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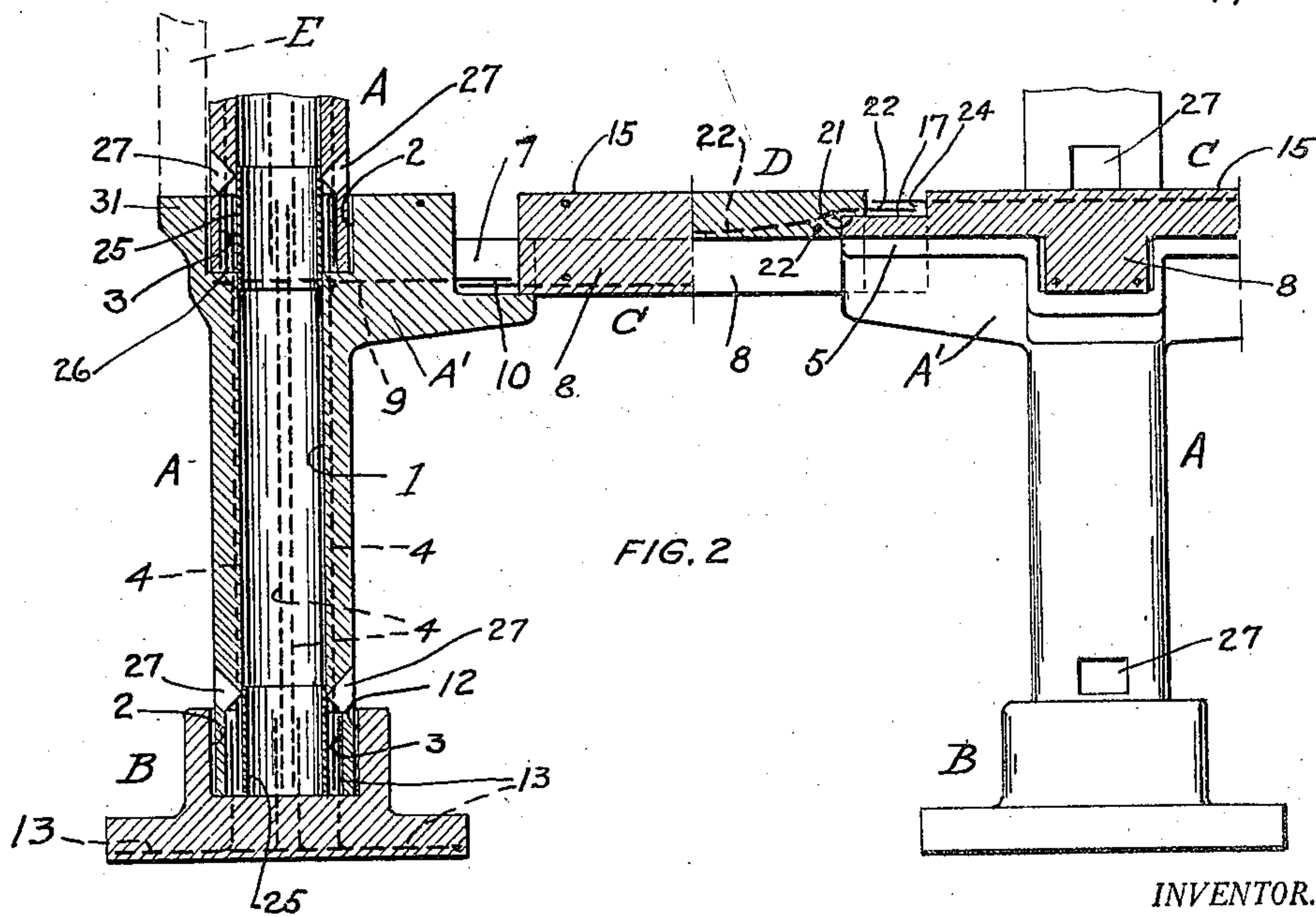
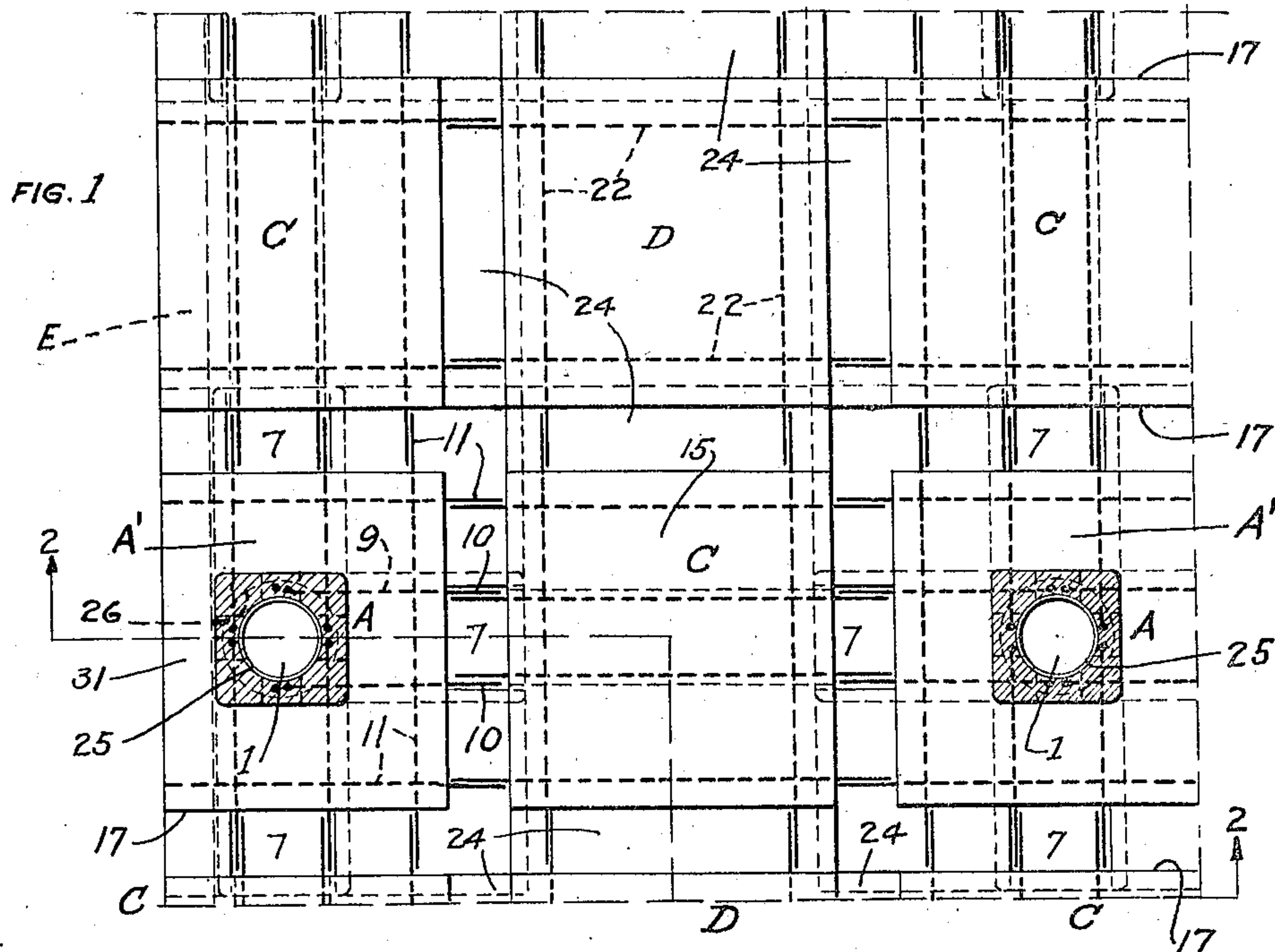
1,516,074

