J. E. CONZELMAN.

CONCRETE CONSTRUCTION.

APPLICATION FILED NOV. 16, 1909.

992,733. Patented May 16, 1911.

7 SHEETS—SHEET 1.

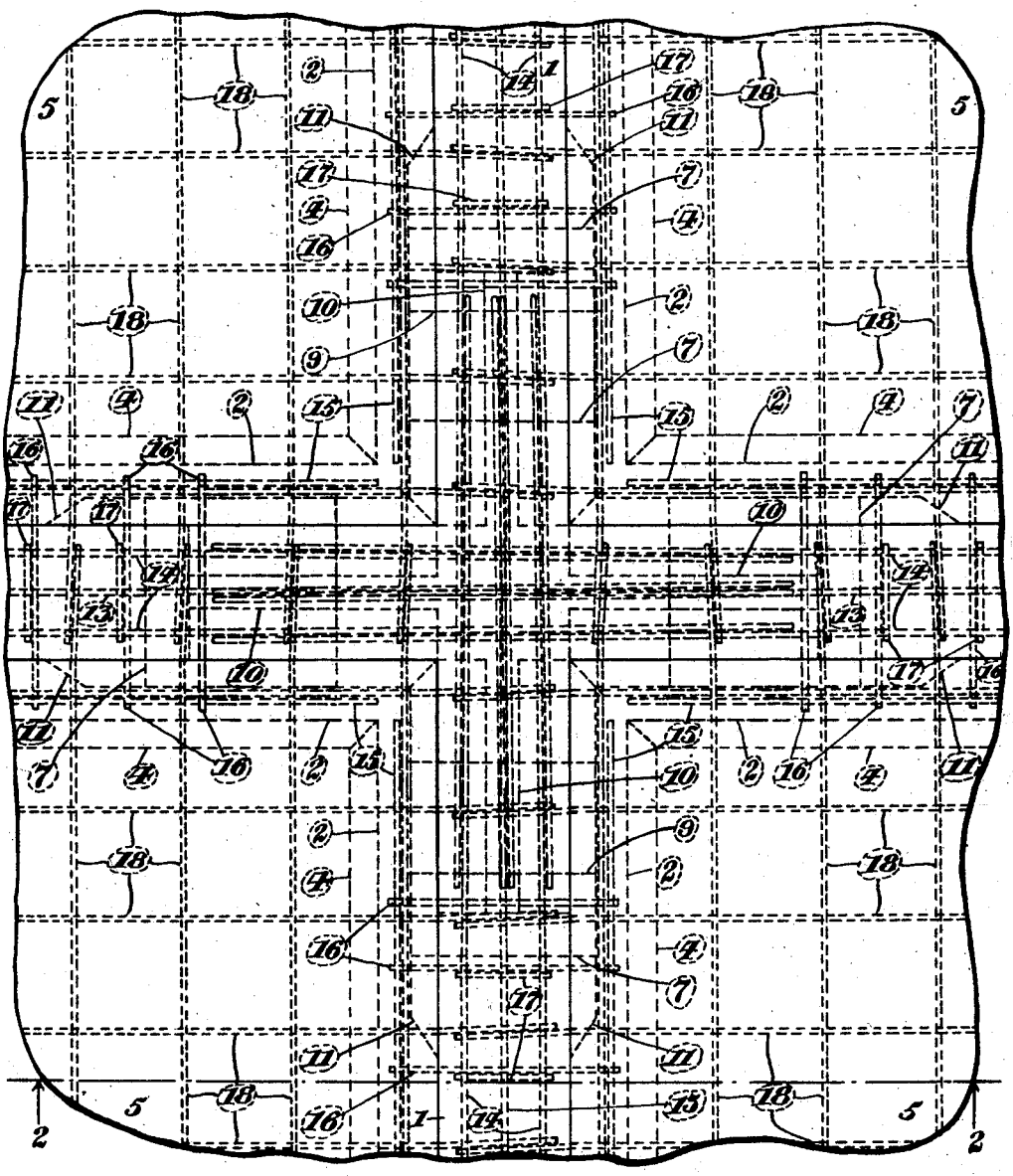


Fig. 1.

Witnesses:
Chas. A. Becker,
George G. Anderson.

Inventor:
John E. Conzelman,
By Hugh V. Wagner,
His Attorney.

J. E. CONZELMAN.

CONCRETE CONSTRUCTION.

