J. E. CONZELMAN.

CONCRETE CONSTRUCTION.

APPLICATION FILED JAN. 9, 1909.

962,078.

Patented June 21, 1910.

2 SHEETS—SHEET 2.

Fig. 3.

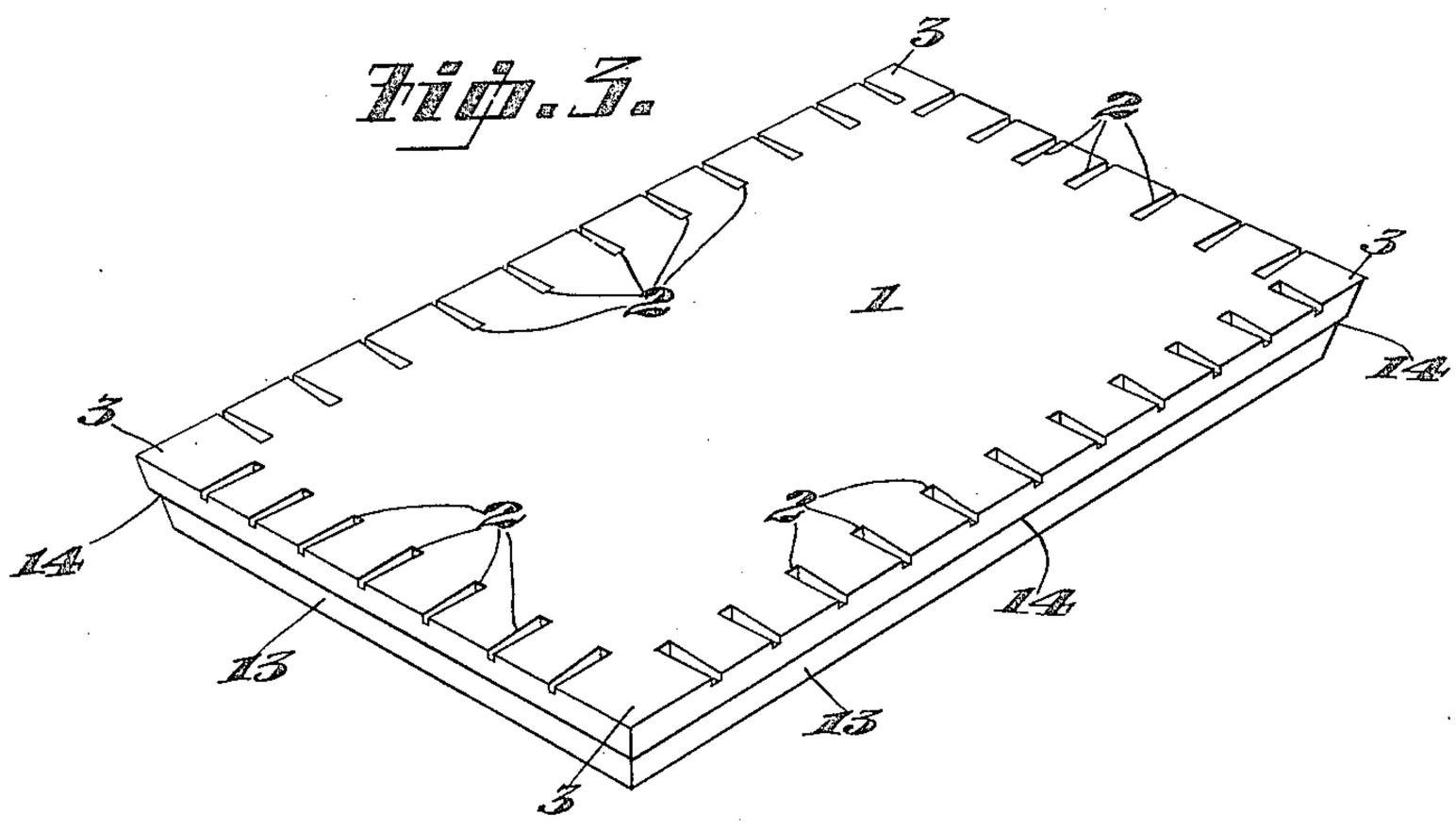
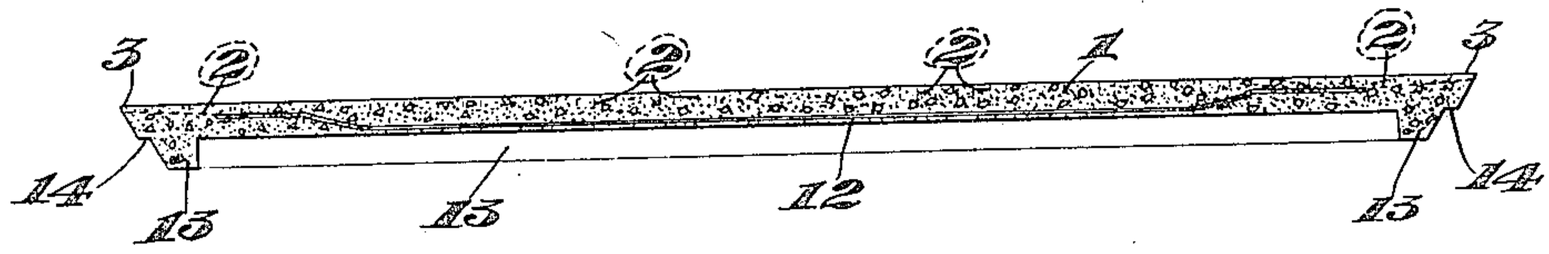


