J. G. BROWN.

REINFORCED CONCRETE CONSTRUCTION.

APPLICATION FILED OCT. 16, 1913.

1,115,387.

Patented Oct. 27, 1914.

4 SHEETS—SHEET 1.

FIG. 1.

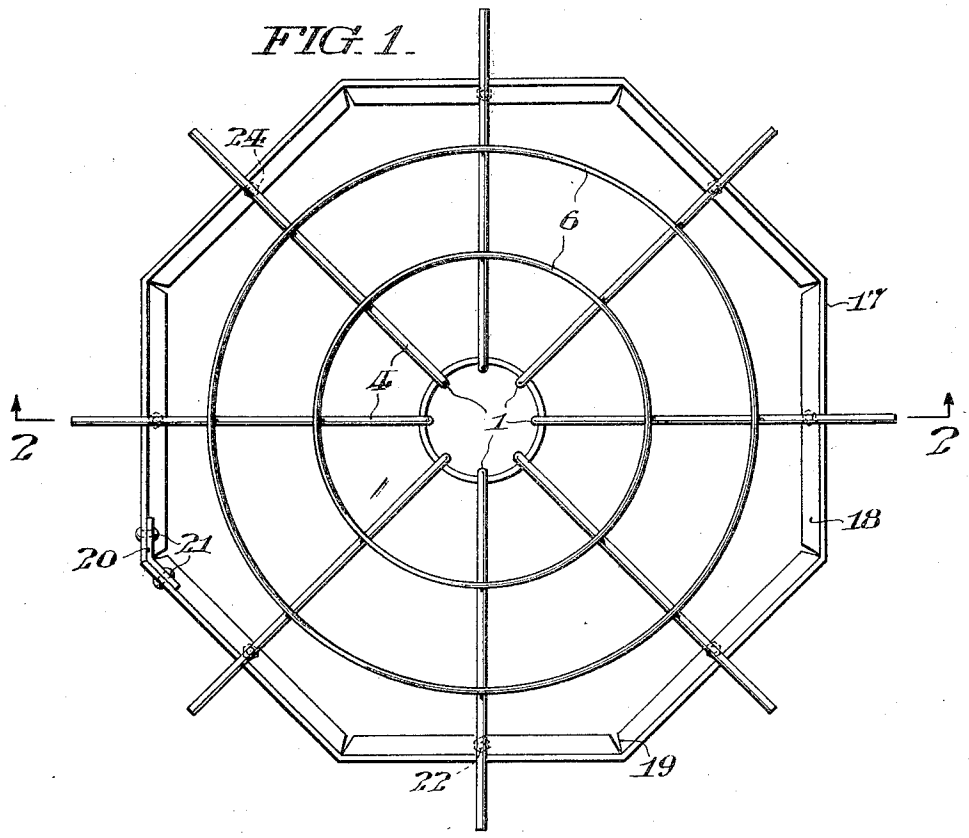
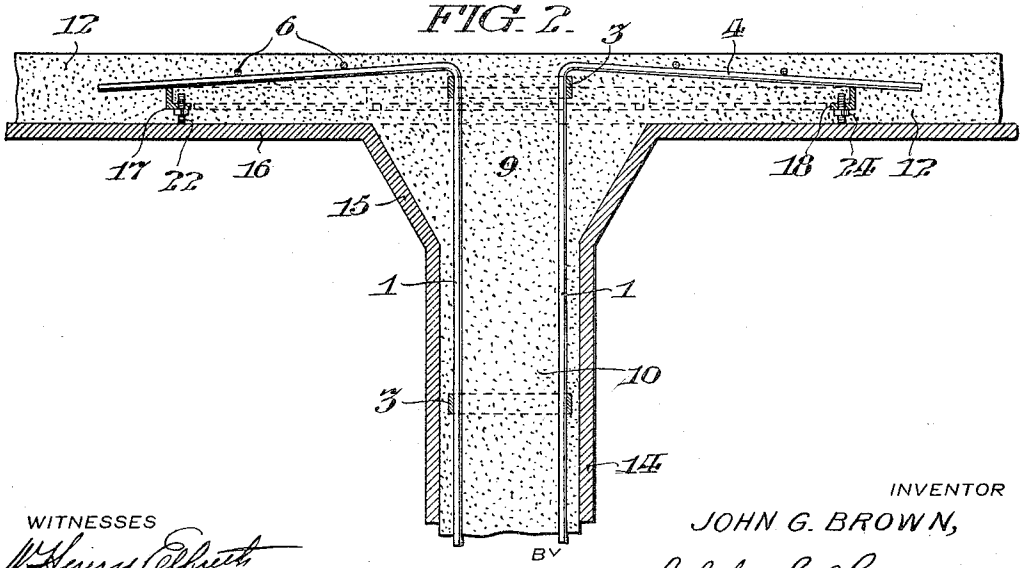


