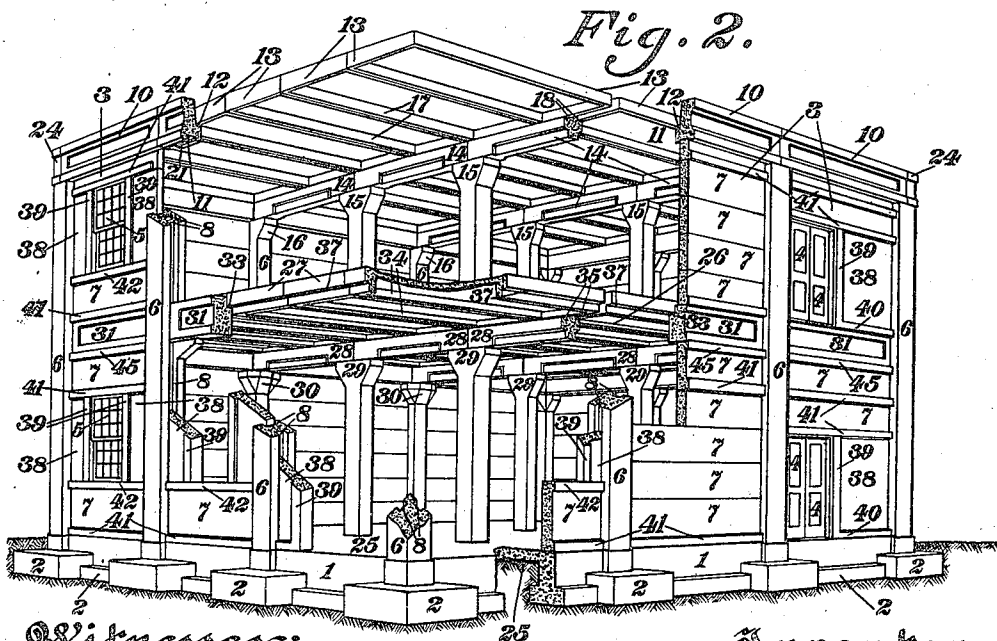
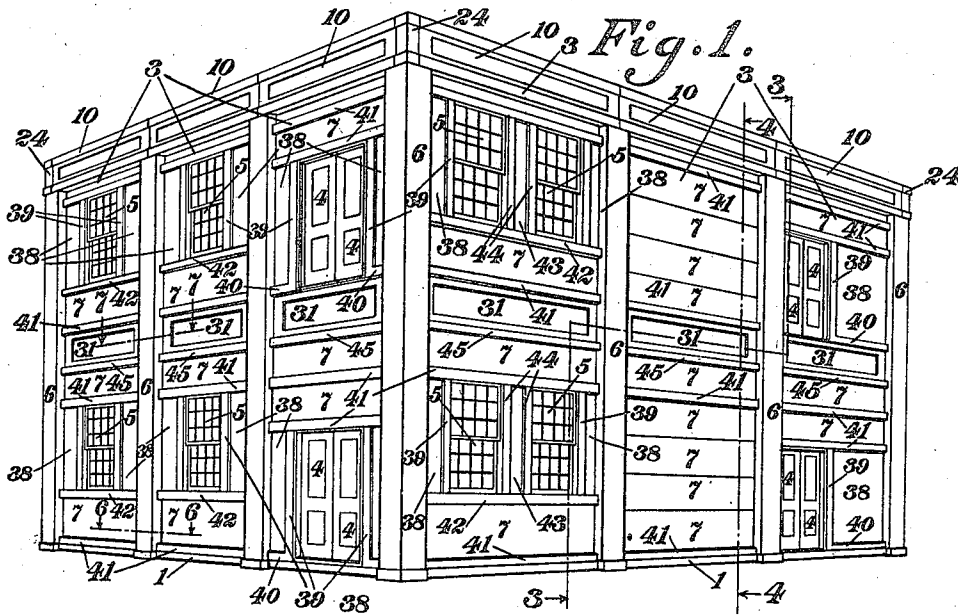


J. E. CONZELMAN.
 WALL CONSTRUCTION.
 APPLICATION FILED JUNE 5, 1911.

1,045,521.