F. G. BORG

CONCRETE BUILDING CONSTRUCTION

Filed Oct. 16, 1922

2 Sheets-Sheet 1



Nov. 18, 1924.

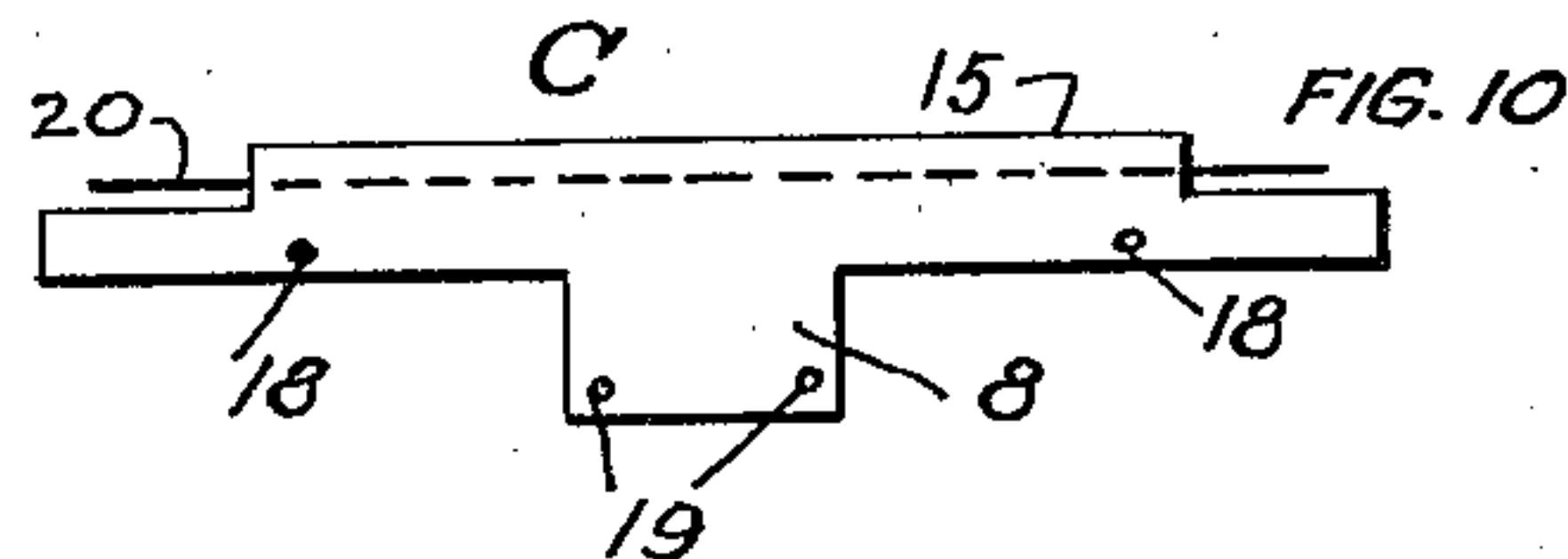