Fig. 4.



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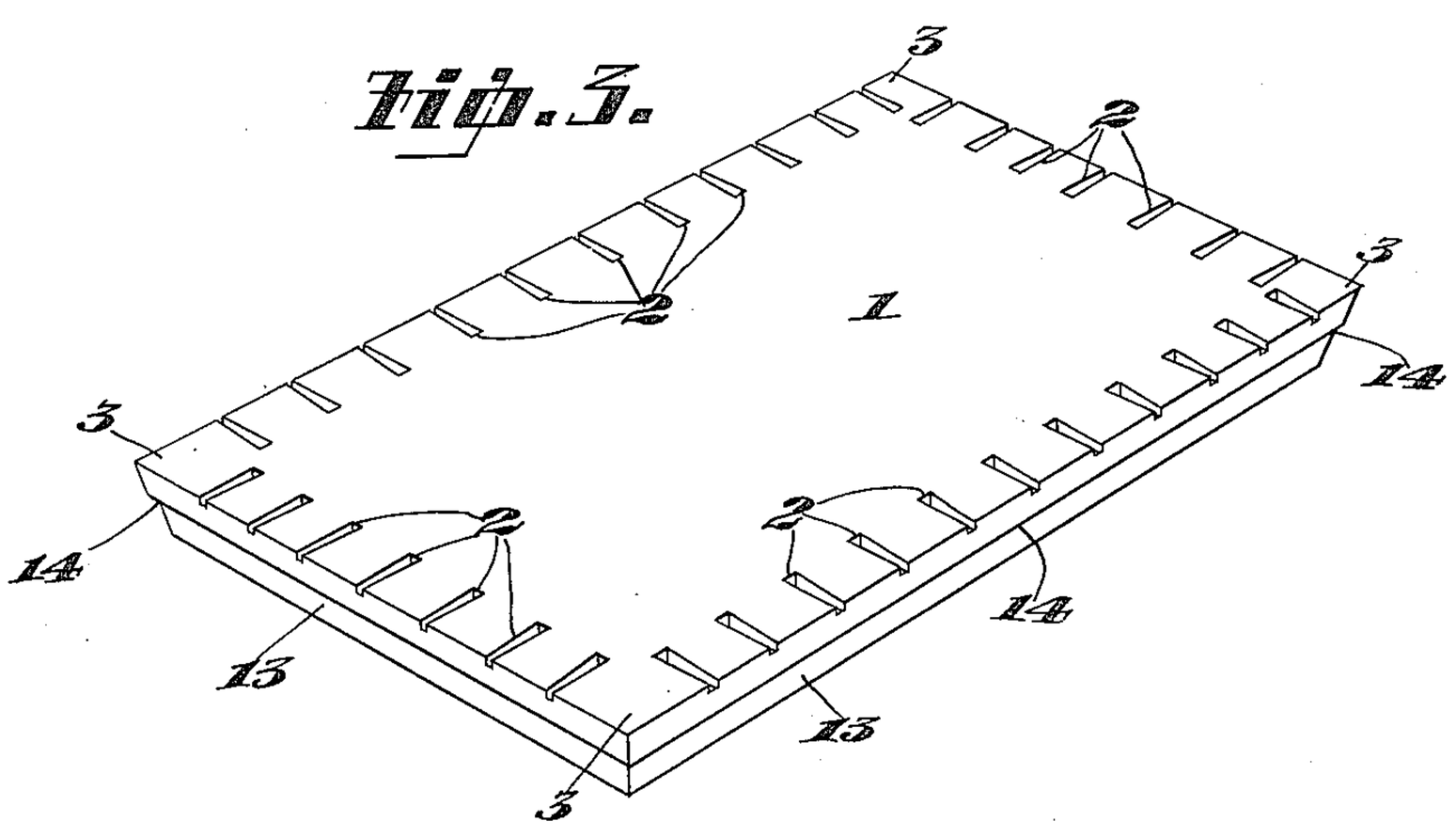
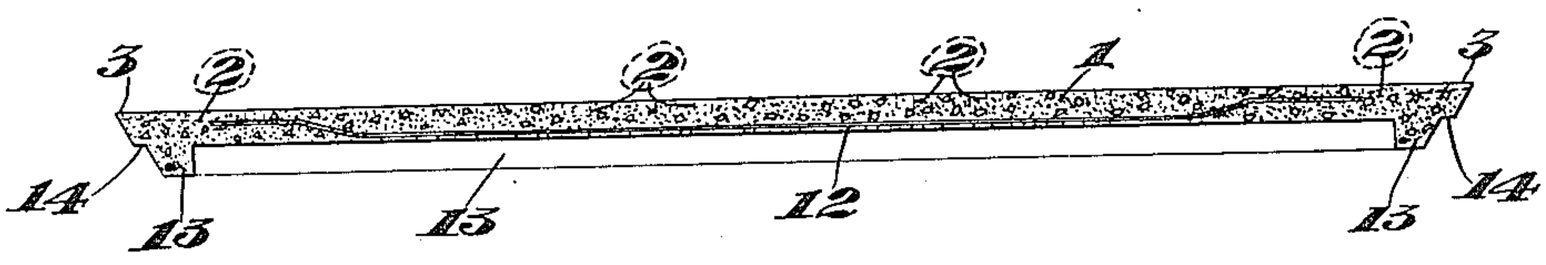