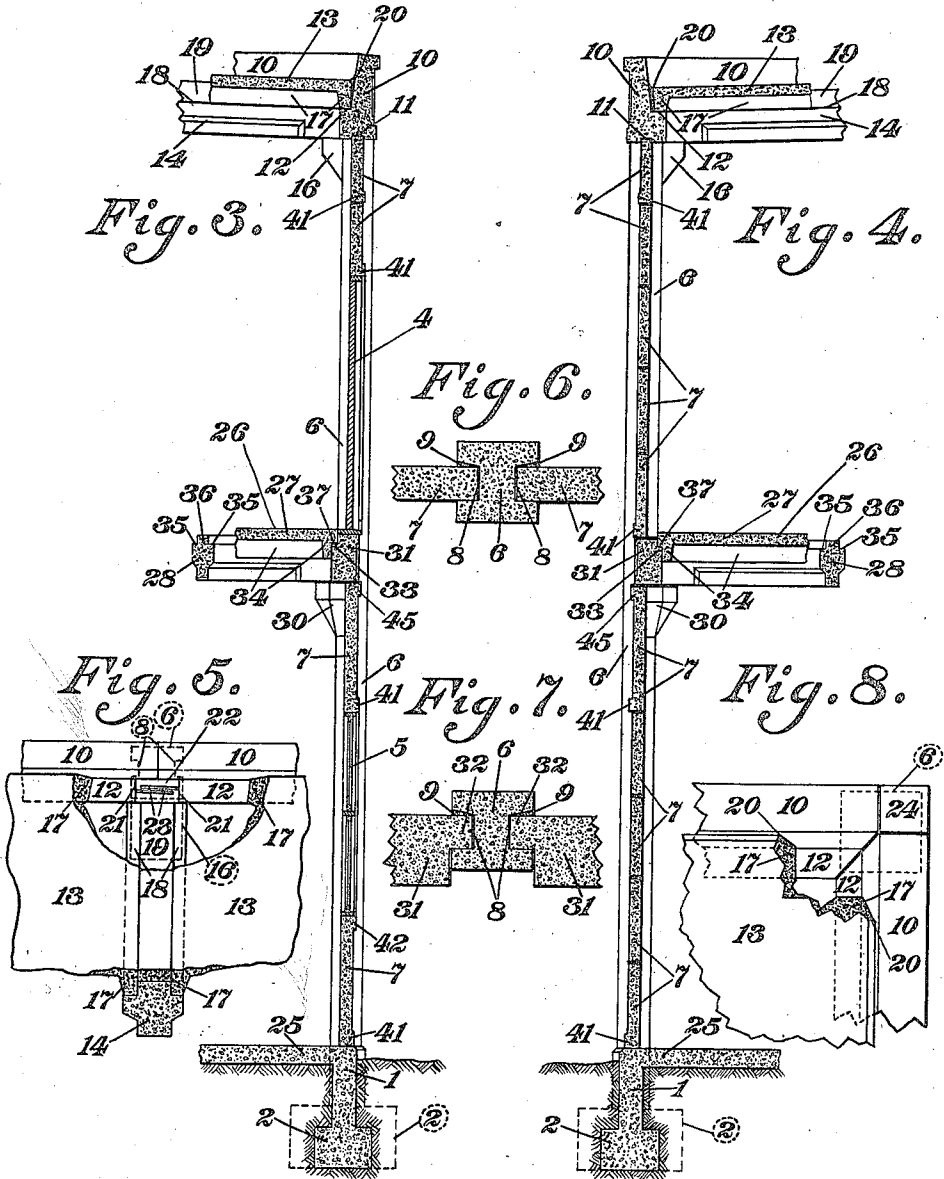
Patented Nov. 26, 1912.

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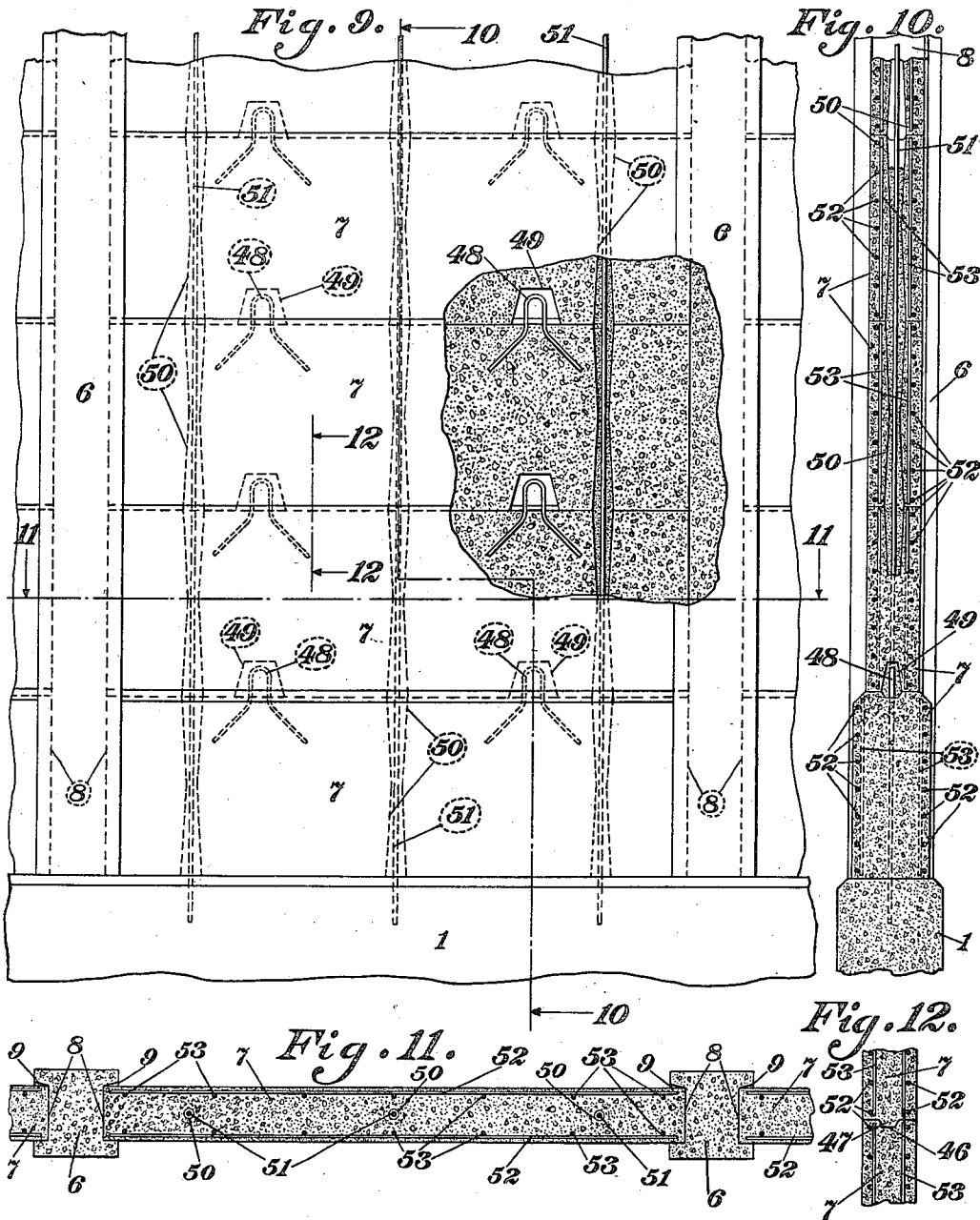
Witnesses:
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 His Attorney.