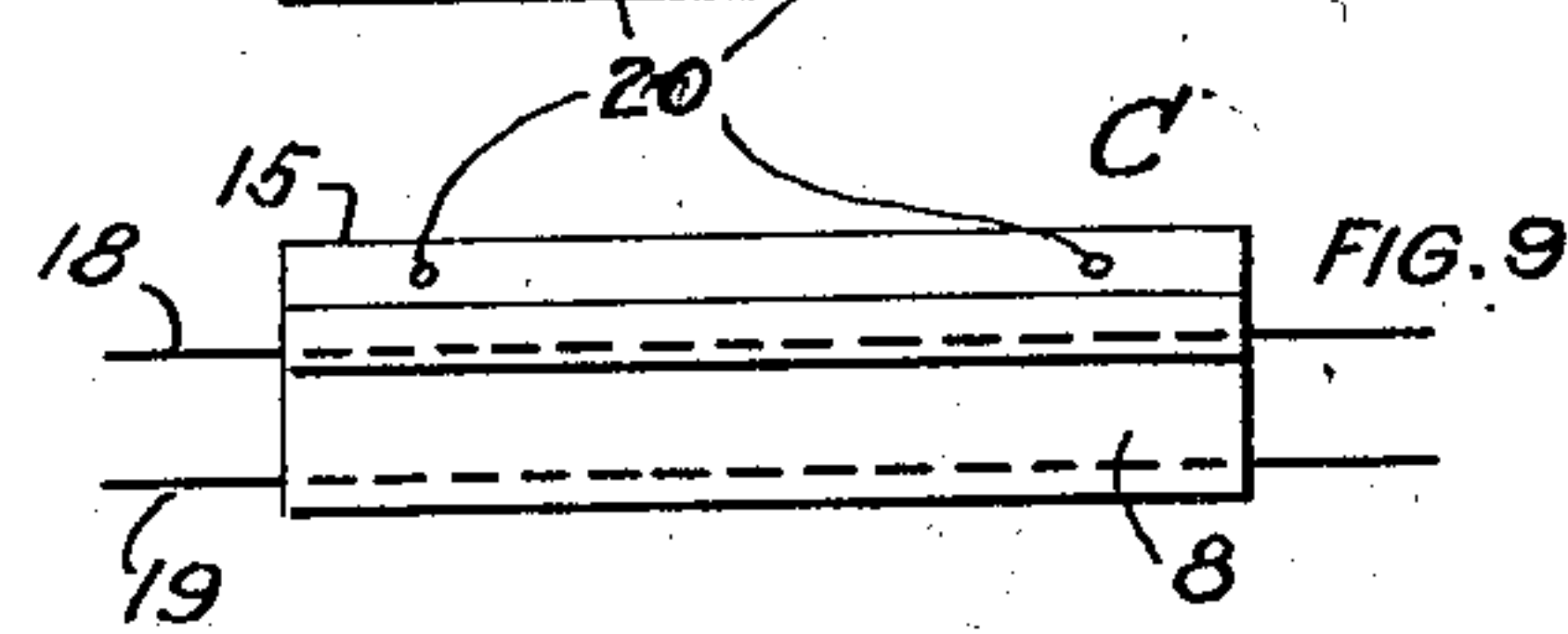
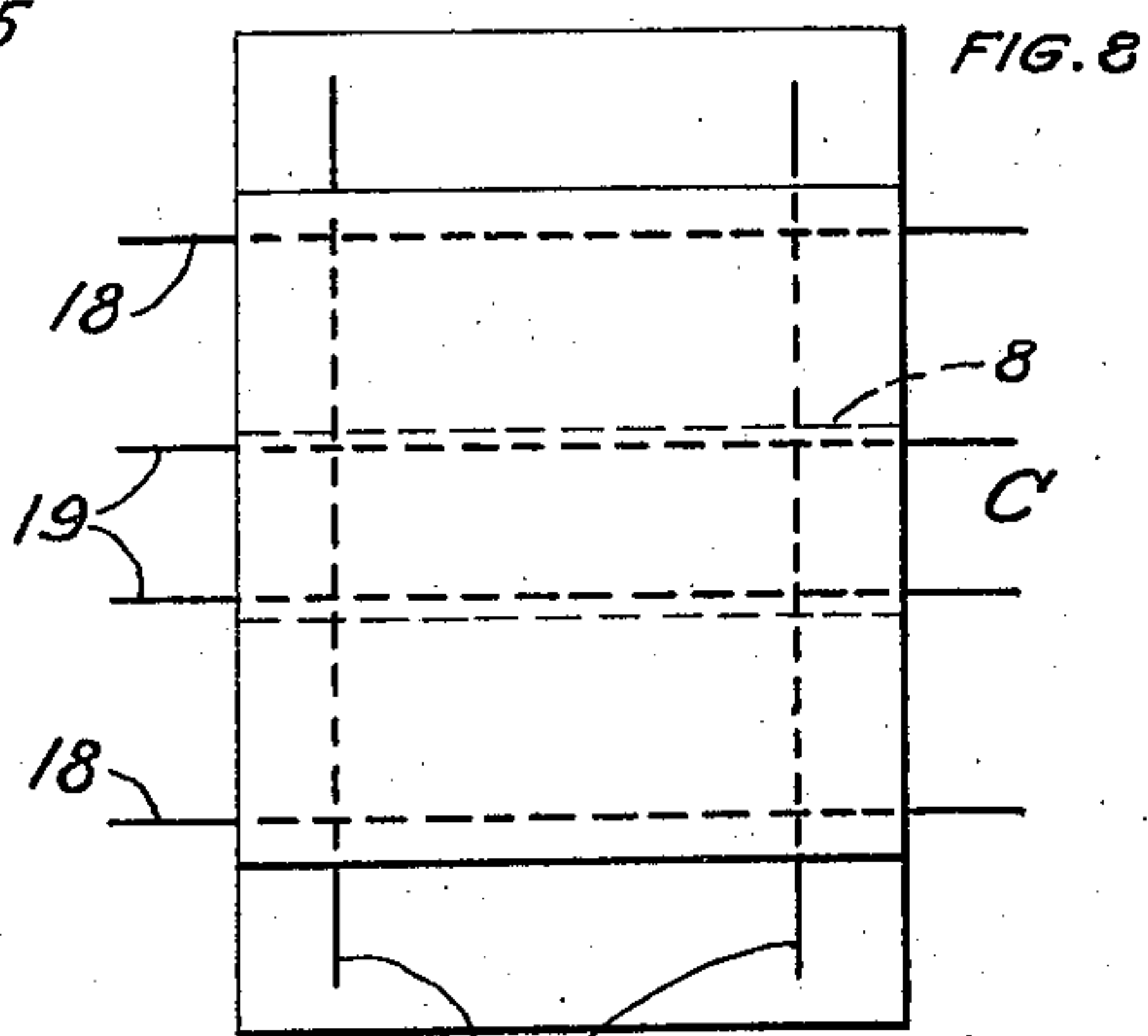
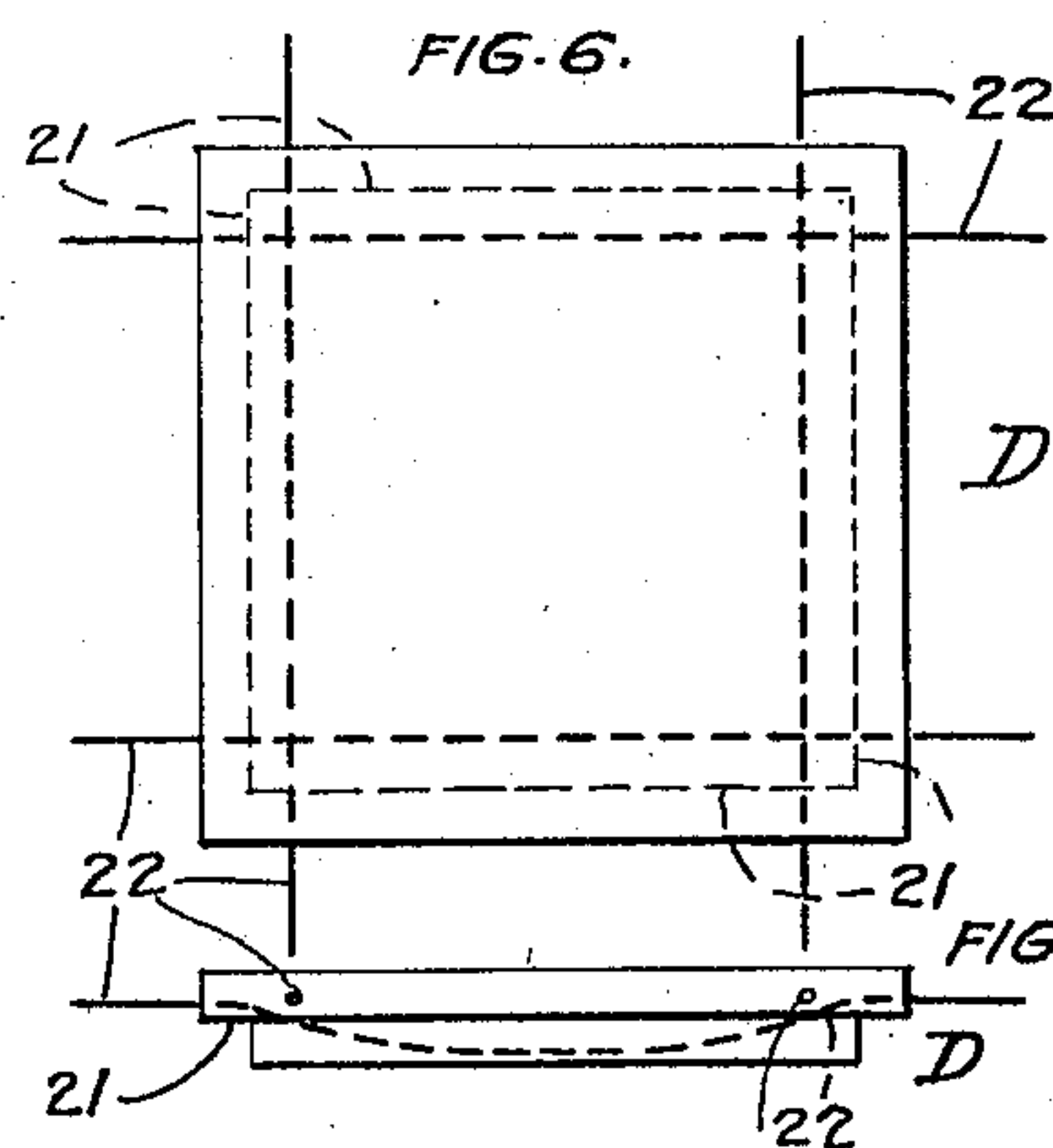