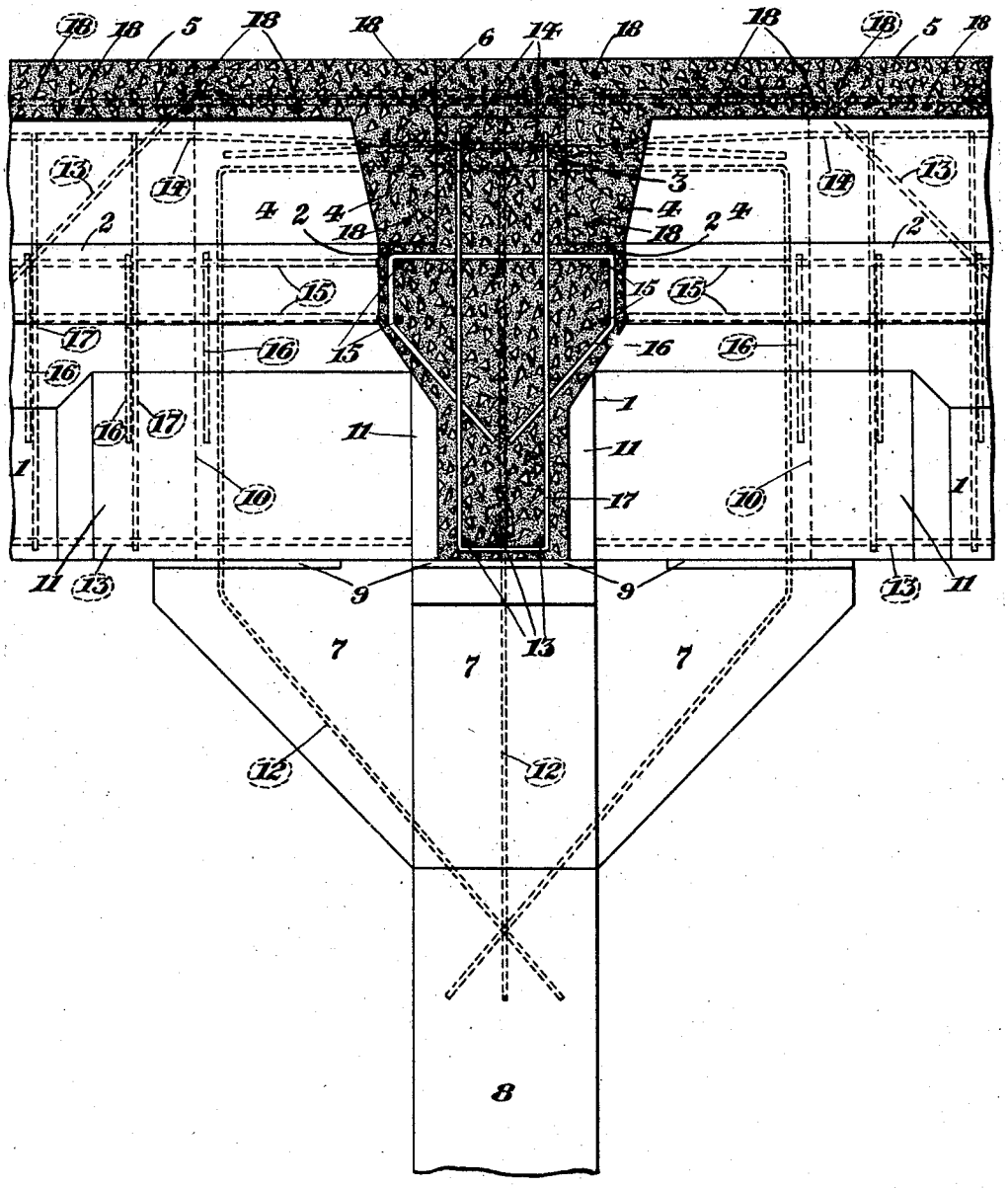
APPLICATION FILED NOV. 16, 1909.

992,733.

Patented May 16, 1911.

7 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

Chas. A. Becker,

George G. Anderson.

Inventor:

John E. Conzelman,

By Hugh K. Wagner

His Attorney.

J. E. CONZELMAN.

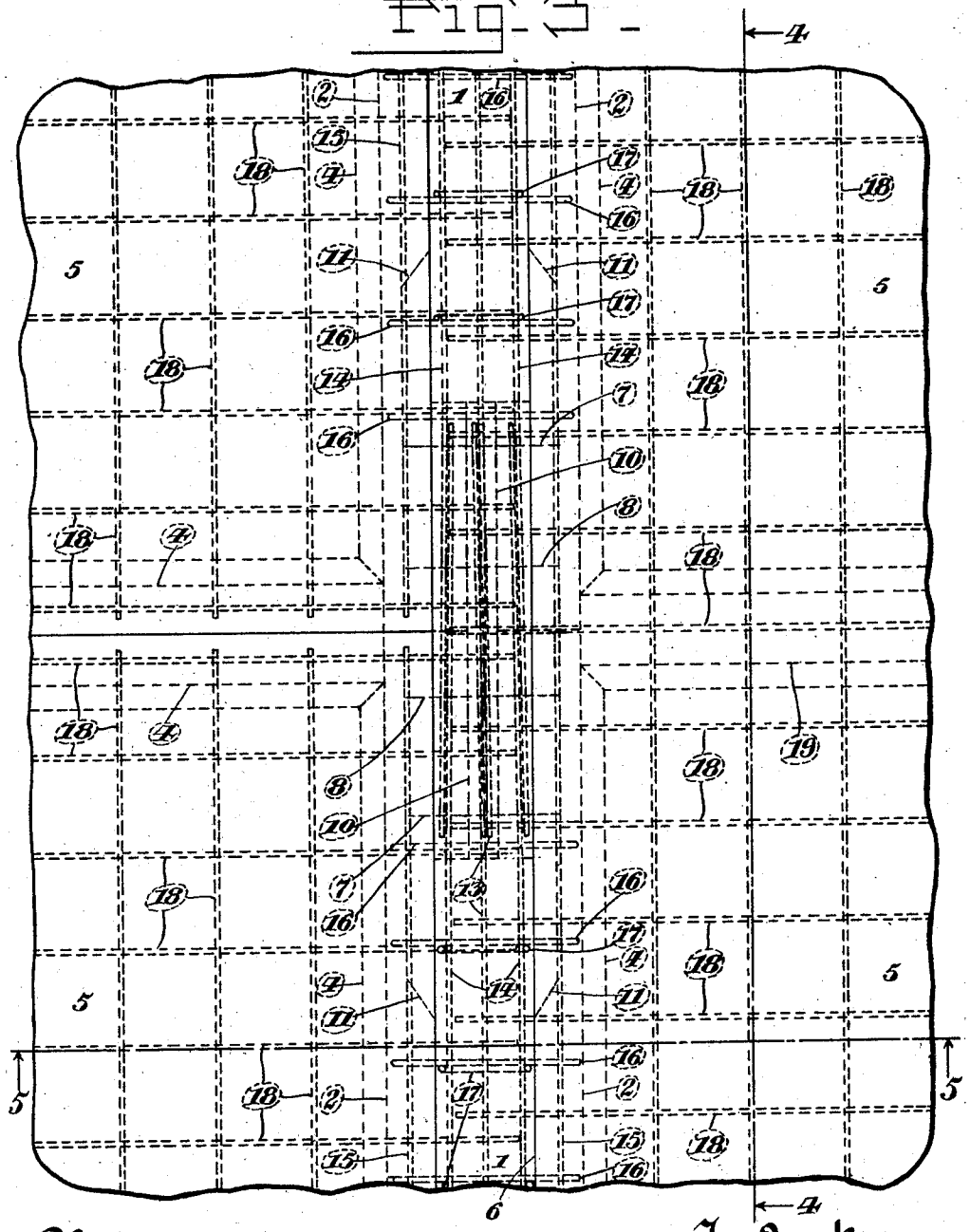
CONCRETE CONSTRUCTION.