FIG. 2.



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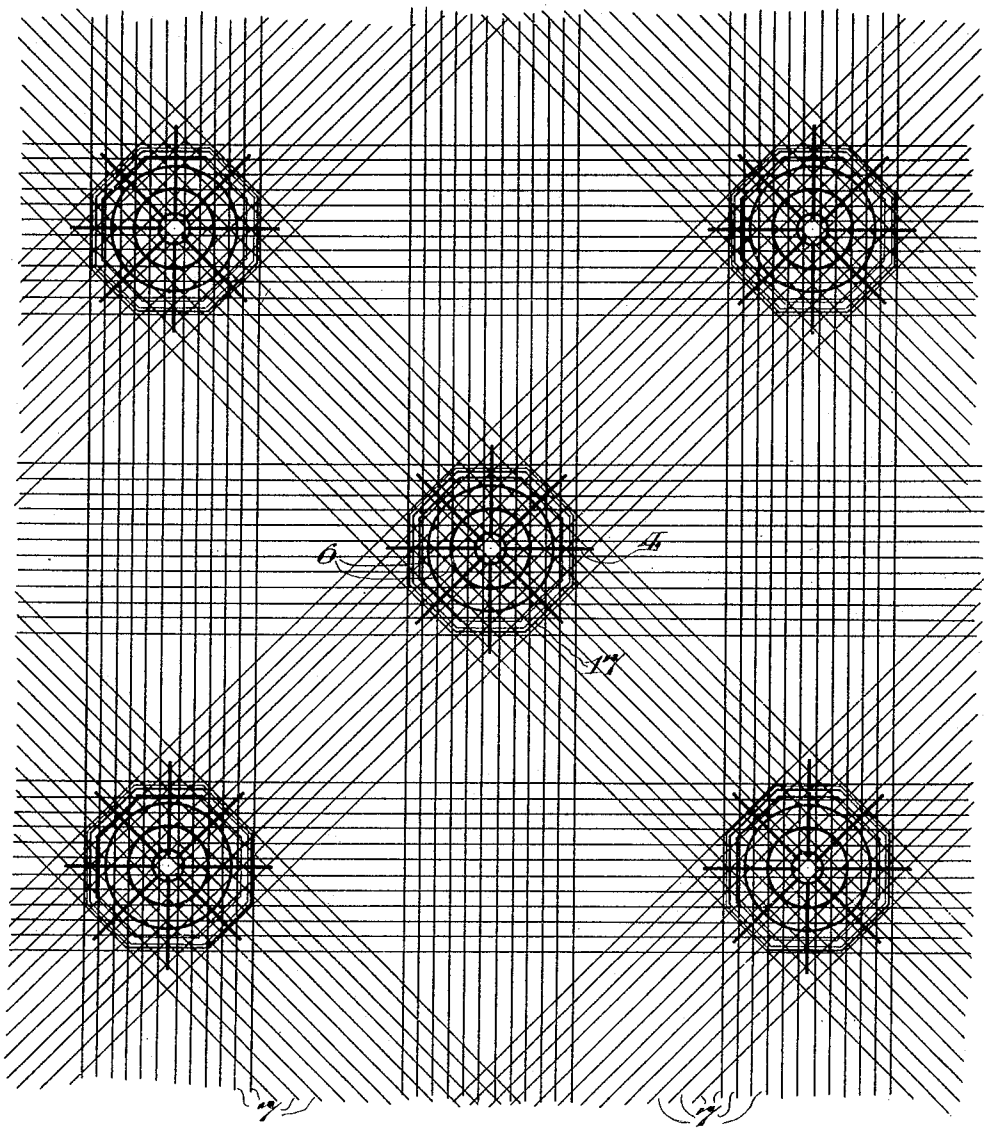
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4 SHEETS—SHEET 2.