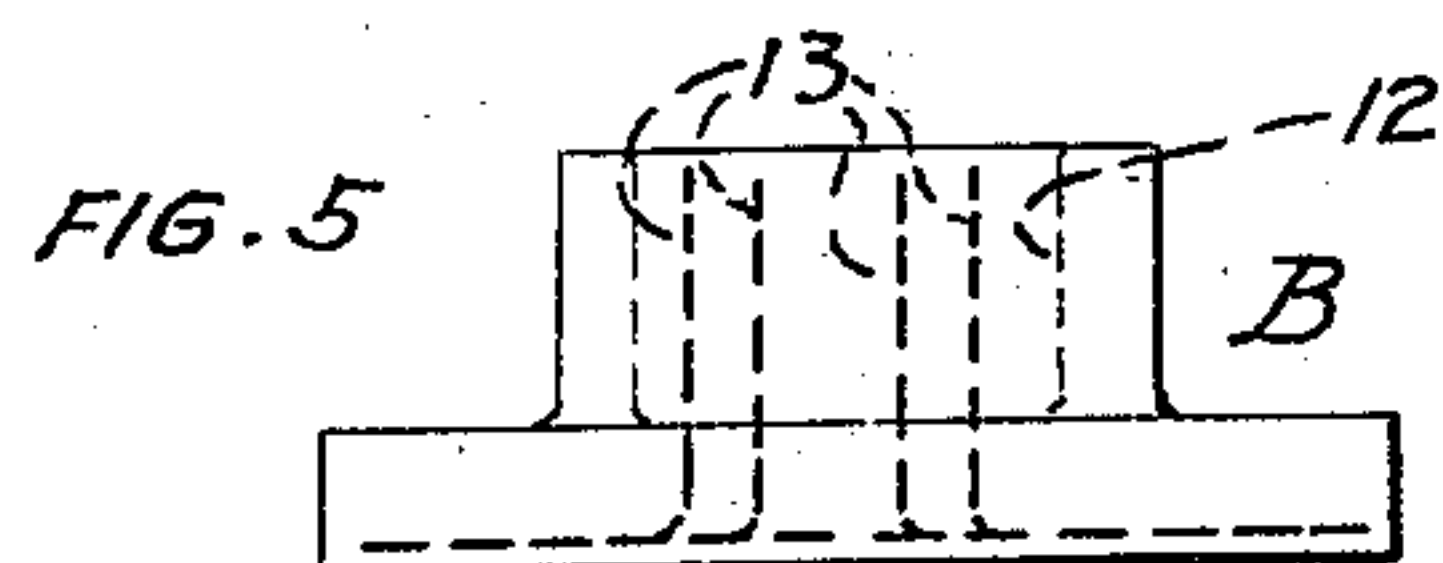
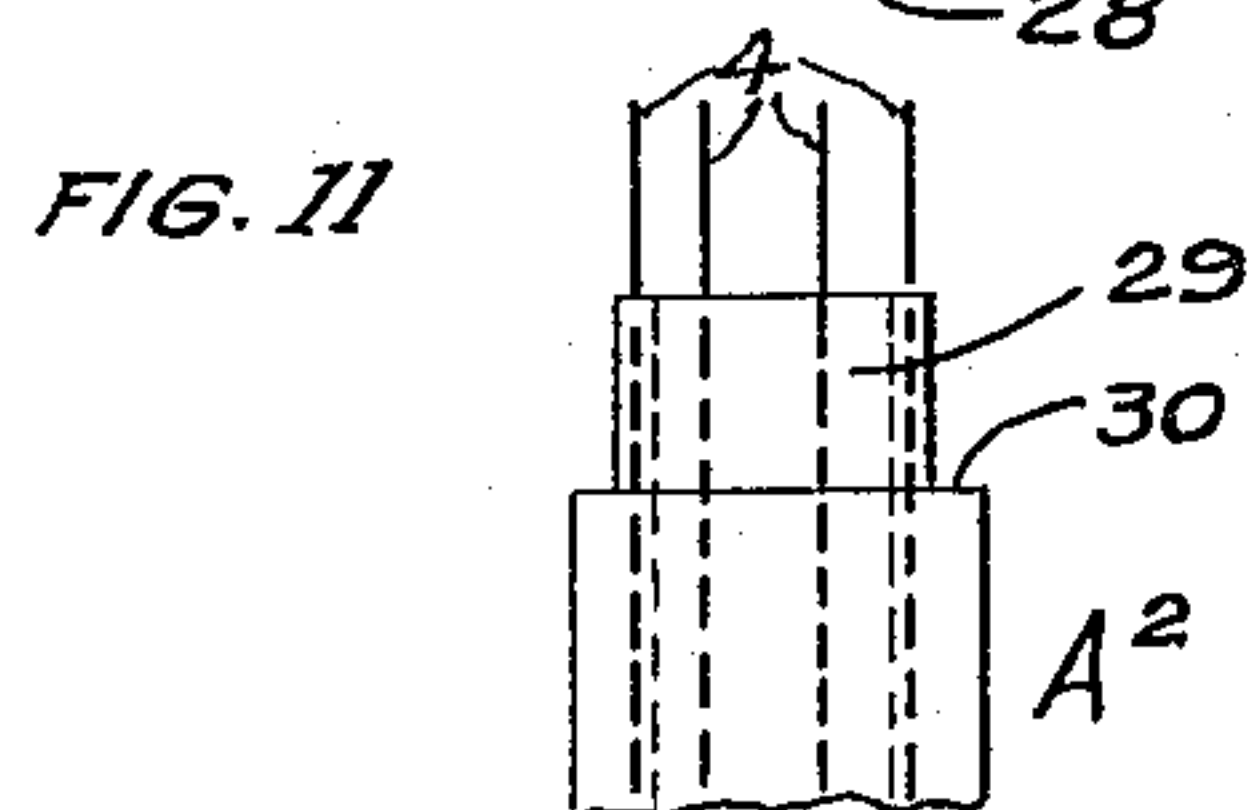
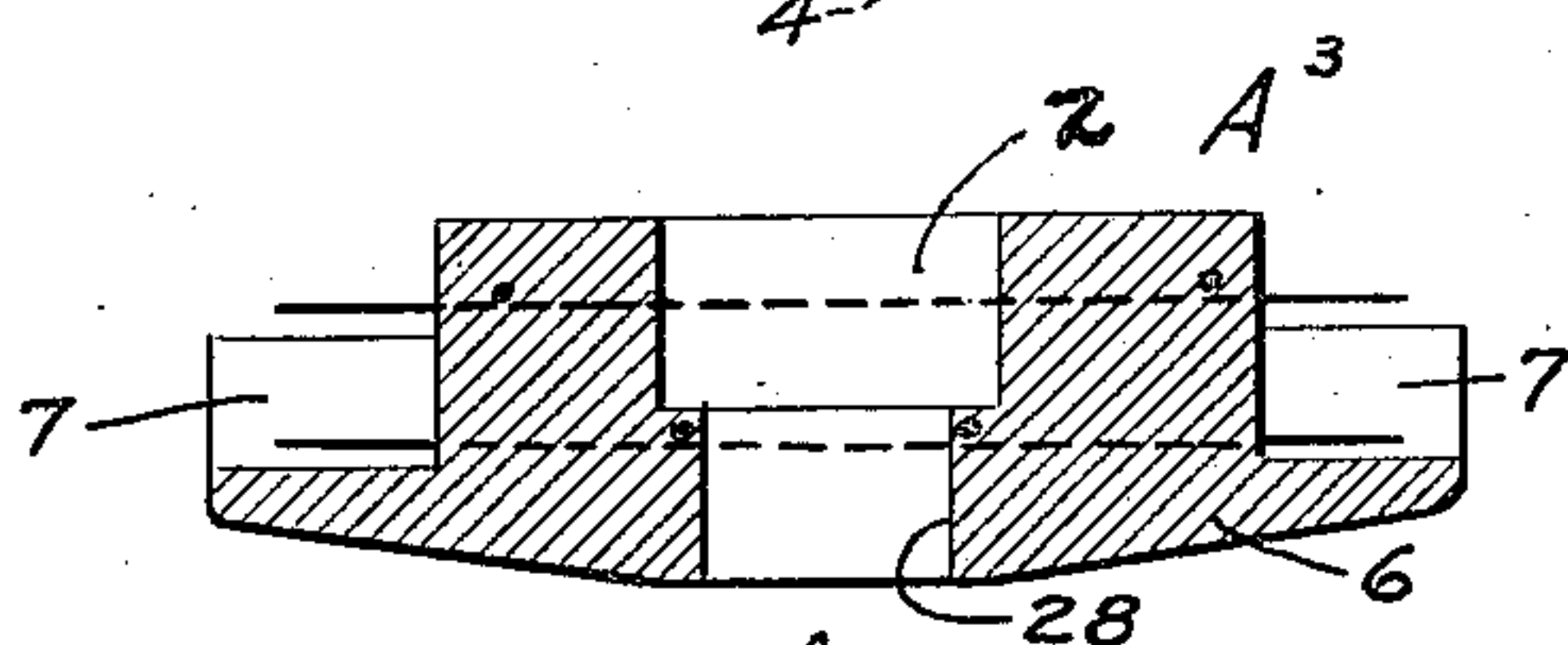