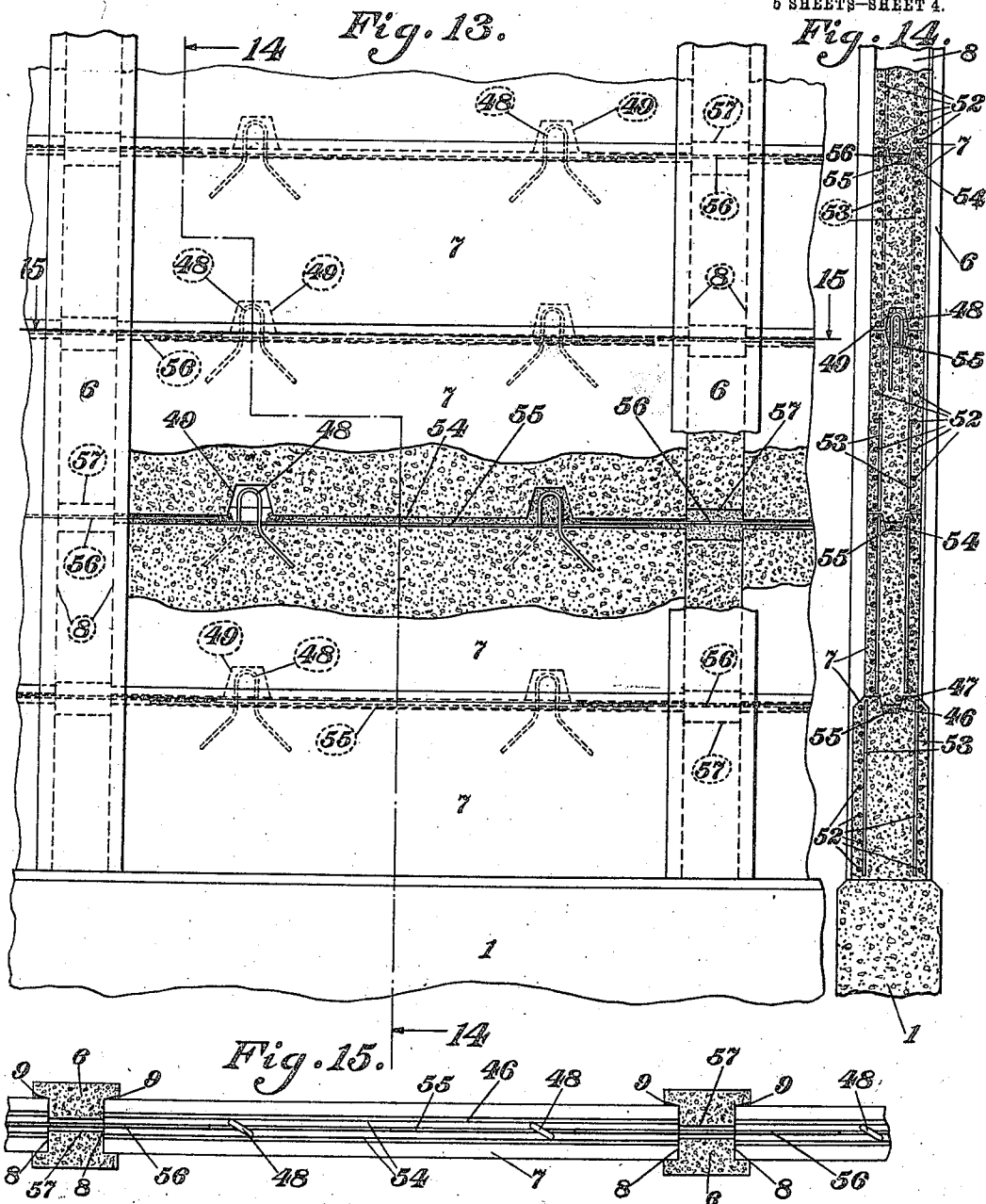
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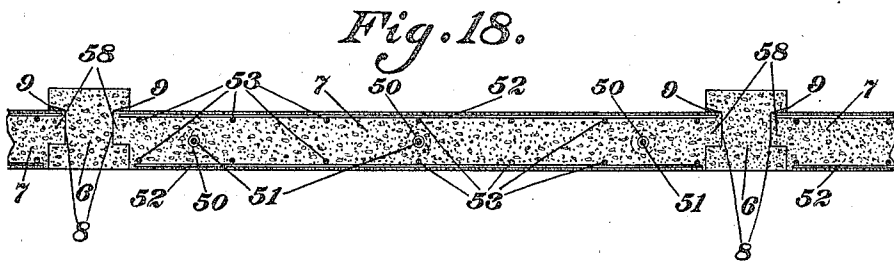
