E. A. DURKEE & C. E. PRINCE.

CONCRETE FLOOR AND COLUMN CONSTRUCTION.

APPLICATION FILED JULY 25, 1906. RENEWED SEPT. 20, 1915.

1,238,726. Patented Aug. 28, 1917.

3 SHEETS—SHEET 1.

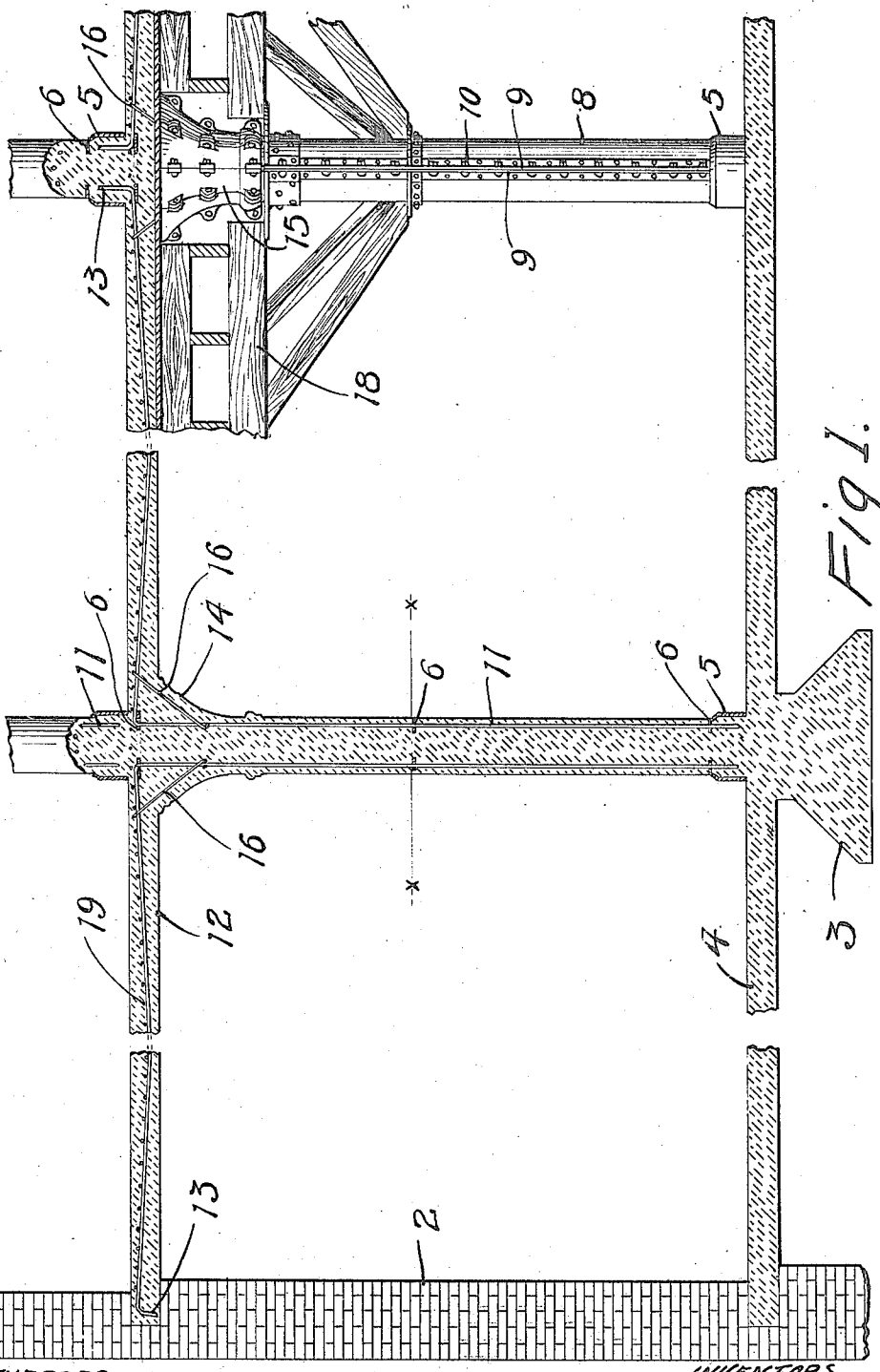



FIG 1.