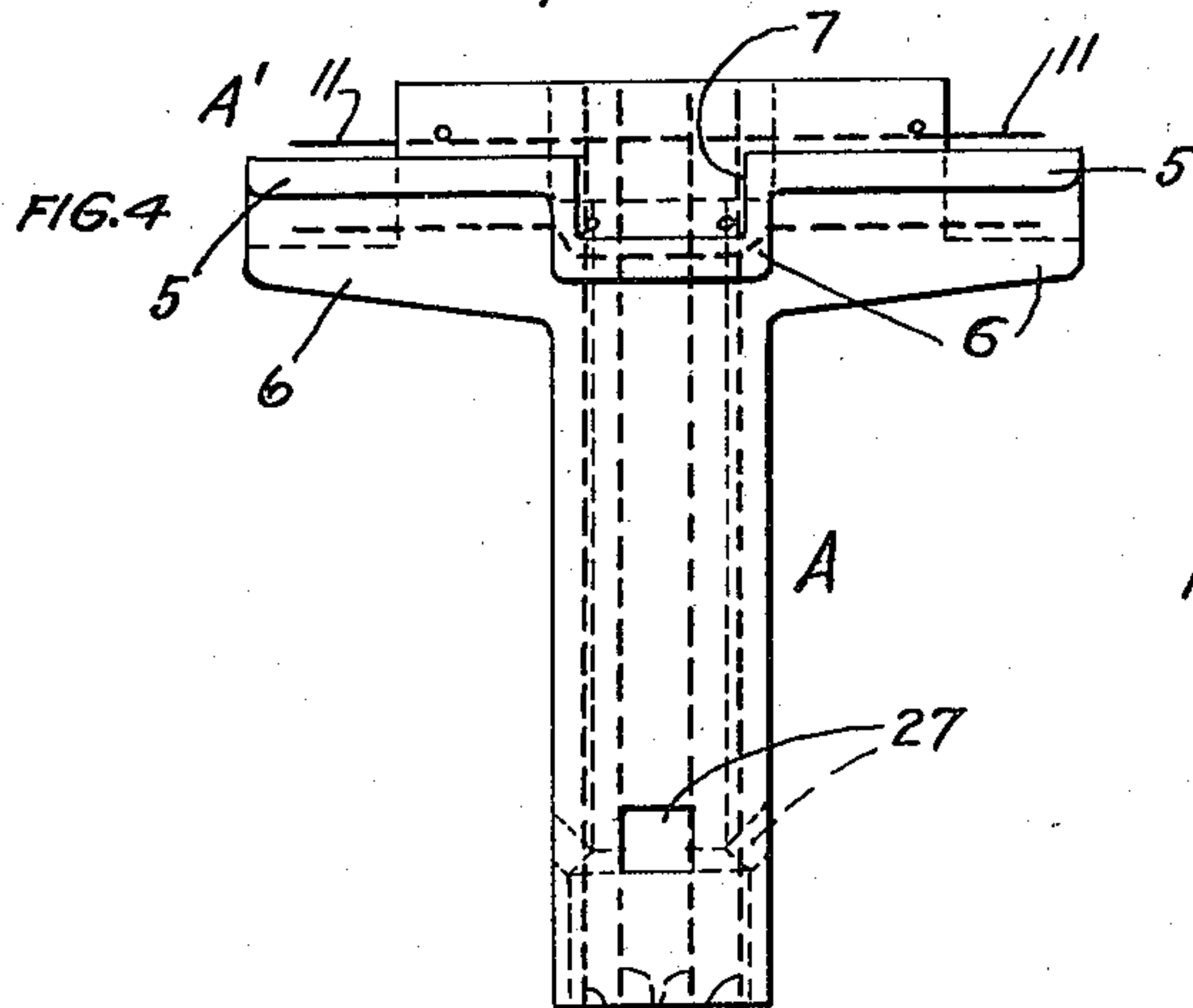
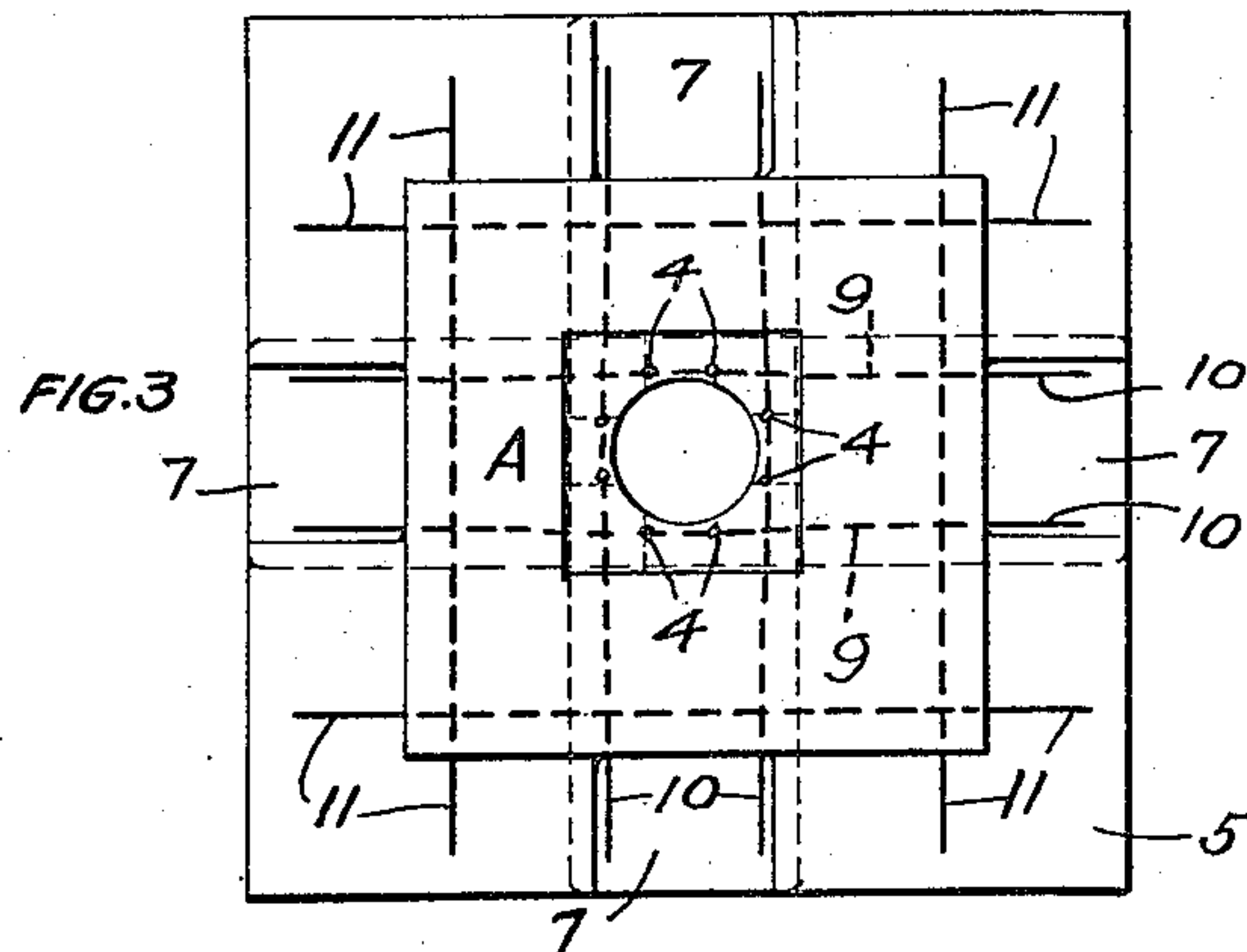
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2 Sheets-Sheet 2