FIG. 3.



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4 SHEETS—SHEET 3.

FIG. 4.

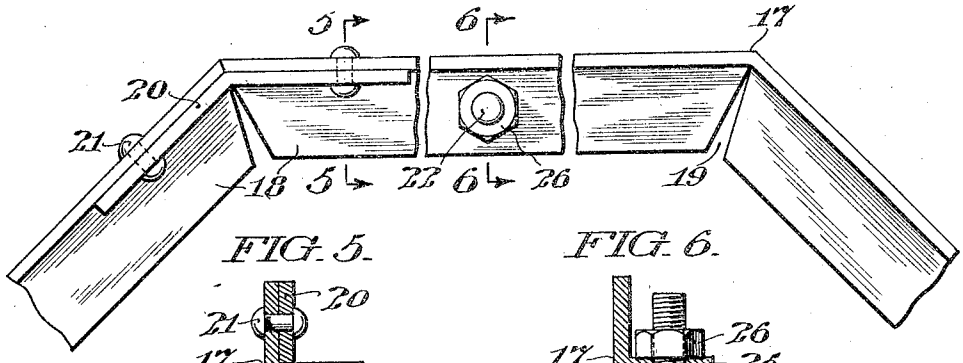


FIG. 5.

FIG. 6.

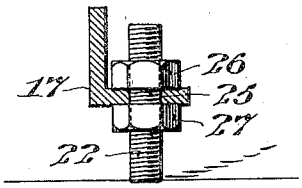


FIG. 7.

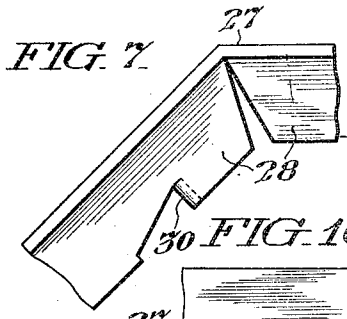


FIG. 8.

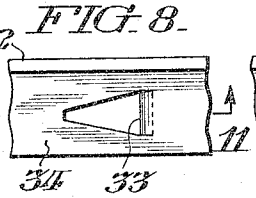


FIG. 9.

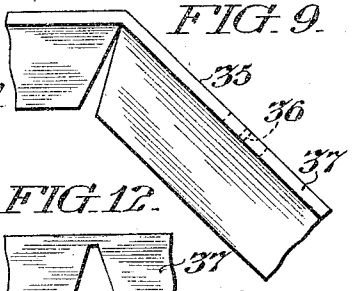


FIG. 10.

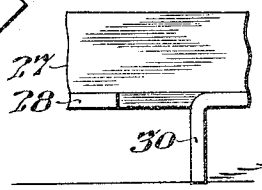


FIG. 11.

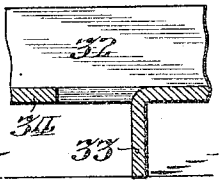


FIG. 12.

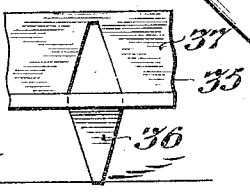


FIG. 13.