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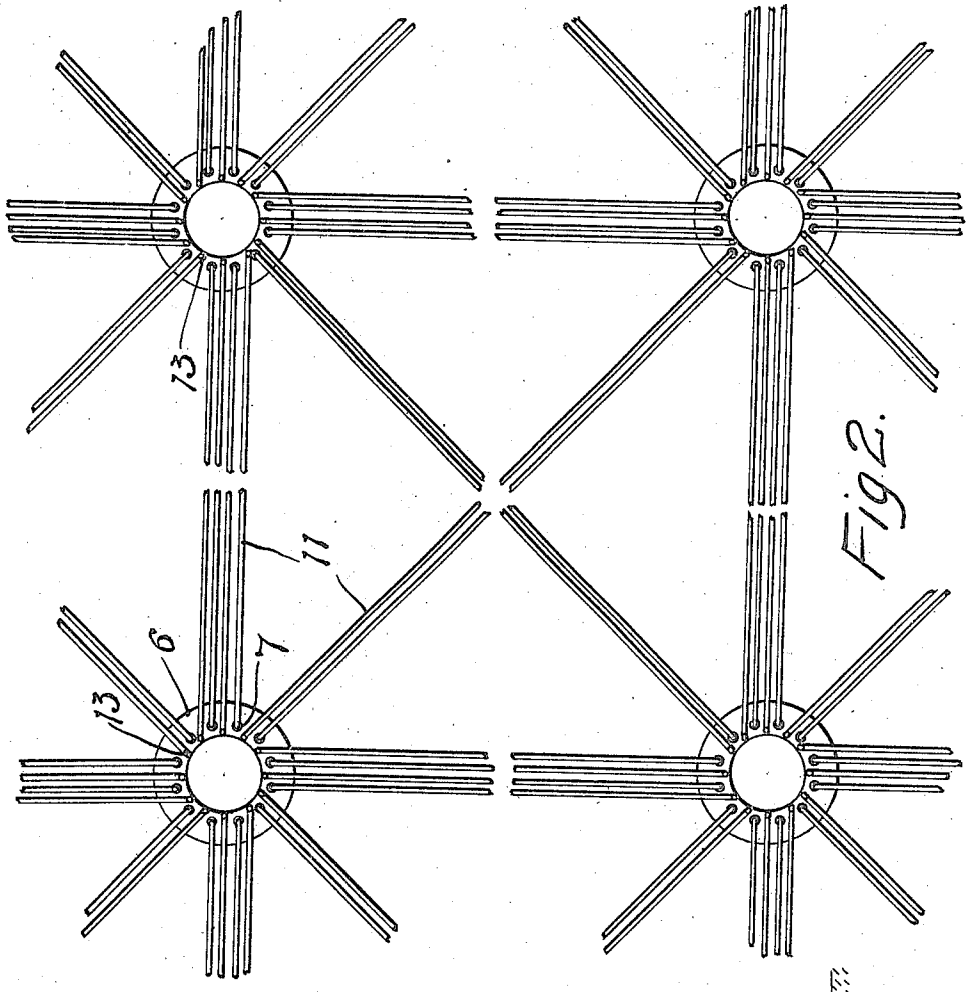



Fig 2.

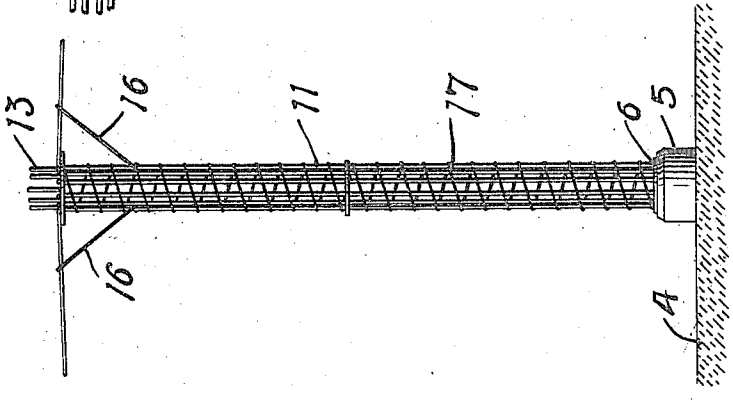



Fig 3.