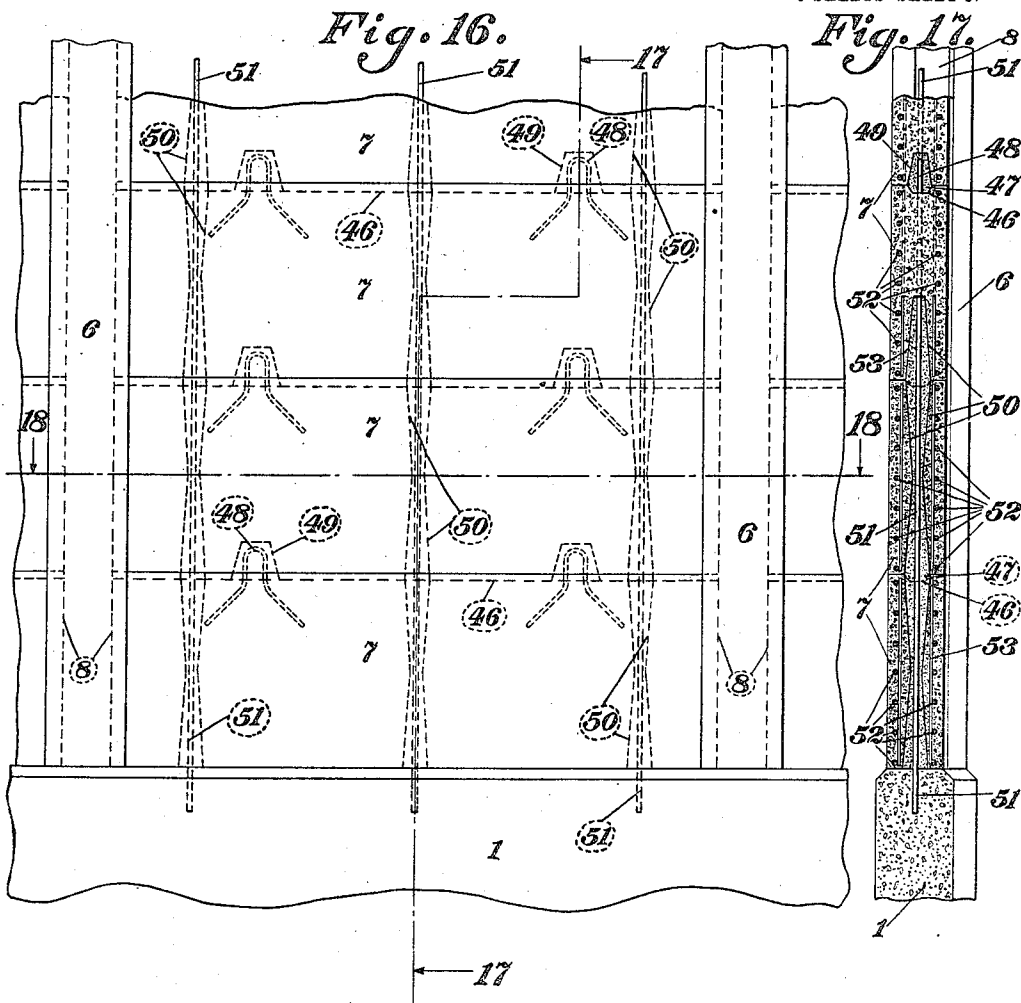
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UNITED STATES PATENT OFFICE.