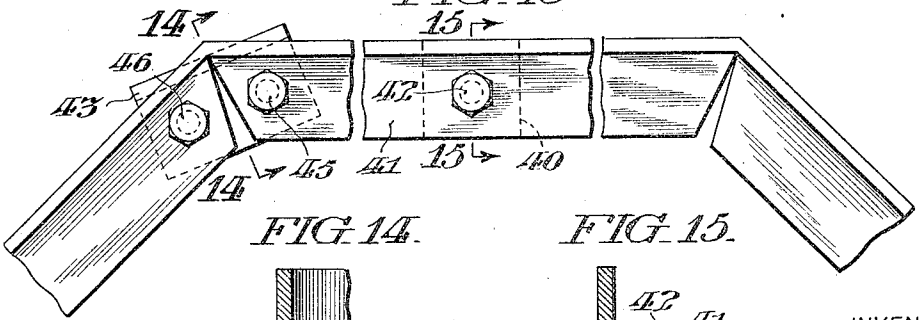


FIG. 14.

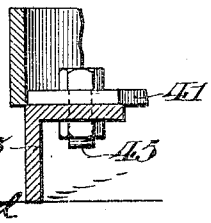
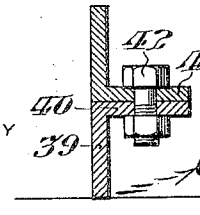


FIG. 15.



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4 SHEETS—SHEET 4.

FIG. 16.

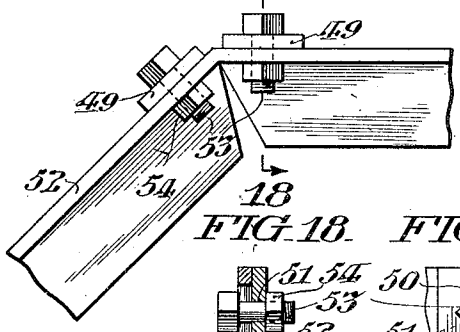


FIG. 17.

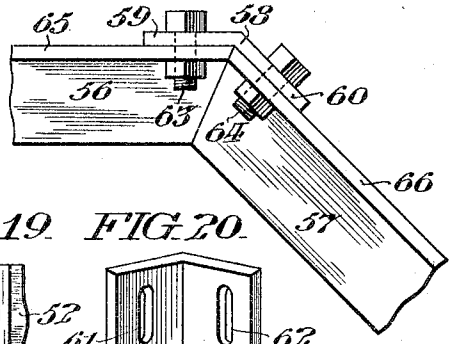


FIG. 18.

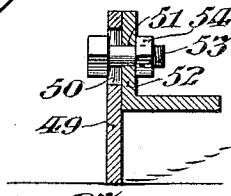


FIG. 19.

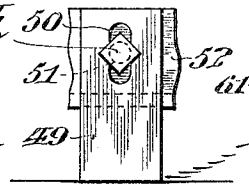


FIG. 20.

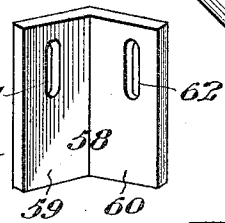


FIG. 21.

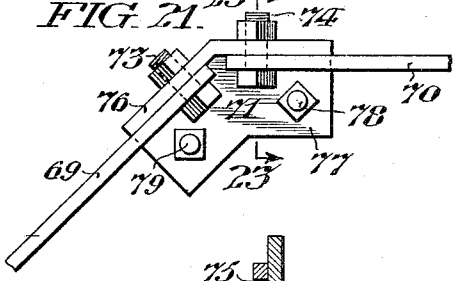


FIG. 22.

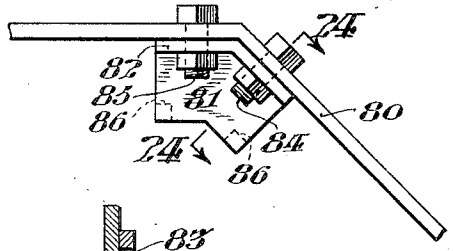


FIG. 23.

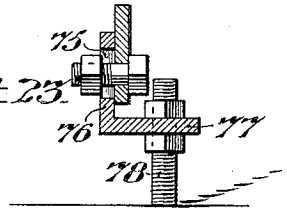


FIG. 24.

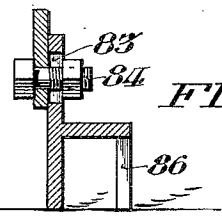


FIG. 25.