Fig. 4.



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UNITED STATES PATENT OFFICE.

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

CONCRETE CONSTRUCTION.

962,078. Specification of Letters Patent. Patented June 21, 1910.

Application filed January 9, 1909. Serial No. 471,431.

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, of which the following is a specification, reference being had therein to the accompanying drawings.

Other inventors have endeavored to obviate the inconvenience and expense involved in making large bodies of concrete, as, for instance, walls and floors, by producing slabs called slabs of concrete which are afterward joined together to form the larger areas. The strength of such concrete slabs being greater than that of bricks, ordinary building stone, or the like, and said slabs being usually of much larger dimensions than bricks, building stone, or the like, the advantage of such concrete formation has been recognized and is now well understood. While, for convenience, facility, and cheapness, it is highly desirable to utilize such concrete slabs as hereinabove mentioned, yet, in departing from the older form of concrete formation in which, for instance, an entire floor or a whole wall would be a unitary mass, the disadvantage occurs of producing a non-integral structure.

The object of the present invention is not only to retain the advantages derived from the use of concrete slabs, but, also, to conjoin those advantages with those of having a unitary structure.

Otherwise stated, this invention contemplates the formation of an integral structure from concrete slabs.

In the drawings forming part of this specification in which like numbers of reference denote like parts wherever they occur, Figure 1 is a top plan view showing a plurality of columns and a plurality of slabs, said slabs being joined together and supported by said columns; Fig. 2 is a section on the line 2—2, Fig. 1; Fig. 3 is a perspective view of a single slab; Fig. 4 is a sectional view of the same; Fig. 5 is a sectional view showing one mode of joining slabs to concrete beams, and Figs. 6 and 7, show other modifications illustrative of my invention, whereby the slabs are joined to the concrete beams.