JOHN E. CONZELMAN, OF ST. LOUIS, MISSOURI, ASSIGNOR TO UNIT CONSTRUCTION COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF DELAWARE.

WALL CONSTRUCTION.

1,045,521.

Specification of Letters Patent.

Patented Nov. 26, 1912.

Application filed June 5, 1911. Serial No. 631,282.

To all whom it may concern:

Be it known that I, JOHN E. CONZELMAN, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have
5 invented certain new and useful Improvements in Wall Construction, of which the following is a specification.

This invention relates to concrete construction and has particular reference to a construction in which concrete slabs are used
10 for walls of a building or other structure, and are joined at their ends to columns or uprights.

In the construction of concrete buildings,
15 it is essential that proper junctures be effected between the columns or uprights and the vertical members or wall slabs.

It is the object of this invention to provide a structure of concrete building elements
20 which cooperate and are interengaged to form a rigid, secure and lasting juncture of said elements.

It is, also, an object of the present invention to provide a concrete building structure in which the general construction of the cooperating columns or uprights and wall slabs is generally improved to present a neat appearance as well as to prove of strong and durable nature.

In the accompanying drawings forming part of this specification, in which like numbers of reference denote like parts wherever they occur, Figure 1 is a perspective view of a building in which the walls are constructed
35 of concrete slabs and columns or uprights; Fig. 2 is a fragmentary perspective view of same, showing the construction of some of the walls thereof; Fig. 3 is a sectional view, on an enlarged scale, on the line 3—3, Fig. 1; Fig. 4 is a sectional view, on an enlarged scale, on the line 4—4, Fig. 1; Fig. 5 is a top plan view, on an enlarged scale, showing the junction of two of the members of the cornice; Fig. 6 is a sectional view, on an enlarged scale, on the line 6—6, Fig. 1; Fig. 7
45 is a sectional view, on an enlarged scale, on the line 7—7, Fig. 1; Fig. 8 is a top plan view, on an enlarged scale, of one of the corners of the roof; Fig. 9 is a side elevation of an alternate form of wall construc-

tion; Fig. 10 is a sectional view on the line 10—10, Fig. 9; Fig. 11 is a sectional view on the line 11—11, Fig. 9; Fig. 12 is a sectional view on the line 12—12, Fig. 9; Fig. 13 is a side elevation of an alternate form
55 of wall construction; Fig. 14 is a sectional view on the line 14—14, Fig. 13; Fig. 15 is a sectional view on the line 15—15, Fig. 13; Fig. 16 is a side elevation of an alternate form of wall construction; Fig. 17 is a sectional view on the line 17—17, Fig. 16; and Fig. 18 is a sectional view on the line 18—18,
60 Fig. 16.

For the purpose of illustration the wall construction of the outer walls of a two-
65 storied building has been depicted in the drawings, but it should be understood that the same construction can be used in constructing inner walls or partitions of same, and, also, in constructing either the outer or
70 the inner walls of buildings having more or less than two stories. It should be, also, understood that the wall construction hereinafter described can be used in constructing retaining walls, fences, and the like. 75

Each outer wall of the building may be supported on a monolithic foundation wall 1 having a suitable footing 2, or upon a foundation of slabs such as used elsewhere in this building as hereinafter described,
80 and consisting of a panel or panels 3. The panels 3 may be blank panels, or, if desired, same may have doors 4 or windows 5 located therein as hereinafter described. Each panel 3 comprises two columns 6 and a vertical slab or slabs 7. Each slab 7 extends
85 from one column 6 to the next column 6 and the ends of same fit in grooves 8 that extend longitudinally in the sides of said columns. Each groove 8 has a beveled side in
90 order to allow the ends of each slab 7 to be inserted readily into same. When the end of each slab 7 is inserted in the groove 8 in a column 6, a crack 9 is left between the beveled side of said groove and the faces of
95 each slab. The crack 9 is filled with grout or similar cement mixture, which, when set, unites column 6 and the ends of each slab 7 integrally together and thereby renders the juncture of said column and said slabs air- 100

tight. The top of the foundation wall 1 is preferably "buttered" with a thin layer of grout, and, while the grout is still plastic, the bottom slab 7 of the panel is placed in position upon same. The grout sets integrally with the foundation wall 1 and the bottom slab 7 and thereby not only unites same integrally together, but renders the joint between same air-tight. The top of the bottom slab 7 is "buttered" with a thin layer of grout, and, while the grout is still plastic, the next slab 7 is placed in position upon same, after which the grout sets and not only unites said slabs integrally together, but renders the joint between said slabs air-tight. In like manner the rest of the slabs 7 are placed one upon another and are united integrally together and, also, integrally with columns 6, as hereinabove described. A slab 10 extends over the upper slab 7 of said panel and rests upon the tops of said columns 6. The bottom of said slab 10 contains a groove 11, which extends longitudinally thereof, in order to receive the top of the upper slab 7. The tops of said columns 6 and the top of the upper slab 7 are preferably "buttered" with a thin layer of grout and, while said grout is plastic, the slab 10 is placed in position upon same, so that, when said grout sets, same unites the slab 10 and the upper slab 7 and said columns 6 integrally together, thus constituting a monolithic structure.

The slabs 10 constitute the cornice of the building and, if desired, the exterior surface of each of said slabs may be paneled or otherwise decorated. Each slab 10 is provided with a shoulder 12 that projects from the inner face of same, in order to afford support for a roof slab 13 or a plurality of such slabs adjacent thereto. The roof consists of a plurality of slabs 13 and a plurality of girders or beams 14. Said girders 14 may extend either transversely or longitudinally of the building, and rest on columns 15 that are located inside the building, and the ends of said girders that are adjacent the walls of the building rest on gussets 16 borne by the columns 6 in said walls. The roof slabs 13 rest on the girders 14 and the particular slabs 13 that are located adjacent the cornice of the building rest on shoulders 12 on the slabs 10. A flange 17 is provided on the under side of each slab 13 and is the particular part of said slab that rests on a shoulder 12 and, also, on a shoulder 18 on a girder 14 and against a tenon 19 on said girder. The slabs 13, girders 14, and columns 15 are preferably similar to and united integrally together in the same manner as the slabs, girders, and columns in the concrete construction that constitutes the subject-matter of my copending application, Serial No. 528,298, filed November 16,

1909. A crack 20 is left between the inner faces of each slab 10 and the roof slabs 13 adjacent thereto, and same is filled with grout or similar cement mixture, which, when set, unites the slabs 10 and the roof slabs 13 adjacent thereto integrally together.