APPLICATION FILED NOV. 16, 1909.

992,733. Patented May 16, 1911.

7 SHEETS—SHEET 3.

Fig. 3.



Witnesses:

Chas. A. Becker,

George G. Anderson.

Inventor:

John E. Conzelman,

By Hugh M. Wagner,

His Attorney.

J. E. CONZELMAN.

CONCRETE CONSTRUCTION.

APPLICATION FILED NOV. 16, 1909.

992,733.

Patented May 16, 1911

7 SHEETS—SHEET 4.

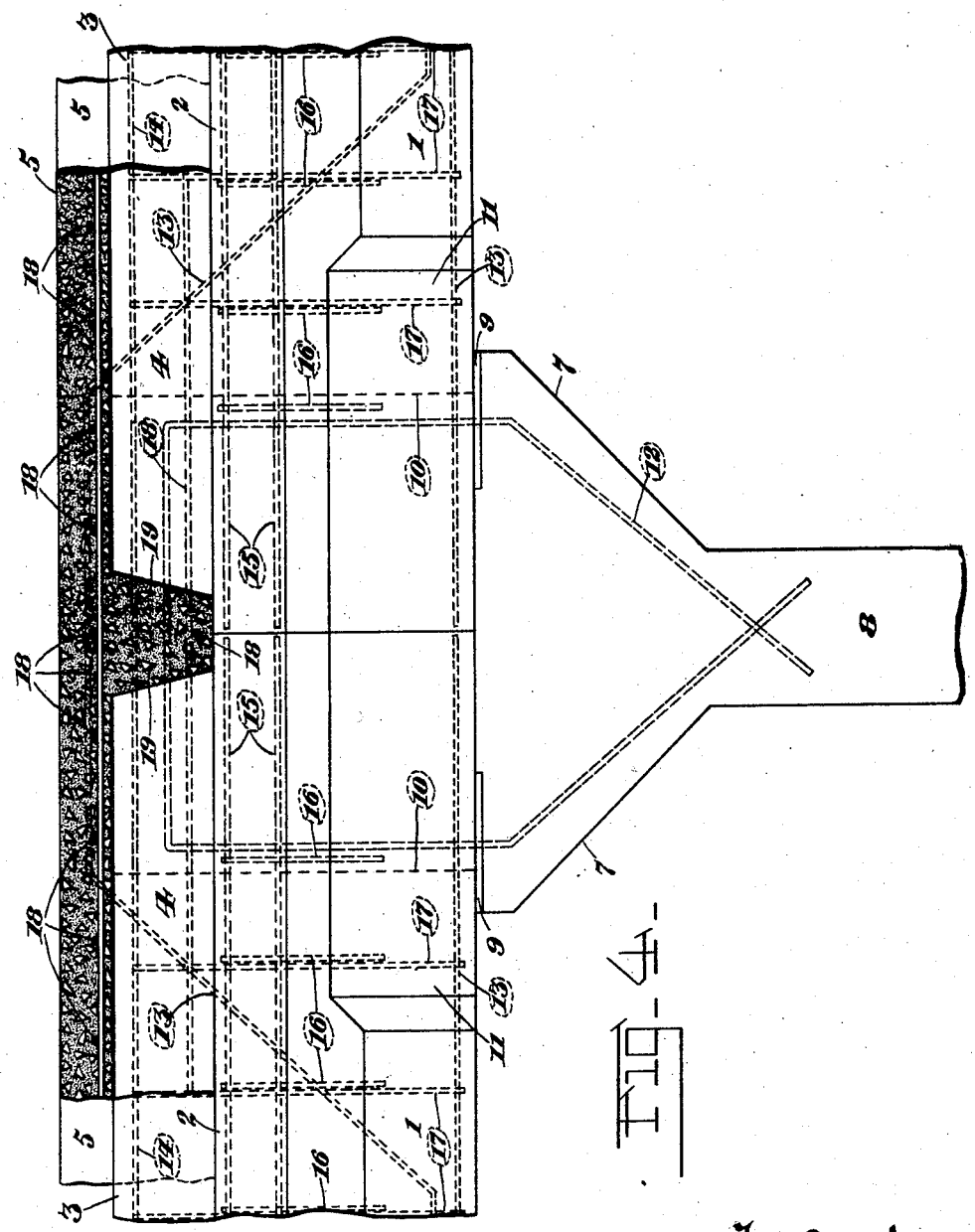


Fig. 4.

