs. 2 and 3 may be used. There ceiling slabs 31 are shown, each having a metal member carried by the longitudinal edges thereof, one member 32 having a groove and the other member 33 a corresponding tongue receivable in the groove. As shown, the ends of each of these edge metal members are turned back into the slab as at 34 to prevent the parts from accidentally becoming loosened from the slabs to which they are attached. The metal member 32 is provided with an upstanding flange 35 perforated at intervals as at 36 and adapted to receive hooks or the like 37 which are in turn carried by a plate 38 conforming closely to a beam enclosed between the interlocking members 2 on the slabs above. Where desired, this member 38 may be additionally nailed to the slab edges as at 39.

It is to be noted that the upwardly projecting flange 35 of the ceiling slab edge member is located below the plane of the surface of such slabs and hence is exposed on each side thereof. This permits such ceiling slabs to be hung as shown in Figs. 2 and 3, either below and out of contact with the floor slabs above or they may be nailed directly to such floor slabs as shown in Fig. 5. As a matter of fact, the same ceiling slabs, for uniformity of erection and making unnecessary the provision of the more than desired few types of slabs, may be likewise utilized as the interior wall coverings to enclose the face channels of the wall slabs as above described in connection with Fig. 4.

In some instances it has been found that in the course of manufacture and handling, dirt, plaster or the like adheres to the metal facing of the slab edges, with the result that it is difficult to get a completely tight joint between the metal members on adjacent slabs. In order to at least eliminate part of this irregularity, it may be desirable to set back a portion of the web of the metal members on the slabs as shown at 40 in Fig. 4. In such case the part 41 will make its surface contact with the corresponding part 42 without regard to whether or not the part 40

contacts with its corresponding face on the adjacent metal member and thus at least half of these irregularities are eliminated.

Where slabs are desired with exceptional lateral stiffness without reliance entirely upon embedded reinforcing rods or the like, the modified construction shown in Figs. 16 and 17 may be used. There not only are the longitudinal edges of the slabs made thicker than the intermediate portion as in Fig. 6, but intermediate lateral ribs 42 are provided. The body material between the lateral ribs and the longitudinal edges may be arched as shown in Fig. 17 to develop all of the strength inherently present in the material of which the body is made. While in Fig. 17 the reinforcing rods as shown in detail in Fig. 6 are used, yet it is to be noted that the lateral ribs 42 are not provided with such reinforcements. This is particularly desirable in a construction in which the channelled face is to be used to carry pipes, conduits, or heating, cooling or conditioning fluids. If but the one standardized form of slab shown in Figs. 16 and 17 is to be used, due to the fact that these ribs 42 do not carry reinforcing rods, they may be readily and quickly knocked out with a hammer or the like where not needed to accommodate such pipes or conduits. The underside of such slabs may carry decorative molding 43 cast thereinto which gives a pleasing effect to a ceiling where no covering slabs are to be used.

In some instances it has been found desirable to use a slab having a substantially plane face at each side thereof rather than the slab of Fig. 2, for instance. This is particularly desirable where the floor slab likewise is relied upon to form an under-flush ceiling. In such instances the modified form of slab in Fig. 18 may be used. It will be noted from an inspection of this figure that the reinforcements 6 and 7 have been duplicated at the top and bottom and a hollow interior or cavity 44 formed in the slab during its process of manufacture. In this way any desired depth of slab may be used dependent upon the load sustaining requirement of the location in which it is to be used, while still maintaining the total weight of the slab at a desired optimum.

In most cases it has been found desirable to form the metal member to be attached to the edge of the slab of sheet metal as remarkable load sustaining values may be secured therewith even in comparatively light gauge material. This is due as above set forth to the intermeshing of complementary parts which form effective I beams. Where, however, metal members are desired which are particularly resistant to sheer, a multiplicity of tongues and grooves may be provided as shown in Fig. 19 which illustrates one such member 2 having a plurality of tongues 45. Any number of these tongues may, of course, be duplicated to provide the requisite sheer resistance.

In slabs having excessive lengths, where it is not desirable to provide an additional reinforcement such as shown in Figs. 12 and 13, this metal member may be cast or hot rolled rather than of sheet metal and such a construction is shown in Fig. 20. It conforms closely to the configuration of the metal member 2 in Fig. 18 for instance, except that it is a cast or hot rolled section. In such a case it is to be noted that the web 46 is in one continuous piece and hence has all of the strength attributable to the present hot rolled structural sections now commonly in use whether of the channel or I beam type. When

two of these parts are placed together as in contiguous slabs, not only is its effective strength increased but it is more than doubled due to the fact that the tongue 47 and the corresponding groove interlock and definitely mate together, thus possessing a resistance to sheer not present in sections not mated.

In Fig. 21 a construction similar to Fig. 20 is shown except that a plurality of tongues 47 and grooves 48 are provided.

In some floor deck constructions it will be found desirable to invert the slabs 1 and make use of the channel 5 therein to contain an insulating or load sustaining dry or wet fill such as dry cinders, cinder concrete or even concrete itself. Such a construction is shown in Figs. 22 and 23. In the former, the slabs are mated together as above described though arranged in an upside down manner with the channel facing upward. This channelled face may then contain a fill 49 of any desired material or it may be left empty. In any case, a floor 50 may be laid directly upon the tops of the contiguous slabs, which will assist in load distribution.