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3 SHEETS—SHEET 3.

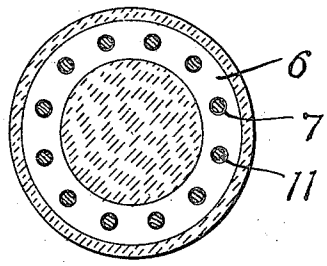



Fig 6.

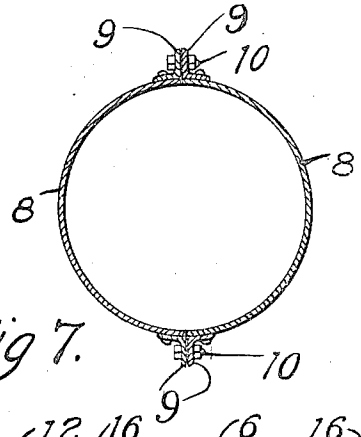



Fig 7.

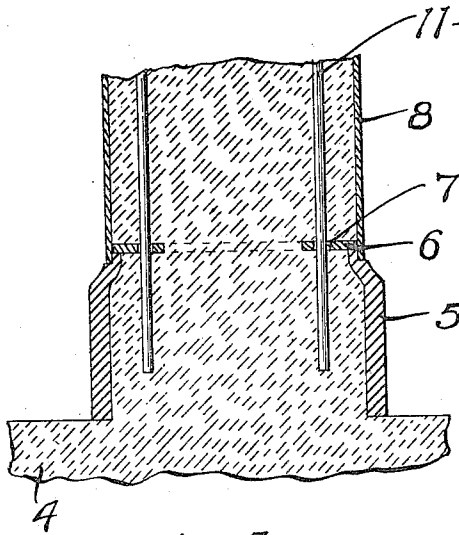



Fig 4.

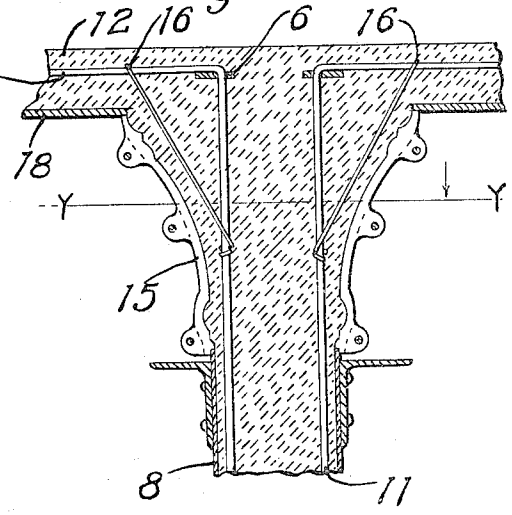



Fig 5.

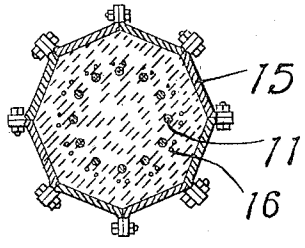



Fig 8.

WITNESSES

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# UNITED STATES PATENT OFFICE.

EVERETT A. DURKEE, OF MINNEAPOLIS, AND CLARENCE E. PRINCE, OF EXCELSIOR, MINNESOTA, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO LEONARD CONSTRUCTION COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS, AND JOHN WUNDER, OF MINNEAPOLIS, MINNESOTA.

## CONCRETE FLOOR AND COLUMN CONSTRUCTION.

1,238,726. Specification of Letters Patent. Patented Aug. 28, 1917.

Application filed July 25, 1906, Serial No. 327,721. Renewed September 20, 1915. Serial No. 51,714.

*To all whom it may concern:*

Be it known that we, EVERETT A. DURKEE, of Minneapolis, and CLARENCE E. PRINCE, of Excelsior, Hennepin county, Minnesota, have invented certain new and useful Improvements in Concrete Floor and Column Construction, of which the following is a specification.

Our invention relates to a reinforced concrete construction; and the object of the invention is to provide a floor and columns whereon the strain or weight of the load will be uniformly distributed and equalized.

A further object is to provide a floor and column construction wherein (aside from the upright columns), all depending or projecting supports, such as girders, which present an unsightly appearance and take up storage space and shut out light, are entirely eliminated.