Witnesses:

Chas. A. Becker,

George G. Anderson.

Inventor:

John E. Conzelman,

By Hugh W. Wagner

His Attorney

J. E. CONZELMAN.

CONCRETE CONSTRUCTION.

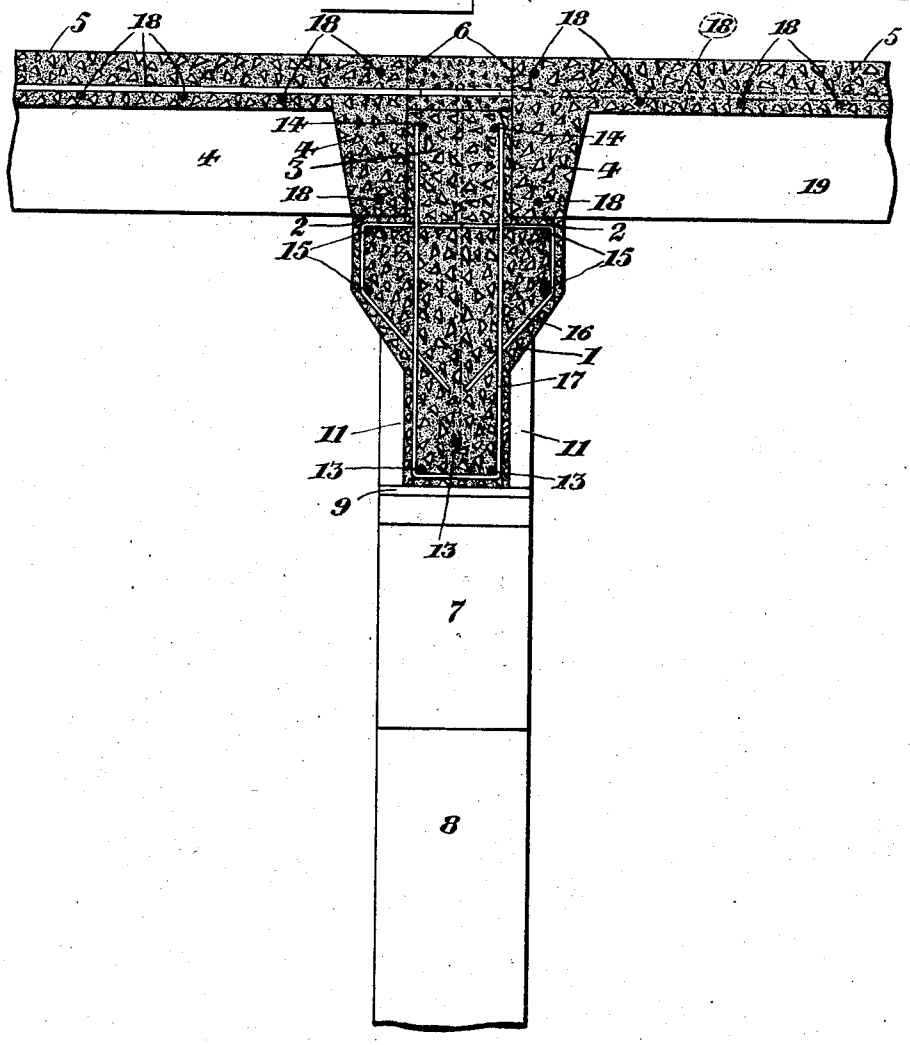
APPLICATION FILED NOV. 16, 1909.

992,733.

Patented May 16, 1911.

7 SHEETS—SHEET 5.

Fig. 5.



Witnesses:

Chas. A. Becker,

George G. Anderson.

Inventor:

John E. Conzelman,

By Hugh K. Wagner,

His Attorney.

J. E. CONZELMAN.

CONCRETE CONSTRUCTION.

APPLICATION FILED NOV. 16, 1909.

992,733.

Patented May 16, 1911.

7 SHEETS—SHEET 6.

FIG. 6.