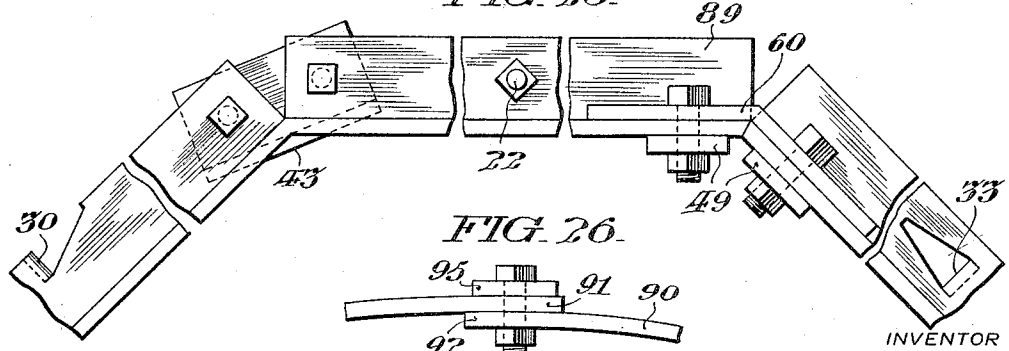


FIG. 26.

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REINFORCED CONCRETE CONSTRUCTION.

1,115,387. Specification of Letters Patent. Patented Oct. 27, 1914.

Application filed October 16, 1913. Serial No. 795,416.

To all whom it may concern:

Be it known that I, JOHN G. BROWN, a citizen of the United States, and a resident of the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Reinforced Concrete Construction, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates particularly to structures formed of concrete, and is especially directed to that class of concrete construction in which the flat floor slab is supported upon vertical columns having reinforcement, comprising members extending therethrough and radiating therefrom, and commonly known as the mush-room construction. Such concrete construction is usually formed by erecting a mold form, into or upon which the semi-liquid concrete material is poured. Prior to pouring the concrete, however, the reinforcing bars are set in the desired position, with the free ends of the radiating members spaced from the mold board which forms the ceiling. The setting of said reinforcing bars necessarily requires considerable time, and the attention of skilled mechanics.

The principal object of my invention is, to provide means which will not only greatly facilitate the setting of the reinforcing bars into registry with a selected plane, but which will also afford additional strength and uniformity to the completed structure.

My invention comprehends means for supporting the free ends of the reinforcing bars, adjustable to vary the spaced relation of said bars with respect to the mold form.

My invention also includes all of the various novel features of construction and arrangement hereinafter more definitely specified.

In the accompanying drawings, Figure 1 is a plan view of the skeleton frame of a mush-room construction, including a convenient embodiment of my invention; Fig. 2 is a central vertical sectional view of the structure shown in Fig. 1, taken on the line 2—2 in said figure, but shown associated with the mold form and the concrete filling; Fig. 3 is a diagrammatic plan view showing the crisscross reinforcing bars of the flat floor slab resting upon the reinforcing bars of a plurality of columns and spanning the space between the columns; Fig. 4 is is fragmentary plan view of the supporting structure shown in Figs. 1 and 2, greatly enlarged; Fig. 5 is a vertical transverse sectional view, taken on the line 5—5 in Fig. 4; Fig. 6 is a vertical transverse sectional view, taken on the line 6—6 in Fig. 4; Figs. 7, 8 and 9 are fragmentary plan views showing modified forms of supporting structures, embodying different types of standards; Fig. 10 is a fragmentary side elevational view of the structure shown in Fig. 7; Fig. 11 is a fragmentary vertical longitudinal sectional view, taken on the line 11—11 in Fig. 8; Fig. 12 is a fragmentary side elevational view of the structure shown in Fig. 9; Fig. 13 is a fragmentary plan view of other modifications of the supporting structure; Fig. 14 is a vertical transverse sectional view, taken on the line 14—14 in Fig. 13; Fig. 15 is a vertical transverse sectional view, taken on the line 15—15 in Fig. 13; Figs. 16 and 17 are fragmentary plan views of further modifications of the supporting structure; Fig. 18 is a vertical transverse sectional view, taken on the line 18—18 in Fig. 16; Fig. 19 is a fragmentary side elevational view, showing one of the standards in Fig. 16; Fig. 20 is a perspective view of the standard shown in Fig. 17; Figs. 21 and 22 are fragmentary plan views of still further modifications of the supporting structure; Fig. 23 is a vertical sectional view, taken transversely on the line 23—23 in Fig. 21; Fig. 24 is a similar vertical sectional view, taken on the line 24—24 in Fig. 22; Fig. 25 is a fragmentary plan view of an alternative form of my invention, embodying generally the modifications shown in the above described figures; and Fig. 26 is a fragmentary plan view of an additional modification of the supporting structure.