In Fig. 5 the junction of two slabs 10, a column 6, and a girder 14 is depicted. The ends of each slab 10 abut each other and rest on the top of the column 6. Each of said slabs is provided with a cut-away part 21 that is preferably formed in the inner face at the end adjacent the column 6. When the ends of each slab 10 are placed upon the column 6, the cut-away parts 21 unite to form a space over said column and with an open side which is closed by the end of the girder 14 that rests on the gusset 16 on said column. Reinforcing bars 23 project from one slab 10 into space 22 and overlap similar bars 23 that project from the other slab 10 into said space. The space 22 is filled with grout or plastic concrete, which, when set, unites the slabs 10, column 6, and girders 14 integrally together. If it is desired, the girder 14 can be omitted entirely, in which case the open side of space 22 must be temporarily closed with a board or former.

In Fig. 8, the two slabs 10 extend at substantially a right-angle to each other and rest on a corner column 6. The ends of slabs 10 cover part of the top of column 6, and the adjoining edges of said slabs are preferably beveled, in order to fit snugly together. A small post or upright 24 rests on the remainder of the top of column 6 and fits against the ends of said slabs 10, the top of said post or upright being preferably flush with the tops of slabs 10. The top of said column and the ends and beveled edges of said slabs are "buttered" with grout or similar cement mixture, and, while same is plastic, said slabs and post 24 are placed in position on said column, so that, when the grout sets, said post 24, column 6, and slabs 10 are united integrally thereby.

The lower floor 25 of the building is molded *in situ* and is formed integrally with the foundation wall 1. If the building has more than one story, each floor above the floor 25 consists of a plurality of floor slabs 27 and girders 28. The girders 28 may extend either transversely or longitudinally of the building, and rest on columns 29 that are located inside the building, and the ends of said girders 28 that are adjacent the walls of the building rest on gussets or brackets 30 borne by columns 6 in said walls. Each panel 3 is provided with a slab 31 that is located between two slabs 7. The slab 31 is preferably thicker than slab 7 and the ends of same rest on gussets or brackets 30 borne by columns 6 at the sides of said panel. Tongues 32

borne by the ends of slab 31 fit in grooves 8 in said columns 6, as best seen in Fig. 7, and thereby hold said slab in place, the top and bottom of said slab 31 being united integrally with the slabs 7 adjacent thereto and the ends of said slab 31 being united integrally with columns 6 by means of grout or similar cement mixture, as hereinabove described. Each slab 31 is provided with a shoulder 33, which projects from the inner face thereof, in order to afford a support for a slab or slabs 27 adjacent thereto. The slabs 31 constitute a belt-course and, if desired, the exterior face of each of said slabs may be paneled or otherwise decorated to improve the general appearance of the building. The slabs 27 rest on the girders 28 and the particular slabs 27 that are adjacent the walls of the building rest on the shoulders 33 on slabs 31. A flange 34 is provided on the under side of each slab 27 and is the particular part of said slab that rests on a shoulder 35 on a girder 28 and against a tenon 36 on said girder. An offset 37 is provided on the side of each slab 27 that is adjacent a wall of the building and is the particular part of said slab that rests on a shoulder 33 on a slab 31. The slabs 27, girders 28, and columns 29 are preferably similar to and united integrally in the same manner as the slabs, girders, and columns in the concrete construction that constitutes the subject-matter of my copending application hereinabove mentioned.

If the building has only one story, the columns 15 may be supported on suitable footings (not shown in the drawings), but, if the building has two stories, the columns 15 are supported on the second floor of the building and are preferably located directly above the columns 29, as best seen in Fig. 2, said columns 29 being supported on suitable footings (not shown). If the building has more than two stories, additional columns 29 are supported on the second floor of the building and an additional belt-course of slabs 31 is provided, in order to support the third floor, which, also, comprises a plurality of slabs 27 and girders 28, and so on until the top floor is constructed, the columns 15 being supported on the top floor, in order to support the roof, as hereinabove described.

When it is desired to have a door 4 in a panel 3, the door-case is placed in its proper position in said panel, so as to rest either on the foundation wall 1 or on a slab 31, depending upon the location of said door relative to the floors of the building. The door-case may be located adjacent a column 6 at one side of said panel 3, or, if desired, same may be located in the middle or nearly the middle of said panel. When the door-case is located adjacent a column 6 at one

side of panel 3, a slab 38 is placed in the space between said door-case and the column 6 at the other side of said panel. The side of slab 38 that is adjacent a column 6 fits in a groove 8 in said column and the side of said slab that is adjacent the door-case forms one of the door-jamb, the other door-jamb being the column 6 that is adjacent said door-case. A slab 7 rests on the top of the door-case and the top of slab 38, and is united integrally with said slab 38 by means of grout, as hereinabove described. A rib 39 on the exterior face of slab 38 extends along the side of said slab that is adjacent the door-case and a rib 40, also, on the exterior face of said slab extends along the bottom of same and thereby strengthens said slab. A rib 41 on the exterior face of the slab 7 above the door-case and slab 38 extends along the bottom of said slab 7, so as to strengthen same. When the door-case is located in the middle or nearly the middle of a panel 3, a slab 38 is placed in each space between the door-case and the columns 6 at the sides of said panel. A slab 7 is placed above the door-case and rests on the slabs 38 adjacent the sides of said door-case, a rib 41 being provided on the exterior face of said slab 7, and ribs 39 and 40 being provided on the exterior faces of each slab 38. Said slab 7 is united integrally with each slab 38 by means of grout, in the manner hereinabove described.

