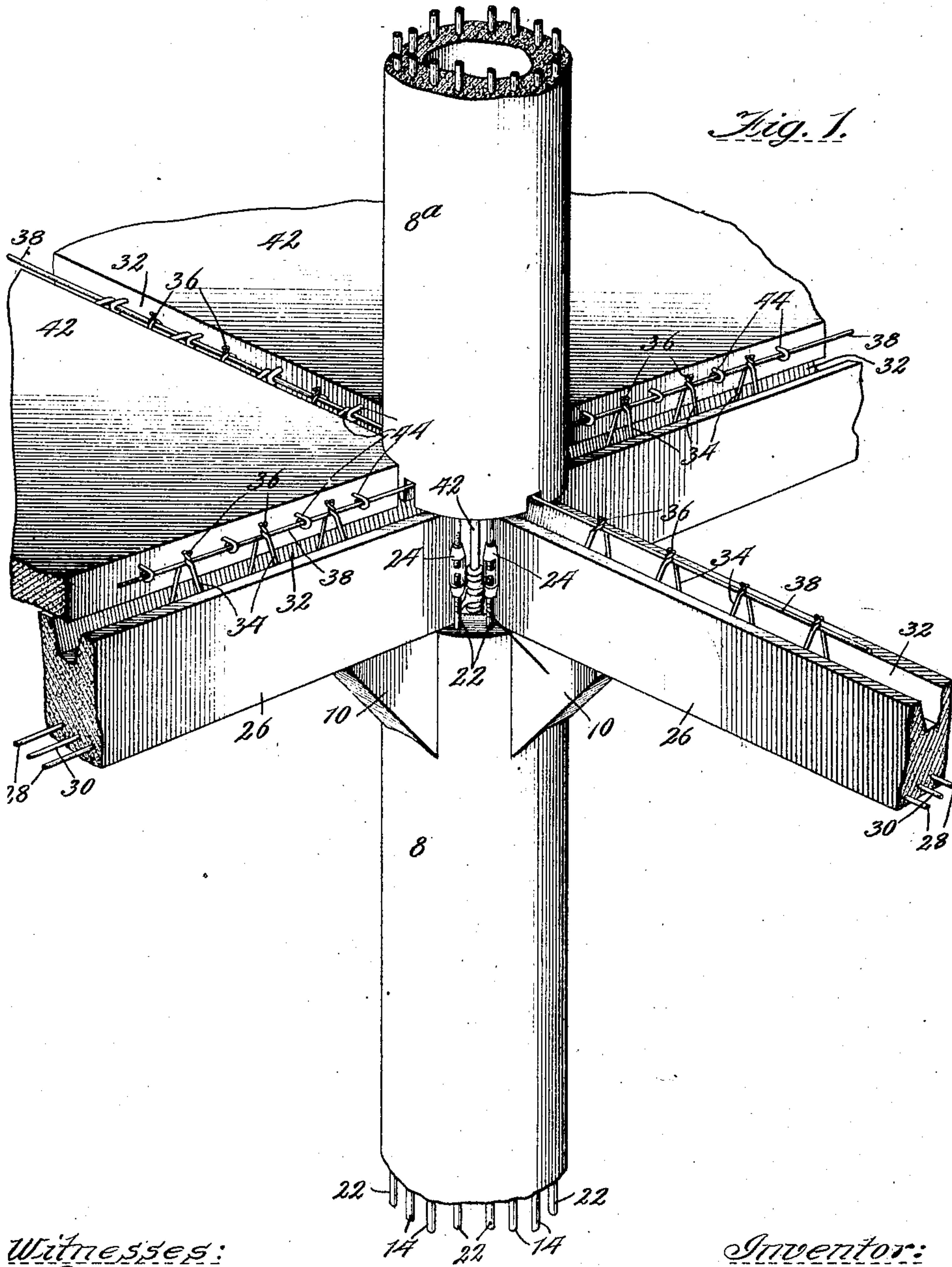


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CONCRETE CONSTRUCTION.  
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2 SHEETS—SHEET 1.



