C. W. BEVERSTOCK.

CONCRETE CONSTRUCTION.

APPLICATION FILED SEPT. 7, 1910.

1,037,416.

Patented Sept. 3, 1912.

2 SHEETS—SHEET 1.

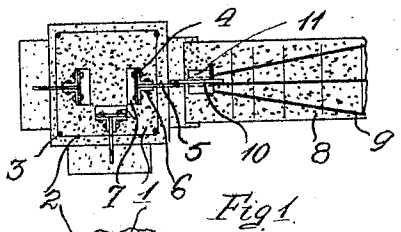


Fig. 1.

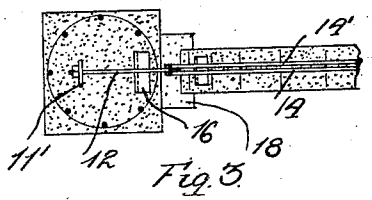


Fig. 3.

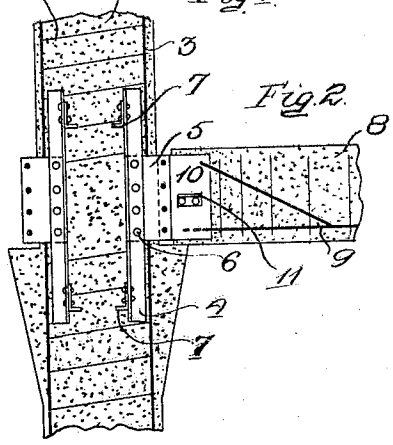
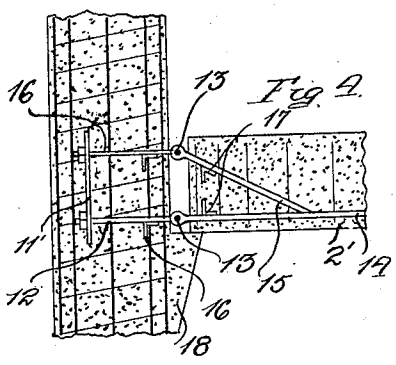


Fig. 2.



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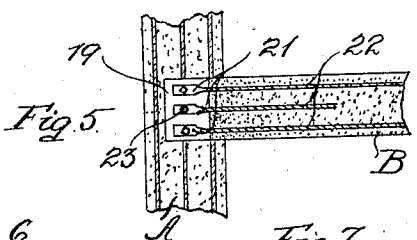

Fig. 5.

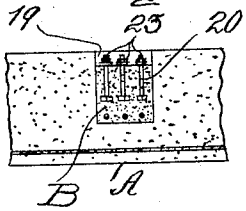

Fig. 6.

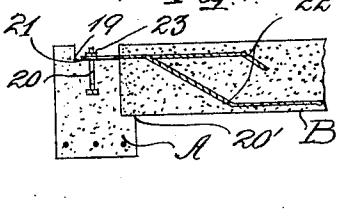

Fig. 7.

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2 SHEETS—SHEET 2.

Fig 8

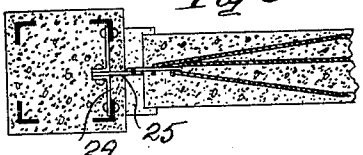


Fig 9

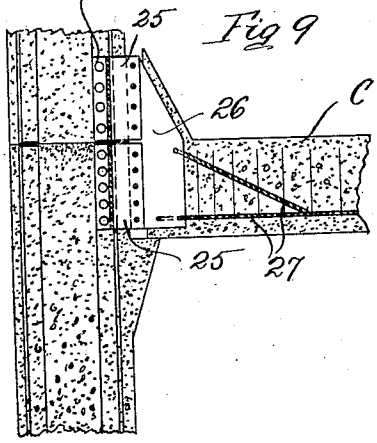


Fig. 10

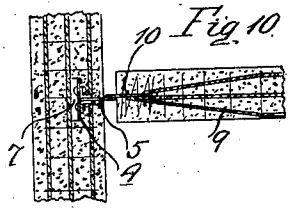


Fig. 11.

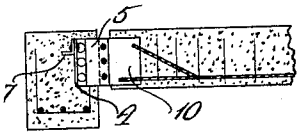


Fig. 12.

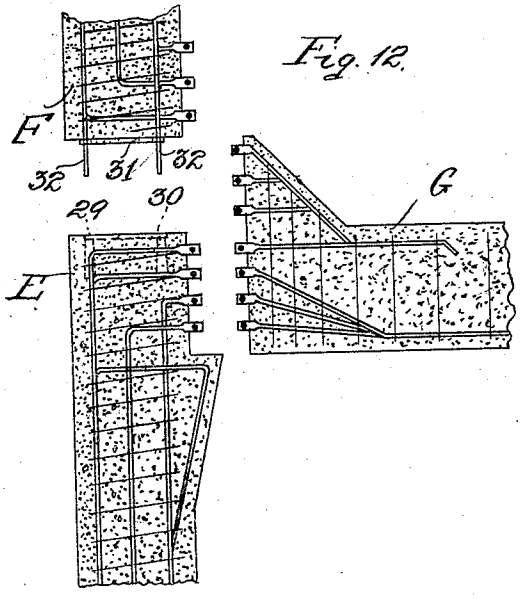


Fig 13

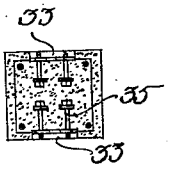
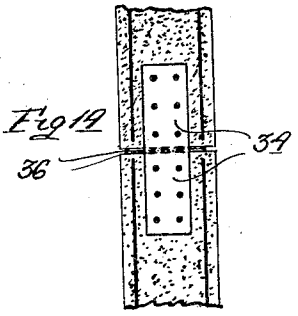


Fig 14



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UNITED STATES PATENT OFFICE.