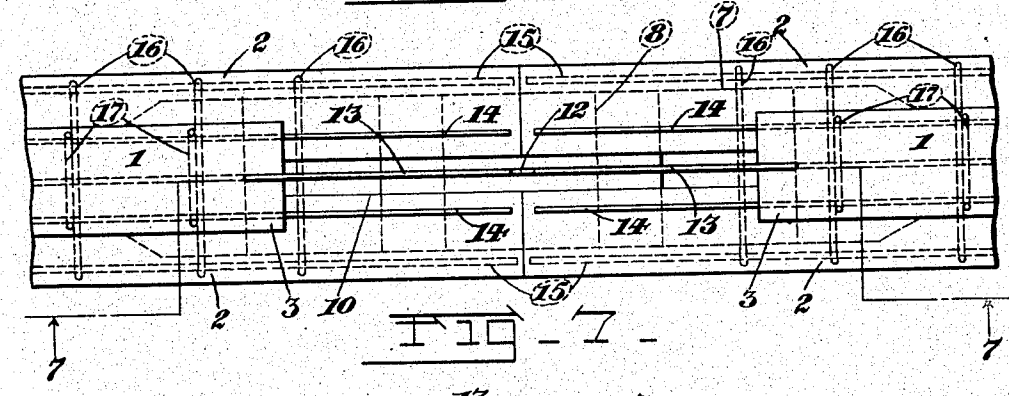
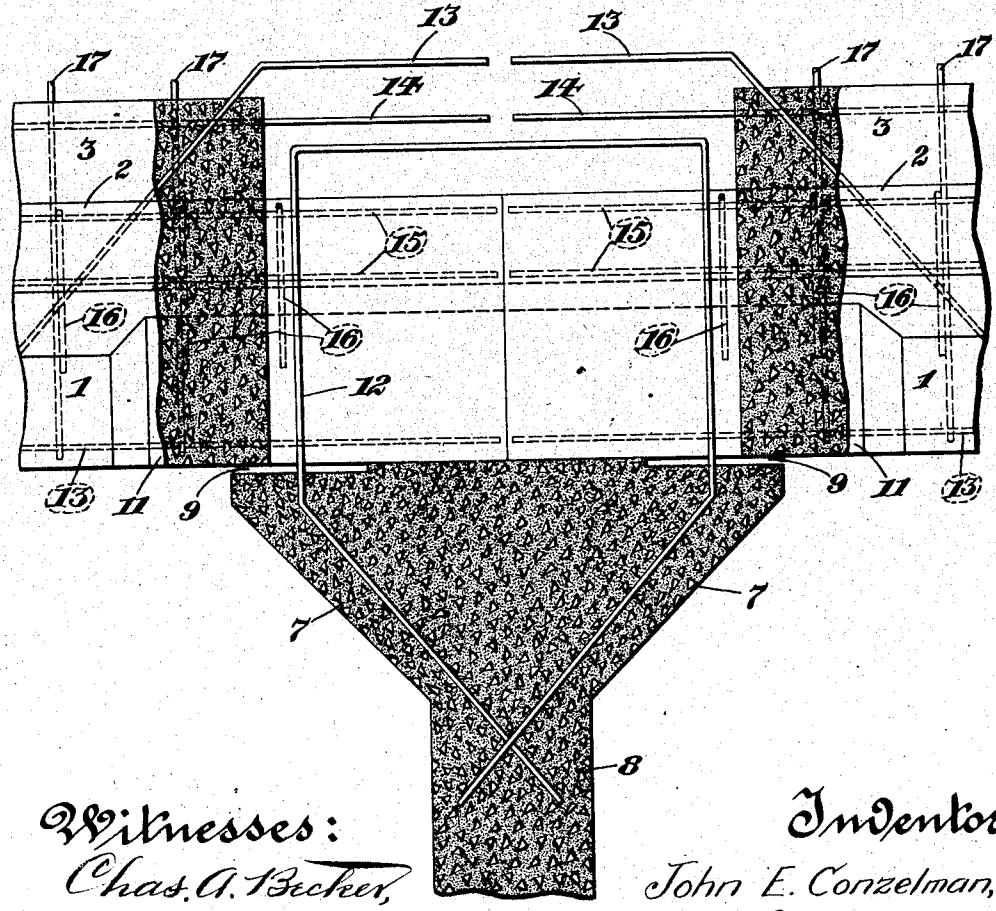


FIG. 7.



Witnesses:

Chas. A. Becker,

George G. Anderson.

Inventor:

John E. Conzelman,

By Hugh R. Magner

His Attorney

J. E. CONZELMAN.

CONCRETE CONSTRUCTION.

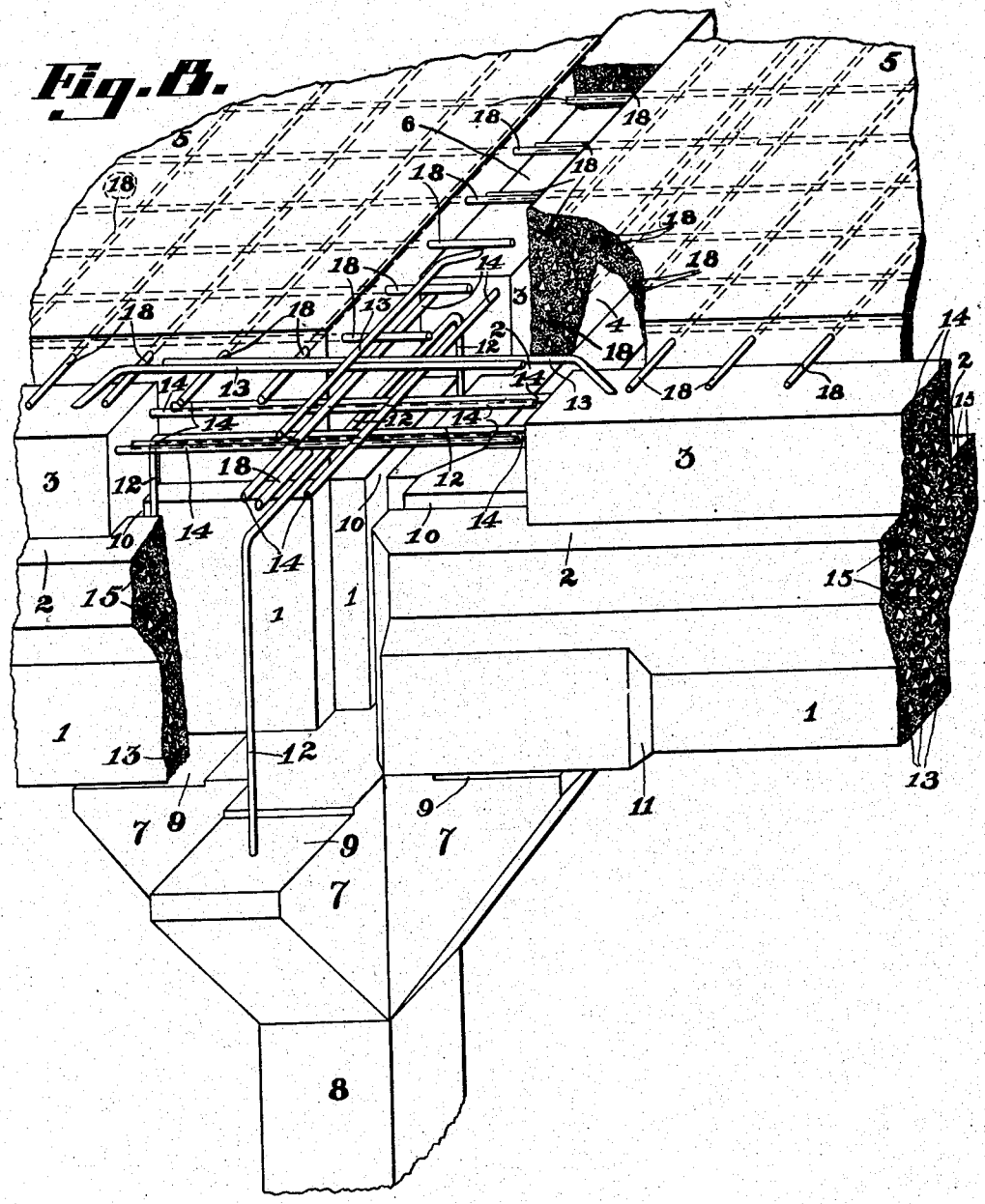
APPLICATION FILED NOV. 16, 1909.