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# UNITED STATES PATENT OFFICE.

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## CONCRETE CONSTRUCTION.

938,458.

Specification of Letters Patent.

Patented Nov. 2, 1909.

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*To all whom it may concern:*

Be it known that I, CARL E. BROCKHAUSEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Concrete Constructions, of which the following is a specification.

This invention relates to reinforced concrete construction for buildings, bridges and the like, in which metallic rods are embedded in the concrete.

The object of the invention is to provide means by which parts of the building or other structure may be built in sections upon the ground or at a point some distance from the finished work and then assembled in such a way that the reinforcing rods, lying in the same plane and running in the same direction, run in practically continuous lines throughout the structure.

The invention consists in the various component parts of the structure which are built upon the ground, and in the means for uniting these parts and particularly the horizontal reinforcing rods for the purpose set forth.

The invention also consists in details of construction which will be hereafter more fully described and claimed as the specification proceeds.

In the drawings, Figure 1 is a perspective view showing the parts made in accordance with this invention in partially assembled condition; Fig. 2 is a plan view taken at the tops of the cross girders illustrated in Fig. 1; Fig. 3 is a vertical sectional detail view of the parts in partially assembled condition, and Fig. 4 is a sectional detail view on the line 4-4 of Fig. 3, showing the tie member.

In constructing the device of this invention, a plurality of hollow columns or pillars 8 are provided, having projecting from their tops at suitable points, the brackets 10. These columns are preferably made upon the ground from concrete built around spiral reinforcing wires or bands 12 and vertical reinforcing rods 14 and 22 respectively. As shown the columns are made hollow but as soon as any given column is set up in permanent position the interior hollow space is filled with concrete or other similar material 16, up to within a short distance of the top of the column, thereby leaving at the top a recess or opening 18. The rods 14 are adjacent to the brackets 10

and have their upper portions bent outwardly in the portions 20 along the lower inclined faces of the brackets thereby reinforcing and strengthening the brackets. The rods 22, which are between the brackets 10, and between each pair of rods 14 extend beyond the upper and lower ends of the column and are screw threaded so that the ends of corresponding rods in oppositely placed columns may be, when placed as shown in Fig. 1, united by turn buckles 24, as shown.

A plurality of beams 26 are provided having lower reinforcing rods 28 and 30 and the upper hollow recess 32. These beams are made of concrete, before building operations begin and are allowed to thoroughly harden before being put in place. At suitable distances along these lower rods 28 and 30 are triangular vertical metallic stirrups or tie members 34, each having its lower member passed under the rods 28 and over the rod 30, the apex 36 of the stirrups being, as best seen in Fig. 4, slightly above the top of the U-shaped recess 32 so that another rod 38 may be passed inside of the tops of these stirrups 34 and adjacent to the tops thereof, as best shown in Figs. 1 and 4. The ends of all of the rods 28, 30 and 38 are provided with loops or eyes 40, through which a connecting or locking pin 42 may pass at the center of the columns 8, heretofore described.

In assembling the device, a plurality of columns 8 are set up upon the foundations of the building at proper distances apart, the beams 24, previously prepared, are placed upon the brackets 10 of adjoining columns in such a way that, as shown, the end of each beam is opposite another corresponding beam at the opposite side of the adjacent column. The loops 40 upon opposite rods 28 are all brought into one central plane, as best seen in Fig. 3, also into approximately the same horizontal plane, so that the pin 42 may be passed through them. The central rods 30 are bent upward, preferably in the process of making the beams and before assembling begins, to the inclined position shown in Fig. 3, in which their loops are engaged by the pin 42 at or near the tops of the girders. The upper tension rods 38 are put in position with their loops 40 also engaged by the pin 42, and in close contact with the under sides of the triangular members 34. Floor members or slabs 43 previously prepared and hardened are