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CONCRETE CONSTRUCTION.

1,037,416. Specification of Letters Patent. Patented Sept. 3, 1912.

Application filed September 7, 1910. Serial No. 580,933.

To all whom it may concern:

Be it known that I, CHARLES W. BEVERSTOCK, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a certain new and useful Concrete Construction, of which the following is a specification.

This invention relates to a building construction and has particular reference to a means for connecting previously prepared and cast columns, girders and beams, the objects of this invention being to dispense with molds in forming the beams, girders and columns at the place of erection of a concrete building, to avoid the delay necessarily consequent on the setting of a grout and reduce the cost by making unnecessary the use of a great amount of lumber. To this end the columns, girders and beams are previously prepared at some convenient place and then transported to their place of erection, the general form of the elements of construction being shown in the accompanying drawings in which,

Figure 1 is a plan view showing a column and a beam, each provided with reinforcements and having plates extending therefrom, which plates are then interlocked, the intervening space between the columns and beam end then being filled in with grout. Fig. 2 is a fragmentary sectional side elevation of the same. Fig. 3 is a top plan view of a modified form. Fig. 4 is a fragmentary sectional side elevation of the same. Fig. 5 is a fragmentary plan view of another modification showing a main beam provided with a recess and a shoulder, a joist resting on the shoulder and a plate for connecting the joist with the main beam. Fig. 6 is a fragmentary sectional side elevation of the main beam. Fig. 7 is a fragmentary sectional side elevation of the beam and joist. Fig. 8 is a top plan view of a column and a fragmentary plan of a beam showing plates and rods rigidly secured to the reinforcing angle irons of the concrete column, and the plates bolted together. Fig. 9 is a fragmentary sectional side elevation of the same showing in addition to the elements afore recited in connection with Fig. 8, the method of securing a beam to two adjoining columns. Fig. 10 is a fragmentary plan view of a modified form of joining a main beam with a joist. Fig. 11 is a fragmentary elevation of the same. Fig. 12 is a segregated view, showing in fragmentary elevation two adjoining columns and a girder, each having the reinforcing rods projecting beyond the sides and ends thereof respectively. Fig. 13 is a sectional plan showing a modified form of joining together two columns, and Fig. 14 is a fragmentary side elevation of the same.

Specifically referring to the drawings and particularly to Figs. 1 and 2 thereof, 1 designates a column composed of cement and reinforcing elements, in this instance comprising a wire strand 2 spirally wound about vertical reinforcing rods 3. At a convenient place in the column, preferably at that point where the jointure with a girder or beam is to be effected, a plurality of sets of bars are embedded in the concrete, these sets severally consisting of two angle irons 4. Between the angle irons of each set approximately centrally of the length thereof is inserted a plate 5 which is arranged to project beyond the side of the column, and the unit thus obtained is fastened together by bolts 6, the whole arrangement being constructed and laid in place previous to the formation of the column.

On the rear of each set of bars is fastened by means of bolts, an angle iron 7, the angle irons being disposed transversely of said bars in order to form a substantial bearing. The beam 8 is prepared in like manner as the column with the exception however that the reinforcing rods 9 are fastened to the projecting plate 10 in substantially the manner shown in Figs. 1 and 2. The said plate 10 is arranged to be bolted to the aforementioned plate 5 and is provided with angle irons 11 in order to give additional purchase on the concrete and insure rigidity of the metal with the cementitious stone. After bolting or pinning the plate 10 of the beam to the plate 5 of the column, the space intervening is grouted up, so that the beam and column become practically a reinforced monolith.

The modification illustrated by Figs. 3 and 4 embodies a structure adapted principally for end columns. The supporting means in the column for the beams comprises a vertical plate 11′, to which are fastened by means of nuts or in any other manner, two horizontal members 12, extending beyond the side of the column and hav-

ing in the ends thereof eyes 13. The beam 2′ is reinforced with three bars, 14, 14′ and 15 extending longitudinally of the same, the bar 15 lying between the bars 14 and 14′ and having its end perforated and bent upward and projecting beyond the end of the beam. The ends of the bars 14 and 14′ are also provided with perforations and project beyond the end of the beam, all of the bars 14, 14′ and 15 forming the reinforcement, being then bolted to the members 12 projecting from the column. To offset the shearing strain on the members 12, angle plates 16 are embedded in the concrete and disposed directly beneath the same near the point of connection with the reinforcing bars of the adjacent beam. A like provision is made in the beam as seen at 17. As in the former instance, the space between the column and the beam is grouted up after the connections have been made. In some instances, especially where the column is to support heavy girders, the column is provided with a skew 18 on which the concrete beam is adapted to rest, thereby additionally strengthening the support and in a measure removing the strain from the steel connections.