INVENTOR.
FREDRIK G. BORG
BY *Gu. E. Waldo*
ATTORNEY.

UNITED STATES PATENT OFFICE.

FREDRIK G. BORG, OF CHICAGO, ILLINOIS.

CONCRETE BUILDING CONSTRUCTION.

Application filed October 16, 1922. Serial No. 594,868.

To all whom it may concern:

Be it known that I, FREDRIK G. BORG, a citizen of the United States, and resident of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Concrete Building Construction, of which the following is a specification.

This invention relates to reinforced concrete building construction.

The object of the invention is to provide a building construction consisting of separate units or elements adapted to be fabricated at a central plant or factory and shipped to and erected on the job without the use of false work or mould forms now in almost universal use in the construction of concrete structures of all kinds.

To effect the objects thereof, a construction embodying my invention and improvements comprises the various features and details of construction hereinafter described and claimed.

In the accompanying drawings, in which my invention is fully illustrated,

Figure 1 is a top plan view of a section of the floor of a building embodying my invention and improvements, illustrating the manner of assembling the units thereof, preparatory to bonding or uniting them together, the columns being shown in horizontal sections.

Figure 2 is a sectional elevation on the line 2—2 of Fig. 1.

Figures 3 and 4 are, respectively, a top plan view and a side elevation of a column forming one of the units or elevations of a building constructed in accordance with my invention.

Figure 5 is a side view of a column base forming another unit or element of a building embodying my invention and improvements.

Figures 6 and 7 are, respectively, a top plan and a side view of a floor slab which also forms a unit of a building embodying my invention.

Figures 8, 9 and 10 are, respectively, a top plan and different side views of a T-girder forming a unit of the building; and

Figure 11 is a sectional side view of a modified form of column adapted for the practice of my invention.

A structure embodying my invention and improvements comprises, as elements or units, columns designated as a whole A, supporting bases therefor designated as a

whole B, T-girders designated as a whole C, and floor slabs designated as a whole D.