If a window 5 is located in a panel 3, the window-frame is supported on a slab 7, and a rib 42 on the exterior face of said slabs 7 extends along the top of same, thereby forming the window-sill and strengthening said slab. A slab 38 is placed in each space between the window-case and the columns 6 at the sides of said panel and is supported on the slab 7 beneath the window-frame, being united integrally with said slab 7 by means of grout, as hereinabove described. The sides of each slab 38 that are adjacent the window-frame form the window-jamb and bear ribs 39, respectively, and the sides of said slabs 38 that are adjacent the columns 6 at the sides of said panel fit in grooves 8 in said columns. A slab 7 having a rib 41 is placed above the window-frame, and rests on the slabs 38 adjacent said window-frame, being united integrally with said slabs 38 by means of grout, as hereinabove described. When two windows 5 are located in a panel 3, slabs 38 are placed between the window-frames and columns 6 at the sides of said panel, and a slab 43 is placed between the window-frames. Ribs 44 on the exterior face of slab 43 extend along the sides of same and thereby strengthen said slab. The slab 43 is supported on the slabs 7 below the window-frames and is united integrally with same

by means of grout, as hereinabove described. A slab 7 is placed on the tops of slabs 38 and slab 43 and is united integrally therewith by means of grout, as hereinabove described. A rib 41 is provided on the exterior face of each slab 7 that rests on the foundation wall 1, and extends along the bottom of said slab, in order to strengthen same and each slab 7 that rests on the belt-course bears a rib 41, which extends along the bottom of same. A rib 45 is provided on the exterior face of each slab 7 on which the belt-course rests, and extends along the top of said slab, in order to strengthen same. Each slab 7 that supports the cornice of the building, also, bears a rib 41, which extends along the top of said slab, in order to strengthen same. All of the ribs hereinabove described not only strengthen the slabs bearing same, but improve the general appearance of the building.

In the alternate form of wall construction depicted in Figs. 9 to 15, inclusive, the slabs 7 are placed one on top of the other, and the ends of said slabs fit in grooves 8 in columns 6, being united integrally with said columns by means of grout or similar cement mixture that fills the cracks 9, as hereinabove described. In the construction depicted in Figs. 9 to 12, inclusive, each slab 7 is provided with a groove 46, which extends longitudinally in the top of same, and a tongue 47 is provided on the bottom of each slab 7, except the bottom slab 7. When one slab 7 is placed on top of another slab 7 the tongue 47 borne by the bottom of the former enters and fills the groove 46 in the top of the latter. Just previous to the placing of one slab 7 upon another slab 7, either the bottom of the former or the top of the latter is covered with a thin layer of grout, so that, after said slabs are joined, the grout sets integrally with both and thereby unites same integrally together. U-shaped bars 48 having their ends embedded in slab 7 project from the top of same, in order to allow a rope or cable of a hoisting machine (not shown) or other suitable means to be attached thereto, when it is desired to raise said slab and place same in its proper position in the wall. Each slab 7, except the bottom slab 7, is provided with depressions 49, which are formed in the bottom of same, in order to allow the bars 48 that project from the slab 7 supporting same to extend into said depressions, said depressions being filled with grout just previous to the placing of said slab upon another.

Each slab 7 contains an opening 50 or a plurality of such openings. Each opening 50 extends vertically through said slab and preferably tapers from the top and bottom of said slab to the middle or nearly the middle of same, being smaller in cross-sectional

configuration at or near the middle of said slab than at the top and bottom of same. The opening or openings 50 in said slab 7 registers with an opening or openings 50 in the next slab 7. Said openings 50 are filled with grout or wet concrete, which sets integrally with all of said slabs 7 and thereby ties said slabs firmly together. By reason of each opening being smaller at or near the center of slab 7 than at the top and bottom of said slab, the grout or wet concrete, when set in said opening, is held firmly in place in same. Reinforcing bars 51 extend through the openings 50 and afford additional means for tying said slabs firmly together, each of said bars having an end thereof embedded in the foundation wall 1. Reinforcing bars 52 extend longitudinally in slab 7, and are preferably located near both faces of same. Bars 53 extend vertically in said slab 7 and, also, lie near both faces of same.

In the wall construction depicted in Figs. 13 to 15, inclusive, the openings 50 and bars 51 are omitted entirely, and each groove 46 is relatively deep. A space 54 in said groove 46 is left below the tongue 47 within same, and a bar 55, which lies in said space, extends nearly the entire length thereof. The ends of bar 55 overlap bars 56, which extend from columns 6 into said space. Each column 6 is provided with a plurality of openings 57, which register with the spaces 54 between the slabs 7 on both sides of same, in order to allow the bars 56 to pass therethrough and, also, to extend the spaces 54 on both sides of said column, said openings 57 being filled with grout, which, when set, anchors the bars 56 firmly in same. The grooves 46 are, also, filled with grout, which, when set, unites the slabs 7 integrally together and holds the bars 55 and 56 firmly in place. The bars 56 hold the slabs 7 firmly in place and, by reason of said bars 56 being arranged to overlap the bars 55, continuous action of the reinforcement is obtained.