Figs. 5, 6 and 7 show the invention embodied in a floor construction, the main beam A being provided on the top with a recess 19 and a plurality of stud bolts 20 which are embedded in the concrete beam and project in the recess, but below the level of the beam. The side of the column is likewise provided with a recess 20′ on which is arranged to rest the end of the joist B, from which the flattened and perforated ends 21 of the reinforcing rods 22 extend. These flattened ends fit over the studbolts 20, and are then secured by nuts 23, the recess 19 in which the nuts and studbolt ends extend, being then filled with grout to form a monolithic structure.

As distinguished from the structures heretofore described, Figs. 8 and 9, while embodying fundamentally the same principle of connecting columns and beams, illustrate a different form consisting chiefly in the interlocking of the reinforcing members. The reinforcement in this instance consists of 4 angle irons disposed vertically in a cementitious column and in the corners thereof. To two of these reinforcing bars are bolted angle plates 24, which together with a steel plate 25 are fastened by means of bolts. Where one column is superimposed on another, as seen in Fig. 9, the plates 25 are provided on the upper and lower ends, respectively, of each column, and project from the sides thereof. The concrete girder C is provided with a steel plate 26 which is arranged to be bolted to the two projecting plates 25 of the columns. The ends of the longitudinally extending reinforcing rods or bars 27, which are embedded in the concrete, are secured to the said plate 26 as shown, thereby insuring the rigidity of the plate 26 in the concrete, and increasing the resisting power of vertical strains on the girder.

Figs. 10 and 11 show the same general form as Figs. 1 and 2, the application being principally to a beam and stringer.

Fig. 12 illustrates the manner in which a girder is fastened to two columns, one superimposed on the other. The reinforcing rods of the columns E and F, and of the girder G, project beyond the sides and ends thereof, respectively. When erected to position the ends are bolted and the interstice between the girder end and the column side grouted in. The column E is provided with a plurality of sockets 29 and a countersunk portion 30, in which latter a steel plate 31 carried by the column F is arranged to rest, while the projecting reinforcing rods 32 in the said column F engage in the sockets 29 of the supporting column E.

Another method of fastening together two columns, one superimposed on the other, is illustrated by Figs. 13 and 14. Two opposite sides of the columns are countersunk as seen at 33, for the accommodation of elongated steel, perforated plates 34. Embedded in the concrete columns are a plurality of bolts 35, the ends of which project in and fill up the countersunk portion. The said free ends of the bolts are arranged to extend through the perforations of the plates 34, and are then upset, or the countersunk portion housing the plate is filled in with grout. To measurably offset the crushing strain of the columns disposed end to end, steel plates 36 are interposed.

In all of the construction herein described and shown, it will be seen that the necessary elements, such as girders, columns, stringers, beams and the like, may be previously made up and then transported to the place of erection, in the same manner as steel beams and girders are prepared at the structural shops previous to uniting in the erection of a structure. Bolting and grouting then complete the skeleton forms of the building.

What I claim is:

1. A building construction consisting of reinforced concrete columns and beams, said columns having embedded therein and free of the reinforcement, angle steels severally provided with transversely disposed steel bearing members embedded in said columns and plates secured to said embedded angle steels and projecting beyond the sides of the said columns, and said beams being provided with steel plates to which are secured the reinforcements of the beams, said plates projecting beyond the ends of said beams, and having horizontally disposed steel bear-

ing members, and means to connect the projecting plates of the columns and beams.

2. A building construction consisting of preformed concrete columns and beams, said columns being reinforced by a plurality of angle irons disposed near the outside of the columns and having riveted thereto vertical L-shaped steel members, between which is riveted a steel plate slightly projecting beyond the sides of the columns, and said beams being reinforced by metallic rods which converge at the terminus of said beams, and having embedded in the ends thereof a plate which projects for a small distance beyond the ends thereof, said metallic reinforcing members being anchored in said plate, and the projecting plates of both said columns and beams being riveted together and grouted in.

3. A building construction consisting of superimposed columns and beams, said columns having vertical reinforcing angle irons, vertical L-shaped steel members embedded in said columns and riveted to two of said reinforcing angle irons and extending to near the center of one side of said columns whereby to leave a space between said angle irons, steel plates inserted between and riveted to said L-shaped steel members, the plates of two superimposed columns projecting slightly beyond the sides thereof and in alinement with each other, and said beams having extensions at the termini thereof of greater height than the said projecting plates of the said columns, plates embedded in said extensions and projecting beyond the ends of said extensions, and being of a height equal to the height to both projecting plates of said superimposed columns, said beams having horizontal reinforcing members converging toward the terminus of said beams and being fastened to said plates in the ends thereof, the plates of both of said columns and beams being riveted together and grouted in, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES W. BEVERSTOCK.

Witnesses:

F. J. McCLARY,

MELVIN H. WHEELER.