Each of the foregoing parts is shown detached and in detail in Figs. 3 to 10, inclusive, and will be described separately.

As shown, the columns A are square in cross section with rounded corners and, as originally fabricated, are formed with holes 1 extending through the same from top to bottom, said holes comprising an intermediate section which is round in cross section, and enlarged upper and lower end sections 2 and 3, of which the sections 2 are adapted to receive the lower ends of superposed columns and conform substantially to the exterior size and shape thereof, while the sections 3 are designed for bonding purposes and are made relatively small in cross section as compared with the top enlargements 2 of the hole 1. As shown, both end enlargements of said hole 1 are substantially square in cross sections and have rounded corners. The exterior shape of the columns and also of the holes formed there-through is immaterial, and may be varied as desired.

Embedded in said columns and extending lengthwise thereof are reinforcing bars 4, the ends of which project into the enlarged end sections 2 and 3 of the holes formed therethrough. For reasons presently apparent, the upper ends of said reinforcing bars 4 extend a considerable distance above the tops of the columns A, while the lower ends thereof extend about flush with their lower ends.

Formed at the upper ends of the columns A, are capitals A', comprising sunken panels 5 on which, in practice, the ends of the T-girders C rest, as hereinafter more particularly described, and brackets 6 formed in the upper sides of which are recesses 7 adapted to receive the stems 8 of said T-girders.

Also embedded in and extending transversely of the capitals A' of the columns A are reinforcing bars 9, the ends of which project into the recesses 7 in the brackets 6, as shown at 10.

Still other reinforcing bars 11 are embedded in the capitals A' of said columns which extend transversely and the ends of which project from the sides of the capitals of the columns over the sunken panels 5 on all sides of said columns.

The supporting bases B for the columns

A are provided in their top sides with recesses 12 adapted to receive the lower ends of the columns A and embedded in said supporting bases are reinforcing bars 13 comprising sections which extend laterally and also upright sections the upper ends of which project into and through the recesses 12 above the tops of said bases, the relation being such that when the lower end of a column is inserted into a recess 12, the projecting upper ends of said bars will extend into the enlarged openings 3 in the lower ends of the columns A and will overlap the lower ends of the reinforcing bars 4 embedded in said columns, which project into said openings.

In a building structure embodying my invention and improvements, the tops of the capitals A' of the columns A, inside of the sunken panels 5, form parts of the floor surface.

When, in the erection of a building, the columns A have been inserted into the recesses 12 in the bases B, with the projecting ends of the reinforcing bars 4 and 13 overlapping, the enlarged sections 3 at the lower ends of the holes or openings formed lengthwise through said columns are filled with concrete in which the ends of the reinforcing bars 4 secured in said columns and the bars 13 in the bases will be embedded, thus rigidly tying or bonding said columns to their bases.

The bases B are used only for the bottom columns, upper columns being seated and secured in the recesses 2 formed in the tops of lower columns, which are of substantially the same shape and size in cross section as the recesses 12 formed in the bases B to receive the lower ends of the bottom columns.

The T-girders C comprise flanges the top sides 15 of which are flat and form sections of the floor surfaces of the building, and comprise central stems 8 on their under sides to reinforce and strengthen said T-girders so that they will be sufficiently strong to carry their own weight and the weight of the floor slabs D, which are supported thereby.

The upper lateral edges of said T-girders C, which extend parallel with the stems 8 of said girders are rabbeted, as shown at 17, and embedded in said T-girders are reinforcing bars 18 and 19 which extend substantially parallel with the stems 8 of said girders and project at opposite ends thereof. Also embedded in said T-girders and extending at right angles to the reinforcing bars 18 and 19 are reinforcing bars 20, the ends of which project into the rabbets 17.

The top surfaces of the floor slabs D are flat and form parts of the floors of the building, the lower edges of said slabs being rabbeted, as shown at 21, said slabs being reinforced and strengthened by reinforcing

bars 22 embedded therein, comprising bars which extend in opposite directions and all of which project beyond the sides of said slabs.

In erecting the building, the T-girders C are placed with their edges resting on the sunken panels 5 on the columns A with the stems 8 thereof in engagement with the recesses 7 formed in the brackets 6 forming parts of the capitals of said columns, said T-girders being of such length that spaces 23 of considerable length will be formed between the ends of said T-girders and the opposed surfaces on the capitals A' of the columns, into which the reinforcing bars 18 and 19 embedded in said T-girders C and the reinforcing bars 9 and 11 embedded in the columns A project.

In practice, the floor slabs D are placed in the spaces defined by the T-girders C supported on columns A arranged to form squares or rectangles, said floor slabs being so placed that the shoulders formed by the rabbets 21 will rest upon the shoulders formed by the rabbets 17 on the T-girders C, said rabbets 17 being so proportioned that when said floor slabs are in position, recesses or spaces 24 will be formed by the rabbets 17, into which the ends of the reinforcing bars 20 embedded in said T-girders and the reinforcing bars 22 embedded in said floor slabs will project.

After the T-girders C and floor slabs D forming the whole or any desired part of the floors have been placed in position, the spaces 23 and 24 at the ends of the T-girders C and between said T-girders and the floor slabs D will be filled with concrete flush with the top sides of said T-girders and floor slabs—that is flush with the proposed floor surface—said filling forming a body of concrete in which, when the concrete sets and hardens, the ends of the reinforcing bars extending into said spaces 23 and 24 will be embedded, thus tying or binding the different parts or elements of the structure into a single unitary structure.

In accordance with accepted practice, superposed columns are bonded together in such manner that a hole formed in part by the holes 1 in said columns, will extend continuously from top to bottom of different series of superposed columns. The holes or openings thus formed are used for installing various utilities, as water and gas pipes, electric conductors and the like.

In accordance with what I now consider to be the preferable construction, the means for bonding the bottom columns A with the bases B and superposed columns with each other, are as follows: Secured in the bases B within the recesses 12 formed therein, and in the columns A within the recesses 2 in the upper ends thereof, are thimbles 25 which are of such length that the upper

ends thereof will enter the lower ends of the intermediate sections 1 of the holes formed through superposed columns A, when the lower ends thereof are inserted into the enlargements 2 at the upper ends of the holes through said columns, the relation being such that said thimbles will define spaces 26 between their outer sides and the sides of the lower enlargements 3 of the holes through the columns A into which the overlapping projecting ends of the reinforcing bars 4 and 13 will extend.

As each column A is erected, either on a base B or on a lower column, the spaces 26 are filled with thin concrete or grout. While my invention contemplates the use of any desired method and apparatus for filling said spaces, I prefer the method whereby said concrete or grout is introduced under pressure, thereby insuring that said spaces or cavities will be entirely filled and that the concrete or grout contained therein will be in intimate contact with the reinforcing bars 4 and 13, thus insuring strong and rigid bonding joints between superposed columns.