A typical form of "mush-room" or "flat slab" construction is illustrated in Figs. 1, 2 and 3, in which reinforcing bars 1 extend vertically in the column, through the spacing bands 3, and have extensions 4 projecting radially into the floor slab and forming a cantaliver structure upon which the reinforcing rings 6 and crisscross reinforcing bars 7 of the floor slab are conveniently supported, as shown in Fig. 3.

A mold form is provided into which the semi-liquid concrete 9 is poured to cast the

columns 10 and flat floor slab 12, and comprises the tubular column forms 14 surrounding the column-reinforcing members, and preferably having a flaring portion 15 at their upper ends merging into the ceiling mold-board 16 which underlies the reinforcing members of the flat floor slab 12, which form the cantaliver structure.

I have found that the strength of the flat floor slab construction is greatly increased when the outer free ends of the radiating extensions 4 of the reinforcing bars 1 are prevented from sagging during the setting of the concrete, and that the best results are obtained when said extensions are uniformly supported in a common plane.

A convenient support for the free ends of the reinforcing members is best shown in Fig. 2, and comprises the frame 17, preferably formed of angle-bar which, as shown in Fig. 1, has its horizontal web 18 provided with V-shaped notches 19, so that it may be bent into any desired contour, such as the octagon shown in Fig. 1, with its opposite ends abutted and suitably joined, such as by the strap 20 which may be conveniently secured thereto by bolts or rivets 21.

The frame 17, as shown in Fig. 2, is provided with adjusting screws 22, whereby it may be adjustably raised or lowered at selected regions, to vary the distance of the reinforcing members with respect to the mold-board 16, as desired.

The adjusting screws 22 may be in threaded engagement with the horizontal web 18 of the frame 17, and provided with suitable locking means, such as the jam-nut 24 shown in Fig. 2, or said screws may extend through suitably provided apertures 25 in the horizontal web 18 of the angle-bar forming the frame 17, and be provided with nuts 26 and 27 respectively disposed upon opposite sides of said web, as shown in the enlarged view, Fig. 4. While it is believed to be desirable to provide such frames with means whereby they may be adjusted vertically with respect to the mold-board, should the latter become warped or otherwise distorted from an absolutely true horizontal plane, other forms of supporting frames may be as readily employed, such as shown in Figs. 7, 8 and 9.

The form of my invention embodied in Figs. 7 to 12, inclusive, comprises a supporting frame formed of angle-bar, and having legs or standards punched from the webs of said angle-bar, and bent downwardly to uphold the angle-bar in any desired spaced relation from the mold-board, the distance being determined by the length of the legs or standards. The frame shown in Figs. 7 and 10 is formed of angle-bar 27, whose horizontal web 28 is slitted obliquely inward from its free edge to form the leg or standard 30 which, as best shown in Fig. 10, is turned downwardly. The frame shown in Figs. 8 and 11 is formed of angle-bar 32, having the leg or standard 33 punched from its horizontal web 34 intermediate of its edges and turned downwardly, as best shown in Fig. 11. The frame shown in Figs. 9 and 12 is formed of angle-bar 35, having the leg or standard 36 punched from its vertical web 37 and turned downwardly at the intersection of the respective webs of said angle-bar, as best shown in Fig. 12.