992,733.

Patented May 16, 1911.

7 SHEETS—SHEET 7.

Fig. 8.



Witnesses:

George G. Anderson.

Ira R. Koenig.

Inventor:

John E. Conzelman.

By Hugh K. Wagner,

His Attorney.

UNITED STATES PATENT OFFICE.

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

CONCRETE CONSTRUCTION.

992,733. Specification of Letters Patent. **Patented May 16, 1911.**

Application filed November 16, 1909. Serial No. 528,298.

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 invented certain new and useful Improvements in Concrete Construction, (Case I,) of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to concrete building structures and pertains particularly to a construction in which concrete slabs and beams are used for ceilings and floors, and are supported at their corners and ends by uprights or columns. In the construction of concrete structures, it is essential that secure and durable jointures be made between the columns and the horizontal members of the structure or the beams and slabs.

It is the object of this invention to provide a structure of concrete building elements which coöperate and are interengaged to form a unitary and rigid structure.

It is also an object of this invention to provide a concrete building structure in which the beams support the slabs and are secured rigidly to the columns in the manner to be hereinafter more fully described.

In the drawings forming part of this specification, in which like numbers of reference denote like parts wherever they occur, Figure 1 is a plan view of the preferred embodiment of the invention; Fig. 2 is a sectional view on the line 2—2, Fig. 1; Fig. 3 is a plan view of a modified form; Fig. 4 is a sectional view on the line 4—4, Fig. 3; Fig. 5 is a sectional view on the line 5—5, Fig. 3; Fig. 6 is a plan view wherein but two beams are employed; and Fig. 7 is a sectional view on the line 7—7, Fig. 6; Fig. 8, is a view in perspective, some of the parts being broken away.

It is to be understood that the slabs and beams hereinafter referred to may be made at any desired place, but preferably away from the location where the building in which they are used is being constructed.

For the purpose of illustration all-concrete columns are depicted in the drawings, but reinforced concrete columns or metal columns can be used, and said columns can, also, be of any size or shape.

Each beam 1 is provided with the shoulders 2 and a tenon 3. Said tenon 3 is preferably shorter than the length of beam 1 and terminates within a short distance of each end of said beam. A flange 4 of each slab 5 rests on a shoulder 2 of a beam 1 and against tenon 3. Said flange 4 raises the top surface of slab 5 to a greater distance above shoulder 2 than the distance the tenon 3 projects above said shoulder, so that, when a slab is placed upon each shoulder 2 of a beam 1, a space 6 above tenon 3 is left between the two slabs supported by said beam. Grout or wet concrete is poured into said space 6 and is leveled off flush with the top surface of each slab, and when said grout or wet concrete becomes set in said space the slabs and the beam are united thereby, thus constituting a monolithic structure.

It should be understood that the flange 4 can be omitted and the slab 5 can be of such thickness that the top surface thereof will be raised to a higher elevation than the top of tenon 3, when the edge of the slab is placed upon a shoulder 2.

A gusset 7 or a plurality of such gussets are formed on column 8. Each gusset 7 is provided with a cut-away portion 9 which communicates with a slot 10 in the end of a beam 1. Said slot 10 communicates with space 6 and, when grout or wet concrete is poured into said space, it runs into and fills each slot 10 and each cut-away portion 9 communicating with said slot. An enlarged portion 11 is formed on the lower part of the end of each beam 1 and is preferably of such thickness that each side of said enlarged portion registers in the same plane with an adjacent side of a gusset 7 upon which the end of said beam rests. Should the beam 1 sag after it is placed in position on a column 8, the cut-away portion 9 prevents said beam from touching the gusset 7, whereby the load is imparted directly to the column.

When four beams are supported by a column 8 in the manner shown in Figs. 1 and 2, the slots in each pair of beams which extend in the same direction are located opposite each other and are preferably located in the same plane. When two beams are supported by a column 8, an end of one of said beams abuts an end of the other said beam in such manner that the slots 10 register with each other in the manner best seen in Fig. 6.