A further object is to provide a reinforced concrete construction which will be comparatively simple and economical to erect, but very strong and capable of supporting a heavy load.

Our invention consists in the several features hereinafter particularly described and then sought to be clearly defined by the claims.

In the accompanying drawings, forming part of this specification,

Figure 1 is a sectional view illustrating the floor and columns, one of said columns being shown in vertical section to illustrate the reinforcing rods embedded therein.

Fig. 2 is a plan view showing the manner of extending the rods through the floor panels from column to column and equalizing the weight of the load thereon.

Fig. 3 illustrates the series of rods included in the column and the coil inclosing the rods and preventing their outward movement.

Fig. 4 is a detail sectional view of the base of a column.

Fig. 5 is a similar view of the top of the column.

Fig. 6 is a sectional view on the line *x—x* of Fig. 1.

Fig. 7 is a sectional view illustrating the form or mold in which the column is built up.

Fig. 8 is a sectional view on the line *y—y* of Fig. 5.

In the drawing, 2 represents the outer wall of the building shown in this case as composed of brick, and 3 is a footing arranged beneath the floor 4 and the supporting columns above. In erecting these columns a sleeve or collar 5 preferably of metal is provided upon the floor 4 directly above the footing 3. A ring 6 having a series of perforations 7 is placed upon the top of the sleeve 5 and a form 8 also composed of metal sections separably secured together by means of flanges 9 and bolts 10, is placed upon the sleeve 5 inclosing the ring 6. Rods 11 are thrust through the holes in the ring 6 into the space inclosed by the sleeve 5, and the interior of the sleeve and form is filled with concrete with the rods embedded therein and entirely concealed from view. A second ring corresponding to the ring 6 is provided near the middle of the column and another one at the top. The rods extend vertically through these rings and after passing through the upper one are turned down substantially at right angles to a horizontal position and embedded in the floor panel 12, and extended to the remote end thereof, the rods being bent so that they will be near the under surface of the panels at the middle thereof and near the upper surface at the ends as shown in Fig. 1, thereby providing a truss effect and forming a substantial brace or reinforcement for the horizontal floor. The ends 13 of the rods are turned either up or down to anchor them more securely. Some of the rods will have their horizontal ends turned up and embedded in the base of the column above and others will be turned down and embedded in the top of the column beneath. Both columns are thus locked securely and held against lateral or spreading movement. The rings arranged at intervals and through which the vertical portions of the rods pass will hold them in proper relation with one another and prevent any possibility of the strain on one rod from pulling it out of its proper position

with respect to the other rods and the column in which they are embedded. A cap 14 is formed at the top of each column within a form 15 and the vertical and horizontal portions of the rods are preferably united across the angles at the top of the columns by means of loops 16 which are embedded in the caps and serve to brace and strengthen the top of the column and form an additional support for the floor panels at this point. The forms 8 and 15 are removable from each column after its completion and may be utilized in the erection of another column. For the purpose of holding the vertical portions of the rods in proper relation with one another we prefer to provide coils 17 of a suitable gage of wire having their ends attached to the middle and top and bottom rings and wrapped around the upright portions of the rods to hold them from spreading during the erection of the column. Suitable wooden false work indicated by numeral 18 will be employed in connection with the columns and will be removed as soon as the concrete has properly set. Rods 19 forming a portion of a netting may also be used.

The truss rods as shown in the drawing, all start at the bottom of the columns and pass out at the top substantially at right angles and cross to the next column, the ends of the horizontal portion being bent and anchored either in the floor or in the base of the column next above or down into the column below. The rods are alternately arranged, that is, one rod starts at the base of one column and extends vertically therethrough and horizontally to the next column and the adjoining rod starts in the last named column and terminates at the top of the first named one. That is to say, in the embodiment of the invention, as shown in the drawing, adjacent columns are connected by pairs of rods, the elements of each pair having their vertical portions in different columns and being arranged to alternate with the elements of the other pair. At intervals around the column, the rods instead of extending straight across the floor panel to the opposite column, are run diagonally through the panel to the column on the opposite corner. The floor space is thus divided by the radiating rods into comparatively small triangular sections of uniform size and whereon the load, by the arrangement of the rods described, is equally and uniformly distributed, and we are able to avoid massing of the rods about the columns and the consequent waste of material.