The form of my invention shown in Figs. 13, 14 and 15, comprises a frame formed of angle-bar such as illustrated in Fig. 4, and, as best shown in Figs. 14 and 15, may be provided with legs formed of comparatively short lengths of angle-bar inverted, the leg 39, which may be disposed intermediate of the corners of the frame, having its horizontal web 40 secured to the horizontal web 41 by the bolt 42. The leg 43, which is adapted to support the corners of the frame, is similarly secured by the bolts 45 and 46.

As shown in Figs. 16 to 20, inclusive, the legs for holding the supporting frame spaced from the mold-board may be formed of sheet metal, and may conveniently provide for vertical adjustment of said frame with respect to said mold-board. The frame shown in Fig. 16 is formed of angle-bar similar to the frame shown in Fig. 4, and is provided with legs or standards 49 having longitudinally extending slots 50 in registry with apertures 51 in the vertical web 52 of said frame, through which apertures and registered slots the adjusting bolts 53, having the nuts 54, extend, said bolts being obviously adjustable in said slots. The frame shown in Fig. 17 may be formed of separate pieces 56 and 57 of angle-bar, having their beveled ends abutted and joined by the leg or standard 58, shown in Fig. 20, which has the angularly related webs 59 and 60 respectively provided with longitudinal slots 61 and 62, in which the bolts 63 and 64 which extend through the vertical webs 65 and 66 of the angle-bar pieces 56 and 57, may be adjusted.

The form of my invention depicted in Figs. 21 to 24, inclusive, comprises a frame formed of strap metal which is carried by chairs formed of cast metal or stampings. In Fig. 21 separate pieces 69 and 70 of strap metal are adjustably connected to the chair 71 by bolts 73 and 74, which extend through slots 75 in the vertical web 76 of the chair whose horizontal web 77 is adjustably spaced from the mold-board by the screws 78 and 79. The frame shown in Fig. 22 is formed of strap 80, which is adjustably carried by the chair 81 having the vertical web 82 provided with slots 83, through which the bolts 84 and 85 extend, for securing said strap frame in adjusted position to the chair. Said chair is also provided with legs 86.

In Fig. 25 is shown a frame wherein the

horizontal web 89 is extended exterior to the frame, and in which the various forms of carriers above described are embodied.

The structure shown in Fig. 26 comprises a circular frame formed of strap 90, having its ends 91 and 92 overlapped, and secured by the bolt 93 to a standard 95, such as is shown in Fig. 19.

My invention aims primarily to provide a frame for supporting the free ends of the reinforcing bars in a predetermined relation to the plane of the floor, and the various illustrations shown are typical ways of accomplishing the desired result, and although the vertical webs of the angle-bars are shown extended upwardly, they may be as readily inverted.

I do not desire to limit my invention to the precise details of construction and arrangement herein set forth, as it is obvious that various other modifications may be made therein without departing from the essential features of my invention as defined in the appended claims.

Having thus described my invention, I claim:

1. In reinforced concrete construction, the combination with a plurality of elbow-rods in the form of an inverted L, having their vertical legs extended outwardly, of a frame supporting the free ends of the horizontal legs in a common plane, and a plurality of independently adjustable members carrying said frame and having means arranged to be adjusted to vary the vertical position of said frame at selected regions.

2. In reinforced concrete construction, the combination with a plurality of reinforcing rods forming a cantaliver structure, of a frame for supporting the free ends of said rods and comprising a vertical web upon which said rods rest, a horizontal web, and standards carrying said frame and having adjustable means engaged with said horizontal web to vary the position of said frame.

3. In reinforced concrete construction, the combination with reinforcing rods forming a cantaliver structure, of a frame for supporting the free ends of said rods, and comprising supporting bars connected in adjustable relation with a plurality of connecting members, means for adjustably engaging said bars with said connecting means, and adjustable standards for said members, having means for varying the position of said frame.

In witness whereof, I have hereunto set my hand this 11th day of October, A. D., 1913.

JOHN G. BROWN.

Witnesses:
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CLIFTON C. HALLOWELL.

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