Each slab 1 is molded with any desired configuration. In Figs. 1 to 4, notches 2 are shown indenting the edges of said slabs. The corners 3 of each slab may rest on a shoulder 4 of the cap 5 of a column 6 and against the stud 7 of such column. When the next slab 1 is similarly placed upon said column, a space 8 is left between the two slabs supported by said column. A so-called form (not shown in the drawings) is placed underneath opening 8 between the adjoining edges of said two slabs 1, and grout, or similar cement mixture or wet concrete, is poured upon said form and into said space 8 and, also, into the notches 2 in the edges of the slabs 1. The concrete or other mixture in space 8 is leveled off flush with the surface of slabs 1, and, when it sets, forms beam 9, the ends of which rest upon shoulder 4 of column 6 between the slabs 1 integrally united thereby, said beam 9 and said two slabs 1, when united thereby, thus constituting a monolithic structure. When the concrete is poured into space 8 to form beam 9, it is, also, poured or falls into the notches 2 in slabs 1 opening into said space 8, which, when set, form projections 10. The union between slabs 1 is thus strengthened, since both rest upon the same column and are united by a concrete beam which has set integrally with both, and from which, in addition, integral projections extend, which not only fit into notches in said slabs, but have, also, set in said notches. As an additional strengthening means, bars 11 may be laid in notches 2 and extending across space 8 prior to the pouring of the wet concrete thereinto to form the beam 9. Bars 11 preferably lie near the surface of slabs 1 and beams 9, because at that point the monolithic floor is supported by the columns, and the greatest stress is near the top surface. On the other hand, bars 12 are preferably embedded near the bottom surface of each slab, to prevent sagging.

In order to raise the top surface of each slab 1 a greater distance above shoulder 4, in order to enlarge the size of space 8 for the purpose of molding a larger beam, a flange 13 is provided on the under side of each slab 1, said flange being the particular part of slab 1 that rests on shoulder 4. An offset 14 projects out from the exterior face of said flange, in order that the concrete poured into the space 8 to form beam 9 may

grip same, and, when set, bind the parts more strongly together.

While Fig. 1 shows the middle slab 1 joined on only two of its edges to other slabs, yet it will be understood that the intention is that it shall be similarly joined on its four edges if it occupies a position in the middle of a floor or wall, and that if, for instance, one of its edges is adjacent a wall or floor extending perpendicularly thereto, said edge, while it can not be united to another slab extending in the same plane, will be united to a beam or, with slight changes, to a slab extending perpendicularly thereto.

A very important consideration in forming a monolithic structure of concrete slabs is that of strongly, conveniently, and cheaply uniting the various other parts of the structure to the columns. Figs. 5, 6 and 7 illustrate different means for accomplishing this object.

In Figs. 5, 6, and 7, beams, each having a different shape in cross-sectional configuration, are shown, the one illustrated in Fig. 5 being of substantially the same shape as those shown in Fig. 2, but on an enlarged scale, said beam having a shoulder 45 which abuts against offset 14 on slabs 1. Reinforcing bars 46 are embedded in the lower part of said beam, and, adjacent the end thereof, turn into upright parts 47, which connect with longitudinal parts running near the upper part of said beam, said longitudinal parts being indicated, but not shown, in the drawings.

In Fig. 6 the offsets 14 and shoulders 45 are dispensed with, and in lieu thereof the side of each slab 1 is dished to form the angular cups 48, while the beam is provided with the angular projections 49 to engage same and rest therein, being, furthermore, tied to slabs 1 by bars 50.

In Fig. 7, the flanges 51 on the bottom of beam 52 engage with the bottom of flanges 13 on slabs 1, and the sides of said slabs are so shaped as to provide a passage 53, tapering upward between said slabs 1.

It is to be understood that each form of beam is molded in a space either between the ends of two adjoining slabs or between the sides of two adjoining slabs and by filling such space with plastic concrete in the same manner as described in connection with Figs. 1 and 2.

It is to be observed that the monolithic, unitary concrete structure herein described is suitable for use not only in buildings and not only in the floors, ceilings, walls, and other parts thereof, but, also, in the construction of bridges and all other construction in which it may be desirable to use same.

In some constructions, it may be necessary to raise slabs 1 from the ground, as, for instance, to the upper stories of buildings; and, for convenience in so doing, eyelets 54, having screw shanks 55 embedded in the concrete of such slabs, are provided. When desired, internally-threaded sockets 55ª may be first embedded in the concrete of the slabs, and the screw-shanks 55 of eyelets 54 may be screwed into same at the place where the building is being erected, or elsewhere.