In the wall construction depicted in Figs. 16 to 18, inclusive, a tongue 58 is provided on each end of each slab 7 and is the particular part of said slab that fits in a groove 8 in column 6. The exterior faces of the slab 7 are flush or nearly flush with the exterior faces of the columns 6 and, by this arrangement, the largest available floor space can be obtained.

Claim:

1. A concrete wall construction comprising a pair of columns having grooves in the sides thereof, a plurality of vertical slabs resting one on top of another and connecting said columns, the ends of said slabs being secured in the grooves in said columns, tongues borne by the bottoms of said slabs, the tops of the slabs having grooves to re-

ceive said tongues, there being a space below each tongue in the grooves in said slabs, the columns being formed with openings extending through the same and registering with said spaces, and a concrete filler for said spaces and said openings adapted to set integrally with said slabs and said columns, thereby to lock the same together.

2. A concrete wall construction comprising a pair of columns having grooves in the sides thereof, a plurality of vertical slabs resting one on top of another and connecting said columns, the ends of said slabs being secured in the grooves in said columns, tongues borne by the bottoms of said slabs, the tops of the slabs having grooves to receive said tongues, there being a space below each tongue in the grooves in said slabs, the columns being formed with openings extending through the same and registering with said spaces, a concrete filler for said spaces and said openings adapted to set integrally with said slabs and said columns, thereby to lock the same together, and bars embedded in the concrete filler in said spaces and extending longitudinally thereof.

3. A concrete wall construction comprising a pair of columns having grooves in the sides thereof, a plurality of vertical slabs resting one on top of another and connecting said columns, the ends of said slabs being secured in the grooves in said columns, tongues borne by the bottoms of said slabs, the tops of the slabs having grooves to receive said tongues, there being a space below each tongue in the grooves in said slabs, the columns being formed with openings extending through the same and registering with said spaces, a concrete filler for said spaces and said openings adapted to set integrally with said slabs and said columns, thereby to lock the same together, bars embedded in the concrete filler in said spaces and extending longitudinally thereof, and bars extending through the openings in said columns and projecting into said spaces.

4. A concrete wall construction comprising a pair of columns having grooves in the sides thereof, a plurality of vertical slabs resting one on top of another and connecting said columns, the ends of said slabs being secured in the grooves in said columns, tongues borne by the bottoms of said slabs, the tops of the slabs having grooves to receive said tongues, there being a space below each tongue in the grooves in said slabs, the columns being formed with openings extending through the same and registering with said spaces, a concrete filler for said spaces and said openings adapted to set integrally with said slabs and said columns, thereby to lock the same together, bars embedded in the concrete filler in said spaces

and extending longitudinally thereof, and bars extending through the openings in said columns and projecting into said spaces, said last-mentioned bars being arranged to overlap said first-mentioned bars.

5. A concrete building including vertical slabs, columns having gussets, the slabs being connected to the columns, top slabs grooved on their bottoms to receive the tops of the uppermost vertical slabs and having their bottoms resting on the gussets of the columns, shoulders on the inner faces of said top slabs, roof slabs seating on said shoulders, the inner faces of the top slabs being beveled and the ends of the roof slabs adjacent the adjoining inner faces of the top slabs forming V-shaped spaces in conjunction therewith, and a concrete filler for said spaces.

6. In concrete construction, a column, a pair of vertically arranged slabs arranged at right angles to each other and having the bottoms of their adjacent ends resting on the top end of the column, the inner sides of the adjoining ends of said slabs being beveled and abutting and overlying the top of the column, the unbeveled end portion of each slab being disposed in spaced relation to the opposite outer side portion of the column to form a space between said unbeveled end portions of the slabs and the adjacent outer side portions of the column, and a post seating at its lower end on the top of the column and abutting said unbeveled end portions of the slabs.

7. In concrete wall construction, a pair of columns, a pair of vertically arranged slabs arranged in superimposed relation between the columns and having their ends secured thereto, one of the slabs having a tongue and the other a groove in which the tongue partly projects, so as to leave a space beyond the tongue, the columns having transverse openings which register with the said groove, and a concrete filler occupying the space in the groove left by the tongue and also extending in said openings of the column.

8. In concrete wall construction, a column having a transverse opening, a pair of superimposed vertically arranged slabs on each side of the column, the adjoining sides of each pair of slabs having tongue and groove connections, the tongues but partly filling the grooves, the grooves registering with said column opening, a rod extending through said column opening and on opposite sides thereof and projecting into the groove of each pair of slabs, and a concrete filler for the slab grooves and the column opening.

9. In a building construction, a column, a pair of vertically arranged top slabs forming the cornice of the roof arranged at right angles to each other and having portions of

their adjoining ends beveled and resting on the column, and in engagement, the un-
beveled end portions of the slabs forming a
space over the column, each of said slabs
5 having a shoulder on its inner face that pro-
jects inwardly, a horizontal slab having the
sides of a corner thereof seating on said
shoulders so as to abut both of the top slabs,
and a post seating on the column and abut-

ting the unbeveled end portions of the top 10
slabs.

In testimony whereof I hereunto affix my
signature in the presence of two witnesses.

JOHN E. CONZELMAN.

Witnesses:

VIVIEN H. EMMER,
ARCHER W. RICHARDS.