provided with projecting hook members 44 also engaging these rods 38, the slabs themselves resting upon the tops of the beams 26. These floor slabs are put in position, as shown in Fig. 1 and in dotted lines in Fig. 4, so that there is a space 46 between them. Another column 8<sup>a</sup> is then placed on top of the girders upon each previously placed column 8 as shown and the buckles 24 are attached to the rods 22 of both the columns 8 and 8<sup>a</sup>. The result of the work thus far done is to assemble the parts in position as shown in Fig. 1. When this condition is reached, the workmen take soft cement and fill in the recesses 34 and the spaces 46 over the tops of the beams, the space 18 in the top of the column 8, and all the space on top of the column 8 and between it and the girders 26 and the upper column 8<sup>a</sup>, molding the cement to the same diameter, as the columns 8 and 8<sup>a</sup> so that to all appearances a practically continuous vertical column is thus formed. The best way of doing this is to apply suitable formers or molds of the same diameter as the columns 8 and 8<sup>a</sup> to the outside of the columns adjacent to the beams and then simply pour the cement or grout into the above mentioned spaces and adjacent to these molds. Such molds are indicated in the drawings by the parts 48 Fig. 2. The hollow interior of the column 8<sup>a</sup> is also filled with cement up to a point near the top so as to leave a space corresponding to space 18 in column 8. When the cement thus inserted has hardened, any supporting devices which have been used, though few, or more are required, are removed and a unitary concrete structure is thus formed in which the rods 28 run practically continuously through the structure, as does also the tension rod 38, and the compression rods 30 also run continuously except for the upward reinforcing bend provided, as shown in Fig. 3, adjacent to each column. The floor members or slabs are permanently and rigidly connected to the girders and to the reinforcing rods therein, with the result that all of the parts are tied together and a very strong, rigid and unitary structure is formed.

The claims are:

1. In concrete construction, in combination with suitable columns adapted to support girders, radially arranged concrete girders resting thereon, provided with horizontal reinforcing rods in their lower portions, and tension rods in their upper portions, all of said metallic rods in all of the girders upon a given column being provided with loops lying in the same vertical plane at the center of the column, a vertical pin at the center of the column passing through

said loops and a cement filling around the pin filling the spaces between the girders and the column as and for the purposes set forth.

2. A concrete construction comprising a column, a pair of oppositely placed girders resting upon said column, a pair of reinforcing rods running horizontally of said girders near their bottoms, loops upon the ends of said horizontal reinforcing rods at the center of the column in substantially the same plane as said rods, another reinforcing rod near the bottom of each girder bent upward near its end to form a diagonal brace, loops upon the ends of said last-mentioned reinforcing rod lying at approximately the center of the column and near the top thereof, a fourth reinforcing rod extending horizontally of said girders and near the top thereof, loops at the ends of said rods in opposite girders at the center of the column, metallic stirrups passing under the first-mentioned bottom rods and over the second-mentioned bottom rod, thence above the said last-mentioned top rod, a pin passing through all of said loops at the center of the column and cement filling uniting the column and girders together and surrounding the tie rods, for the purposes specified.

3. In a device of the class described, the combination of a vertical column, a pair of opposing girders resting upon said column, reinforcing rods lying in the same horizontal plane near the bottom of each girder, a reinforcing rod near the top of each girder, stirrups joining the rods at the top and bottom of each girder, means for connecting the ends of all of the reinforcing rods in said two opposing girders together in one single vertical line at the center of the column, another column adapted to be above the first column, floor members resting upon the tops of the girders, metallic connections between the floor members and the upper reinforcing member of each girder, vertical rods in and extending from the ends of the columns, turn buckle connections between the opposite rods in the columns, and cement filling for all the spaces between the girders and the columns and between the girders and the floor members and between successive floor members whereby a unitary structure as shown and described is produced.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

CARL E. BROCKHAUSEN.

Witnesses:

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