It is to be understood that the slabs herein 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.

One great advantage arising from the manner of constructing the building herein described resides in the fact that the slabs when placed on the columns form molds in which, with the temporary assistance of a board underlying each space between slabs, the beams are formed. The columns and beams form the frame-work of the building and constitute its structural elements. The slabs *in situ* form molds for one of said structural elements, namely, the beams, and in such manner as to unite said structural element firmly to the columns as well as to the slabs, thus producing a monolithic building.

The columns referred to herein may be either all-concrete columns, or they may be metal columns, or they may be reinforced concrete columns, as shown in Fig. 2; or they may be columns in which an ordinary metal column is surrounded by concrete, and they may, also, be of any size or shape. Furthermore, although a distinction in the foregoing description has been made between the beams 9 and flanges 13, it will be observed that when the plastic material of the beam 9 sets it is so united to flanges 13 as really to form a beam of which said flanges 13 form a part. Accordingly, the shoulder 4 on a column 6 may be made wide enough to support a beam of such enlarged width, instead of merely exceeding beam 9 in width.

It is to be understood that the reinforcing bars 12 may be located at either the upper or lower parts of the constructions in which they occur, and that they may be either straight, as shown in some figures, or bent, as shown in others, and that same may be introduced into slabs, beams, and columns, as desired. The object of bending reinforcing bars 12 in the manner shown in Fig. 4 is to provide against shear and reverse movements and in order that such reinforcement may hold its position better with relation to the concrete body in which it is embedded.

Flange 13 on slabs 1 is useful not only as providing a part of the mold for the beam 9 and also after setting of beam 9 as constituting part of the beam, but is also of utility in stiffening the slab.

It may be desirable in some constructions to omit the stud 7, so as to allow for a continuous beam, or for a greater bearing surface for same. Moreover, in various constructions slabs 1 may be joined at their corners by concrete into a unitary whole.

Having thus described my said invention, what I claim and desire to secure by Letters-Patent is:

1. A concrete structure, comprising, in combination, a plurality of columns, rectangular slabs supported at their corners upon said columns and arranged to have intervening spaces between adjacent slabs, and continuous beams molded centrally of said columns and between said slabs to form a bond between adjacent slabs and between slabs and columns.

2. A concrete structure, comprising, in combination, a plurality of columns, rectangular slabs supported at their corners to radiate from said columns and having spaces between adjacent slabs, and intersecting beams formed in said spaces to cross centrally of said columns and unite said slabs.

3. A concrete structure, comprising, in combination, a plurality of columns, rectangular slabs supported at their corners to radiate from said columns and having spaces between adjacent slabs, overhanging edges formed on said slabs, and intersecting beams formed in said spaces to cross centrally of said columns, and rest below said overhanging edges.

4. A concrete structure, comprising, in combination, a plurality of columns, a plurality of slabs supported by said columns, and having recesses extending inwardly along their horizontal edges, and beams formed between said slabs and interlocking with said recesses, and extending centrally over said columns, whereby said beams become a part of and support said slabs.

5. A concrete structure, comprising, in combination, a plurality of columns, slabs supported by said columns, and having undercut edges and recesses extending inwardly along their longitudinal sides, and beams formed between said undercut edges and projecting into said recesses and extending over said columns, whereby said beams form a part of and support said slabs.

6. A concrete structure, comprising, in combination, a plurality of columns, a plurality of slabs supported by said columns, and having recesses extending inwardly along their horizontal edges, beams formed between said slabs and interlocking with said recesses, and extending centrally over said columns, whereby said beams become a part of and support said slabs, and anchors extending transversely of said beams and into the recesses in opposing slabs.

7. A concrete structure, comprising, in combination, a plurality of columns, slabs supported by said columns, and having undercut edges and recesses extending inwardly along their longitudinal sides, beams formed between said undercut edges and projecting into said recesses and extending over said columns, whereby said beams form a part of and support said slabs, and anchors extending transversely of said beams and into the recesses in opposing slabs.

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

JOHN E. CONZELMAN.

Witnesses:
GLADYS WALTON,
EDNA J. GOCKEL.