Where the fill to be contained by the channel is of a wet nature which might cause seepage and consequent rusting of the metal members or weakening of the body of the slab, the entire inner surface thereof may be coated with a suitable waterproof material as shown at 51 and a weep hole 52 provided at the bottom of the channel. As a consequence any excess water will be permitted to completely drain therefrom without seepage into the slab body. This will be found to be of extreme advantage during the construction of a building where the open slabs are put in place and then before other work can be done thereon, water would otherwise accumulate in the slab such for instance as in the case of a rain storm. In the construction as shown, this water would immediately run out of the slab without producing any detrimental effect on the slab itself.

Where the slabs are arranged as shown in these figures, it may be found desirable to slightly re-arrange the lateral strengthening reinforcements 6 so that one end thereof enters the metal forming the tongue on one edge of the slab and rests upon the metal forming the groove in the corresponding member on the opposite edge of the slab.

Such a construction utilizes a full load sustaining value of the metal members 2 while utilizing the slabs themselves as a form or container for the fill. This assembly also has the advantage of producing a substantially flat under ceiling.

While in Fig. 22 no suspending beams or purlins are shown other than the metal edge members themselves, yet obviously such a combined floor and ceiling may rest upon suitable beams where this is desirable.

In Fig. 23 a slightly modified form of floor is shown, in which a concrete or other plastic floor 53 has been poured directly upon the fill 49.

In this case the slab body 1 is provided with a cutaway portion immediately beneath the flanges 3 of the metal elements 2 and this space is filled with the soffit slab of Fig. 25 as shown more in enlarged detail in Fig. 24.

This soffit consists of the slab 54 having embedded therein a hanger element with an up-standing portion 55, the lower part of which is split and bent in opposite directions and embedded in the body of the soffit. Obviously this

upstanding part 55 may be continuous as shown in Fig. 25, or it may be interrupted intermediate its length. It also has a corresponding tongue or groove to coincide with the mated edge members 2 as shown in Fig. 24. In any event, nails may be used where desired to assist in securing the soffits to the slabs. In erection a slab 1 will be put in place, then the soffit erected, which will then be followed by the next adjacent main slab.

Such a construction where the soffits are of proper dimension, may afford adequate fire protection to the bottom flanges 3 of the metal elements 2 while at the same time maintaining a desirable flush ceiling beneath the entire floor or roof deck.

From the above it will be obvious, of course, that there has been here presented a system of building construction which may be made completely from a comparatively few types of slabs without the use of beams, columns, or the like, but which on the contrary, due to the metal mating members on the edge portions form effective beam construction in and of themselves. Such a construction of slab insures rigidity, stability and extreme load sustaining value whether placed on end, on the side or on a face. Such a construction is of particular advantage where comparatively small dwellings are contemplated. Where larger houses or constructions are to be made therefrom, the various sections or parts may be made correspondingly heavy or reinforced, all as above set forth.

As a result, a completely flexible system results 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 limited thereto but is to be construed broadly and restricted only by the scope of the claims.

I claim:

1. A precast slab of set cementitious material having complementary metal members on opposite edge portions, the thickness of the slab at its edge portion being greater than its thickness intermediate thereof, its portion of greater thickness extending in a lateral direction beyond the metal member at that edge.

2. A precast slab of set cementitious material having a tongued metallic member on one edge and a correspondingly grooved member on the opposite edge, an arch shaped reinforce embedded in said slab body, one end of the reinforce resting within the hollow tongue and the other end on top of the hollow groove of the metal members respectively.

3. A precast slab of set cementitious material having metal members on at least two opposite edges thereof, one face of the slab being substantially a plane surface, the other face of said

slab including substantially an arch, and reinforce members extending between the metal edge members and embedded in the body and conforming substantially to the arched face of the slab.

4. A precast slab of set cementitious material having metallic edge members on at least two opposite edges, one of the slab faces being substantially a plane surface, the other face being arched longitudinally in a plurality of arches, and a lateral stiffening rib of set cementitious material located between two of said surfaces.

5. A building construction including two contiguous slabs, each slab of set cementitious material having metallic edge members, the adjacent edge members on two slabs being interlocked together in a mating joint, and an area of solidified fused metal securing the mated metal elements together.

6. A building construction comprising a series of precast slabs of set cementitious material end to end and laterally adjacent other slabs, each slab having metal elements on at least two opposite edges, the adjacent metal elements on contiguous slabs being mated together, the series of slabs arranged end to end having channels on one face thereof extending the complete length of each slab so that said channels extend continuously from slab to slab, and facing sheets or slabs covering said channels and secured to said slabs.

7. A precast slab having a body of set cementitious material, having metallic members on at least two opposite edges thereof, one of said members having a groove and the other a mating tongue, one of said members having an edge portion substantially at right angles to the slab face and embedded in the slab body and lying between the plane of the top and bottom faces of the slab, the material of the slab body being of greater thickness at its edge portions than its thickness intermediary thereof.

8. A precast slab having a body of set cementitious material having metallic members on at least two opposite edges, one of said members having a tongue and the other a complementary groove, each of said members having a flange on each side of the tongue or groove, extending substantially parallel to a slab face, one of said flanges of each metal member being flush with a slab face and the other embedded between the slab faces.

9. A precast slab having a body of set cementitious material, two edges of which are substantially covered with metal, one metal covered edge being provided with a tongue and the other with a complementary groove, the metal covering of each of two edges having a flange completely embedded in the slab body and a portion substantially parallel to said flange lying substantially flush with a slab surface.

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