Each end of reinforcing bar 12 is embedded in the top of column 8 and is provided

with a bent portion which projects above said column into a pair of oppositely-disposed or registering slots 10 hereinabove described and extends preferably higher than said slots. Reinforcing bars 13 are embedded in the lower part of each beam 1 and, adjacent the end thereof, one or more of said bars turn upwardly and project from tenon 3 and extend preferably above each reinforcing bar 12. Reinforcing bars 14, which are embedded in the upper part of tenon 3, protrude from each end of said tenon and are located preferably above each reinforcing bar 12. Said bars 13 and 14 of each beam 1 can either project from tenon 3 to approximately the end of said beam as shown in Figs. 6 and 7, or they can be long enough to extend beyond the end of beam 1 and overlap similar bars 13 and 14 projecting from a tenon of a beam extending in the same direction as shown in Figs. 1, 2, 3, and 4. The shoulders 2 are provided with reinforcing bars 15 which are encircled at intervals by bars 16. U-shaped reinforcing bars 17 are spaced at intervals in each beam 1 and the lower part of each bar 17 preferably underlies bars 13. The ends of each bar 17 extend within a short distance of the top of tenon 3 in the manner depicted in Figs. 2 and 5, or said ends can project above said tenons into space 6. Reinforcing bars 18 are embedded in each slab 5 and those rods 18 which extend at an angle to a space 6 preferably project into said space.

In forming a structure composed of a column supporting four beams, each of which beams supports a pair of slabs as shown in Figs. 1 and 2, the column 8 is erected, an end of each beam 1 is placed in such position upon a gusset 7 that a portion of bar 12 will enter a slot 10 in said end, and each slab 5 is then placed so that each flange 4 will rest upon a shoulder 2 and against a tenon 3 of a beam 1. The other end of each beam is supported in the same manner, by an upright, wall, or other suitable means of support (not shown in the drawings). The sides of each cut-away portion 9 is covered with a so-called form (not shown in the drawings and the cut-away portions 9, slots 10, and spaces 6 are all filled with grout or wet concrete in the manner hereinabove described. When said grout or wet concrete has become set, a unitary structure comprising the above-mentioned building elements is obtained, and the juncture of said elements is greatly strengthened by the reinforcing bars.

In Figs. 3, 4, and 5 two beams 1 are shown supported by a column 8 and each beam 1 supporting a pair of slabs 5. The ends of each beam are placed in such position upon column 8 that a portion of bar 12 will enter each slot 10 and said ends will abut each other. Slabs 5 are then placed so that each flange 4 will rest upon a shoulder 2. When desirable, three slabs can be used as shown in Fig. 3, or two or four slabs can be used for the same purpose. When three slabs 5 are used, one of said slabs can be reinforced with a beam 19 which is formed on the under side of said slab and preferably extends transversely of said slab, as depicted in Fig. 3. The cut-away portions 9, slots 10, and spaces 6 are filled with grout or wet concrete in the manner hereinabove described. Said grout or wet concrete is allowed to set whereby the above-mentioned elements are united to form a rigid and unitary structure.

I claim:

1. In a concrete structure, a column and a beam supported thereby, said column being formed with a horizontally disposed cutaway portion at the periphery thereof, said beam having an opening which communicates with said cutaway portion, whereby the beam-load is imparted directly to the center of the column, and a concrete filler for filling the opening and said cutaway portion to thereby constitute a unitary structure when the concrete filler has set.

2. A concrete structure comprising a beam surmounted by a tenon, there being a shoulder on the top of said beam around said tenon, a pair of slabs abutting said tenon and supported by the shoulder surrounding said tenon, the edges of said slabs extending higher than said tenon and forming a space therebetween, reinforcing bars projecting from said slabs into said space, and a concrete filler for said space to set integrally with the edges of said slabs surrounding said space and with said tenon, there being also reinforcing bars extending from said tenon into said space.

3. A concrete structure comprising a beam surmounted by a tenon, there being a shoulder on the top of said beam around said tenon, reinforcing bars embedded in said shoulder, a pair of slabs abutting said tenon and supported by the shoulder surrounding said tenon, the edges of said slabs extending higher than said tenon and forming a space therebetween, reinforcing bars projecting from said slabs into said space, and a concrete filler for said space to set integrally with the edges of said slabs surrounding said space and with said tenon, there being also reinforcing bars extending from said tenon into said space.

4. A concrete structure comprising a beam surmounted by a tenon, there being a shoulder on the top of said beam around said tenon, reinforcing bars embedded in said shoulder, a plurality of reinforcing bars embedded at intervals in said beam, each of said last-mentioned bars encircling all of said first-mentioned bars, a pair of slabs

abutting said tenon and supported by the shoulder surrounding said tenon, the edges of said slabs extending higher than said tenon and forming a space therebetween, reinforcing bars projecting from said slab into said space, and a concrete filler for said space adapted to set integrally with the edges of said slabs surrounding said space and with said tenon, there being also reinforcing bars projecting from said tenon into said space.

5. A concrete structure comprising a beam surmounted by a tenon, there being a shoulder on the top of said beam around said tenon, reinforcing bars embedded in said shoulder, a plurality of reinforcing bars embedded at intervals in said beam, each of said last-mentioned bars encircling all of said first-mentioned bars, a pair of slabs abutting said tenon and supported by the shoulder surrounding said tenon, the edges of said slabs extending higher than said tenon and forming a space therebetween, reinforcing bars projecting from said slab into said space, and a concrete filler for said space adapted to set integrally with the edges of said slabs surrounding said space and with said tenon, there being also reinforcing bars extending from said tenon into said space.