To provide for thus concreting or grouting in the spaces or cavities 26 under pressure, holes 27 are formed through the columns A which communicate with the upper ends of said spaces or cavities. Any desired or approved apparatus may be employed for thus filling said cavities and subjecting the contents thereof to pressure, and after said spaces or cavities and the holes 27 have been filled, the exterior of the column is finished by smoothing off the concrete or grout which fills said holes or openings, flush with the outer surfaces of the columns A.

Instead of making the columns A and the capitals A' thereof integral with each other, my invention contemplates making said columns and their capitals as separate units to be united on the job.

This modification is shown in Fig. 11 of the drawings, in which A² designates the column proper and A³ the capital thereof, both of which are substantially similar to the corresponding parts of the column shown in other figures of the drawings and heretofore described, excepting that they are fabricated as separate units and the capital A³ is provided with a hole 28 which is adapted to receive a reduced portion 29 at the upper end of the column A² and which defines a shoulder 30 on the column on which the capital is adapted to rest. When connected, said modified form of column is identical both in construction, appearance and function with columns in which the columns proper and the capitals thereof are fabricated as unitary structures.

In my improved building construction, the exterior walls and partitions of the

different stories may be made of any desired or approved building material, the walls and partitions of the different stories of the building being separately supported by the outside columns of the next lower story. In accordance with my invention, the outer walls of the building indicated in dotted lines at E, Figs. 1 and 2, are supported by ledges 31 formed on the outer sides of the outside columns of the building continuous with the outer edges of the T-girders C supported between said outside columns.

After the floors have been finished by filling in the channels between adjacent structural units, partition walls may be erected wherever desired, and it is not, therefore, necessary to either show or describe the same.

I claim—

1. Concrete building construction comprising columns and T-girders initially fabricated separately, said columns comprising capitals having sunken panels and brackets provided with recesses in their upper surfaces on the sides thereof to which girder connections are to be made, and said T-girders comprising stems and flanges proportioned, respectively, to enter and rest upon the bottoms of said recesses and to rest upon the sunken panel portions of the column capitals in spaced relation to the opposed surfaces of said column capitals, forming channels, and means for connecting said column capitals and T-girders when erected, to form a unitary structure, consisting of reinforcing bars embedded in said capitals and T-girders which project therefrom into the channels between opposed surfaces thereof the ends of which overlap, whereby, when said channels are filled with concrete the overlapping ends of said reinforcing bars will become embedded therein.

2. Concrete building construction as specified in claim 1, in which the column capitals form parts of the floor structure, and the floor surface includes the portions of the top surfaces of said column capitals within the sunken panel portions thereof.

3. Concrete building construction as specified in claim 1, in which the column capitals form parts of the floor structure, and the floor surface includes the portions of the top surfaces of the column capitals within the sunken panel portions thereof and portions of the top surfaces of the T-girders.

4. Concrete building construction as specified in claim 1, in which the floor structure comprises the column capitals, the T-girders and separate floor slabs supported in the openings defined by the T-girders when erected, and the floor surface includes the portions of the top surfaces of the column capitals within the sunken panel portions thereof and portions of the top surfaces of the T-girders, said floor slabs being suffi-

ciently larger than the openings defined by said T-girders that the edges thereof will overlap and rest upon the edges of said T-girders, the upper edges of said T-girders being rabbeted, said rabbets and the thickness of the floor slabs being so proportioned that the top sides of said T-girders and of said floor slabs will be in the plane of the floor surface and will form channels between the edges of said floor slabs and the sides of the rabbets in said T-girders opposed thereto adapted to receive concrete filling for connecting said T-girders and floor slabs when erected, to form a unitary structure.

5. Concrete building construction as specified in claim 1, in which the floor structure comprises the column capitals, the T-girders and separate floor slabs supported in the openings defined by the T-girders when erected, and the floor surface includes the portions of the top surfaces of the column capitals within the sunken panel portions thereof and portions of the top surfaces of the T-girders, said floor slabs being sufficiently larger than said openings that the edges thereof will overlap and rest upon the edges of said T-girders, the upper edges of said T-girders and the lower edges of said floor slabs being rabbeted, the rabbets in the upper edges of said T-girders and the thickness of said floor slabs being so proportioned that the top sides of said T-girders and of said floor slabs will be in the plane of the floor surface and will form channels between the edges of said floor slabs and the sides of the rabbets in said T-girders opposed thereto adapted to receive concrete filling for connecting said T-girders and floor slabs when erected, to form a unitary structure, and the rabbets in the lower edges of the floor slabs fitting closely within the openings defined by said T-girders.

6. Concrete building construction as specified in claim 1, which comprises separate bases for supporting the bottom columns of the structure, said bases being provided with recesses to receive the lower ends of the columns, said columns also being provided with recesses in their lower ends, and means for connecting said columns to their bases when erected to form a unitary structure, comprising reinforcing bars embedded in said bases and columns which project into the recesses in the lower ends of said columns and which overlap, and concrete filling poured into said recesses in which the overlapping ends of said reinforcing bars become embedded.

7. Concrete building construction as specified in claim 1, in which the columns are provided with recesses in their upper ends to receive the lower ends of superposed columns, and superposed columns are provided with recesses in their lower ends, and means for connecting columns to other columns superposed thereon when erected to form a unitary structure.

8. Concrete building construction as specified in claim 1, in which the columns are hollow and are provided with recesses in their upper ends to receive the lower ends of superposed columns and also with recesses in their lower ends, the recesses in both the upper and lower ends of said columns being formed by enlargements of the holes therethrough, the recesses in the lower ends of said columns being designed to receive concrete filling for connecting adjacent superposed columns.

9. Concrete building construction as specified in claim 1, in which the columns are hollow and are provided with recesses in their upper and lower ends both formed by enlargements of the holes therethrough, and which comprises thimbles which close the inner sides of the recesses in the lower ends of said columns forming closed cavities adapted to receive concrete filling for connecting the adjacent ends of superposed columns when erected, and which also connect the hollow interiors of adjacent superposed columns providing continuous openings extending from top to bottom of a plurality of superposed columns adapted to receive various utilities.

10. Concrete building construction as specified in claim 1, in which the outer walls of each story of the building are separately supported by the outside columns which define the next lower stories and by T-girders supported by said outside columns, substantially as described.

11. Concrete building construction as specified in claim 1, in which the outer walls of each story of the building are separately supported by the outside columns which define the next lower stories and by T-girders supported between adjacent outside columns, the portions of the capitals which support said wall forming ledges continuous with the outer edges of said T-girders.

In testimony that I claim the foregoing as my invention, I affix my signature this 13th day of October, 1922.

FREDRIK G. BORG.