A construction of this kind is not only economical and comparatively simple to erect, but it forms a very substantial structure in which no space is unnecessarily occupied by supports, and which is capable, owing to the equalization of the strain, of sustaining a very heavy load. The molds or forms for the vertical columns may of course, be varied in shape and size to produce the desired configurations of the columns.

We claim as our invention:

1. A concrete floor and column construction comprising upright concrete columns and connecting floor panels between them, and reinforcing rods in the columns and the panels, each rod being in one continuous piece and extending from the base of one column upwardly to the top thereof and thence bent laterally and extending through the panel as far as another column or wall and at such column or wall bent into alinement therewith, thus locking the columns one to the other by rods anchored at its opposite ends in separate columns or walls, substantially as described.

2. A concrete floor and column construction comprising upright columns and connecting floor panels between them, and reinforcing rods in the columns and the panels, each rod being in one continuous piece and extending from the base of one column upwardly to the top thereof and thence bent laterally and extending through the panel as far as another column or wall, said rods being arranged so that one rod starts at the base of one column and extends vertically therethrough, and thence laterally to the next column, and the adjoining rod starts in the base of the last mentioned column and terminates at the top of the first named column, substantially as described.

3. A concrete floor and column construction comprising upright concrete columns and connecting floor panels between them, and reinforcing rods in the columns and the panels, each rod being in one continuous piece and extending from the base of one column upwardly to the top thereof and thence bent laterally and extending through the panel as far as another column or wall, each column being formed with a cap at its upper end, and metal loops inclosed in said cap and connecting the vertical with the laterally extending portion of each rod to brace and strengthen the top of the column and the portion of the panel next thereto, substantially as described.

4. In a reinforced concrete structure in combination, a plurality of supports, a floor panel carried by the supports and connecting their higher ends, a plurality of reinforcing rods in each of the supports, each of said rods being extended continuously in one piece from the base to the top of the support in which it is located and thence laterally through the floor panel as far as an adjacent support, the end of the laterally extended portion of the rod being anchored in the support to which it extends and the several reinforcing rods of each support be-

ing extended through the floor panel to different adjacent supports.

5. A monolithic concrete floor and column construction comprising upright columns and connecting floor panels between them, reinforcing rods arranged in groups and extending through said panels directly and diagonally from one column to another and having their ends anchored in said columns, the anchoring portions of said rods at one end thereof extending upwardly and at the other end downwardly, substantially as described.

6. A monolithic concrete floor and column construction comprising upright columns and connecting floor panels between them, reinforcing rods arranged in groups and extending through said panels directly and diagonally from one column to another and having their ends anchored in the columns by vertical extensions at the ends of the rods, said extensions alternating with the rods constituting the groups so that the extensions will be in different columns, substantially as described.

7. A monolithic concrete floor and column construction comprising upright reinforced concrete columns and connecting reinforced concrete panels between them, reinforcing rods arranged in groups and extending through said panels directly and diagonally from one column to another, said rods extending downwardly in the upright columns to afford reinforcements thereto, and plates lying within the upright columns at the line of intersection of the panels therewith and through which pass the downwardly extending portions of the reinforcing rods to relieve the concrete of the columns of strain on the reinforcing rods at the junction of the vertical and horizontal portions thereof, substantially as described.

8. A monolithic concrete floor and column construction comprising upright reinforced concrete colmuns and connecting reinforced concrete panels between them, reinforcing rods arranged in groups and extending through said panels directly and diagonally from one column to another, said rods being extended vertically in the upright columns to afford reinforcements thereto, plates lying within the upright columns at the line of intersection of the panels therewith and through which pass the vertically extended portions of the reinforcing rods to relieve the concrete columns of strain on the reinforcing rods at the junction of the vertical and horizontal portions thereof, and diagonally extending bracing and reinforcing elements connecting the horizontally extending portions of the reinforcing rods with the vertically extending portions thereof in the upright columns, substantially as described.

In witness whereof, we have hereunto set our hands this 19th day of July 1906.

EVERETT A. DURKEE.
CLARENCE E. PRINCE.

Witnesses:
RICHARD PAUL,
J. B. ERA.

**Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."**