6. A concrete structure comprising a beam surmounted by a tenon, there being a shoulder on the top of said beam around said tenon, reinforcing bars embedded in said shoulder, a plurality of reinforcing bars embedded at intervals in said beam, each of said last-mentioned bars encircling all of said first-mentioned bars, a pair of slabs abutting said tenon and supported by the shoulder surrounding said tenon, the edges of said slabs extending higher than said tenon and forming a space therebetween, reinforcing bars projecting from said slabs into said space, and a concrete filler for said space to set integrally with the edges of said slabs surrounding said space and with said tenon, there being also a plurality of U-shaped reinforcing bars embedded at intervals in said beam.

7. A concrete structure comprising a beam surmounted by a tenon, there being a shoulder on the top of said beam around said tenon, reinforcing bars embedded in said shoulder, a plurality of reinforcing bars embedded at intervals in said beam, each of said last-mentioned bars encircling all of said first-mentioned bars, a plurality of U-shaped reinforcing bars embedded at intervals in said beam, reinforcing bars embedded in the lower part of said beam and resting in said U-shaped bars, a pair of slabs abutting said tenon and supported by the shoulder surrounding said tenon, the edges of said slabs extending higher than said tenon and forming a space therebetween, reinforcing bars projecting from said slabs into said space, and a concrete filler for said space to set integrally with the edges of said slabs surrounding said space and with said tenon.

8. A concrete structure comprising a beam surmounted by a tenon, there being a shoulder on the top of said beam around said tenon, reinforcing bars embedded in said shoulder, a plurality of reinforcing bars embedded at intervals in said beam, each of said last-mentioned bars encircling all of said first-mentioned bars, a plurality of U-shaped reinforcing bars embedded at intervals in said beam, reinforcing bars embedded in the lower part of said beam and resting in said U-shaped bars, reinforcing bars embedded in said tenon, a pair of slabs abutting said tenon and supported by the shoulder surrounding said tenon, the edges of said slabs extending higher than said tenon and forming a space therebetween, reinforcing bars extending from said slabs into said space, and a concrete filler for said space to set integrally with the edges of said slabs surrounding same and with said tenon.

9. A concrete structure comprising a beam surmounted by a tenon, there being a shoulder on the top of said beam around said tenon, reinforcing bars embedded in said shoulder, a plurality of reinforcing bars embedded at intervals in said beam, each of said last-mentioned bars encircling all of said first-mentioned bars, a plurality of U-shaped reinforcing bars embedded at intervals in said beam, reinforcing bars embedded in the lower part of said beam and resting in said U-shaped bars, one of said reinforcing bars in the lower part of said beam being turned upwardly adjacent the ends thereof to project beyond the ends of said tenon, reinforcing bars embedded in said tenon and projecting from the ends of said tenon, a pair of slabs abutting said tenon and supported by the shoulder surrounding said tenon, the edges of said slabs extending higher than said tenon and forming a space therebetween, reinforcing bars projecting from said slabs into said space, and a concrete filler for said space to set integrally with the edges of said slabs surrounding same and with said tenon.

10. A concrete structure comprising a column having cut-away portions, a plurality of beams supported by said column, each of said beams being surmounted by a tenon, there being a shoulder on the top of each of said beams around said tenon, each of said beams having a slot, each of said slots communicating with a cut-away portion of said column, said slots being disposed opposite each other in pairs, a plurality of reinforcing bars, each of said reinforcing bars projecting from said column into a pair of said oppositely-disposed slots, a plurality of slabs abutting said tenon and supported by said

shoulders, the edges of said stabs extending higher than said tenon and to form a space therebetween, and a concrete filler for said cut-away portions, slots, and space, said column, beams, and slabs constituting a unitary structure when the concrete filler in said cut-away portions, slots, and space has become set.

11. A concrete structure comprising a column having cut-away portions, a plurality of beams supported by said column, each of said beams being surmounted by a tenon, there being a shoulder on the top of each of said beams around said tenon, each of said beams having a slot, each of said slots communicating with a cut-away portion of said column, said slots being disposed opposite each other in pairs, a plurality of reinforcing bars, each of said reinforcing bars projecting from said column into a pair of said oppositely-disposed slots, a plurality of slabs abutting said tenon and supported by said shoulders, the edges of said slabs extending higher than said tenon to form a space therebetween, reinforcing rods projecting from each end of said tenons into said space, and a concrete filler for said cut-away portions, slots, and space, said column, beams, and slabs constituting a unitary structure when the concrete filler in said cut-away portions, slots, and space has become set.

12. In a concrete structure, in combination with a column, a beam formed with a tenon and shoulders adjacent the same, reinforcing rods extending along the height of the beam into the body thereof and up into the tenon, other reinforcing rods extending transverse of the length of the beam below the shoulder of the beam and having their ends extending down into the body of the beam, and slabs seating on the shoulders.

13. In a concrete structure, in combination with a column, beams seated thereon, said beams having vertical slots at points overlying the column, and said column having horizontal cutaway parts at its outer side edges underlying said slots to communicate therewith, and a concrete filler engaged in the slots and cutaway parts.

14. In a concrete structure, a column, beams supported thereby and slotted at points overlying the column, an arched bar secured in the column and having its arched portion extending in said beam slots, and bars secured to the beams and having their inner ends projecting without the beams and curved upwardly and over said arched portion of the first named bar.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHN E. CONZELMAN.

Witnesses:

GLADYS WALTON,

GEORGE G. ANDERSON.