

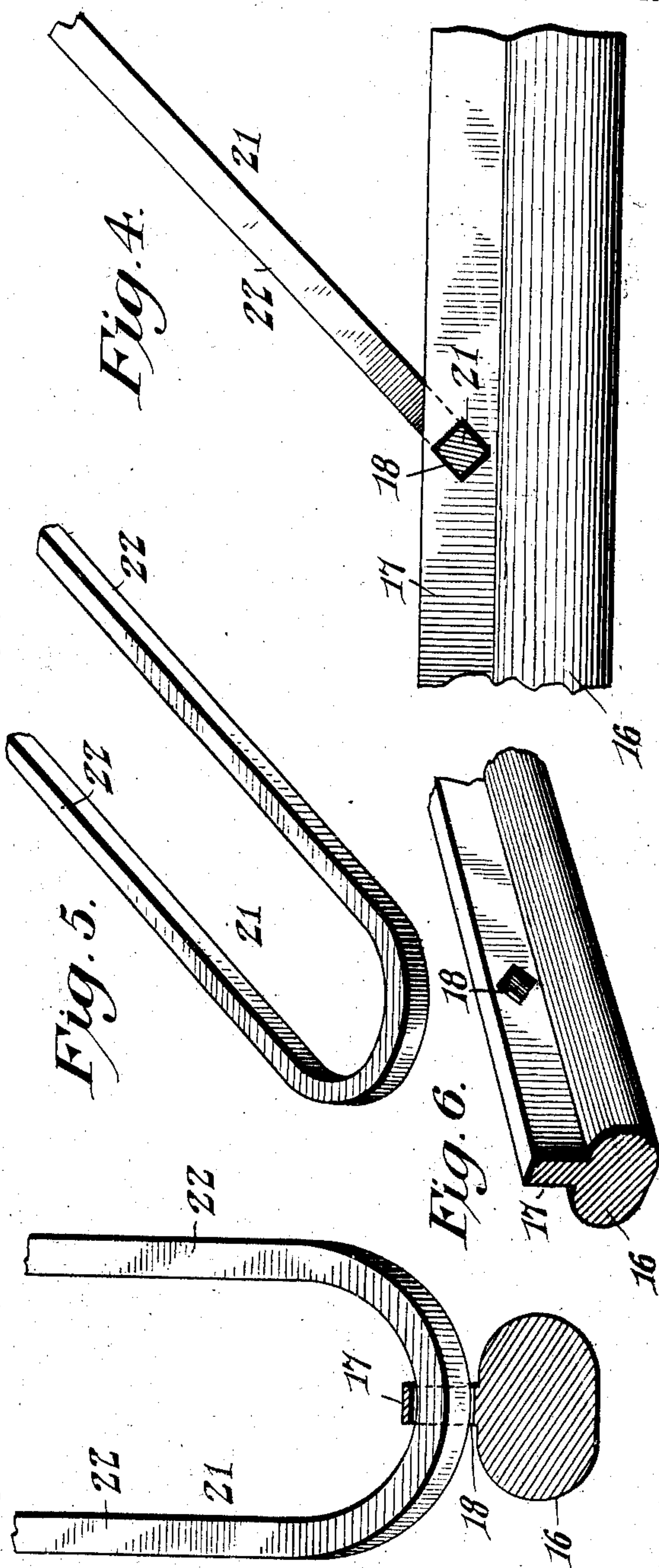
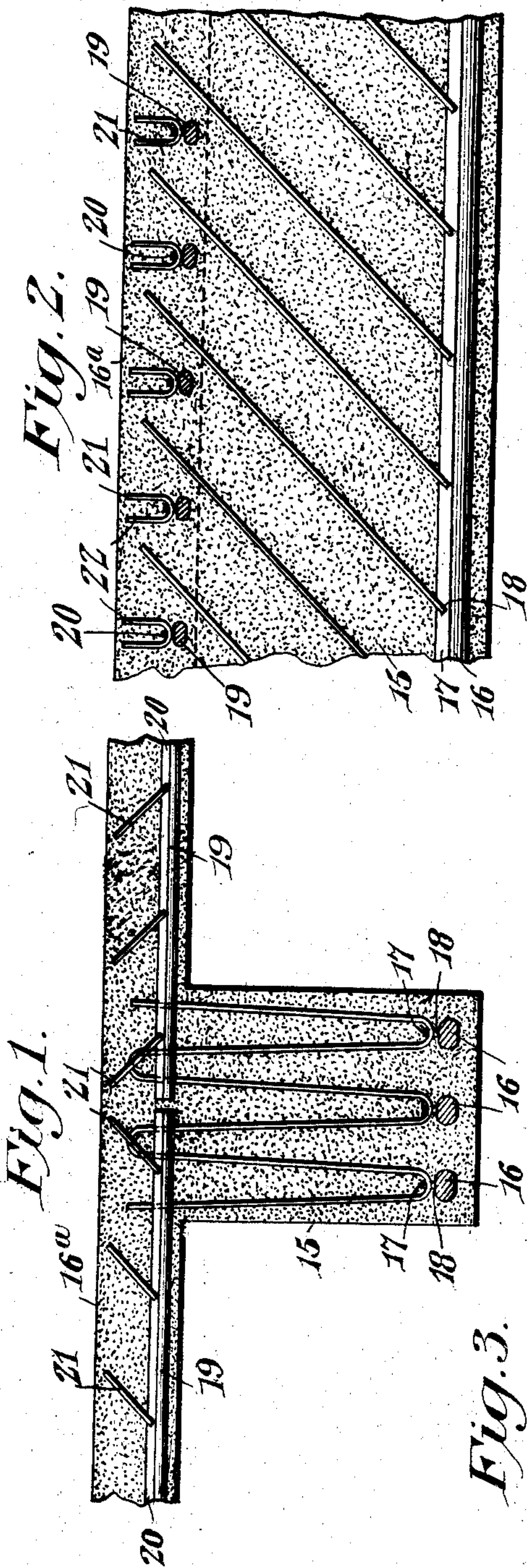
No. 865,231.

PATENTED SEPT. 3, 1907.

E. R. BOYLE & W. B. UPTON.
REINFORCED CONCRETE STRUCTURE.

APPLICATION FILED OCT. 9, 1906.

2 SHEETS—SHEET 1.



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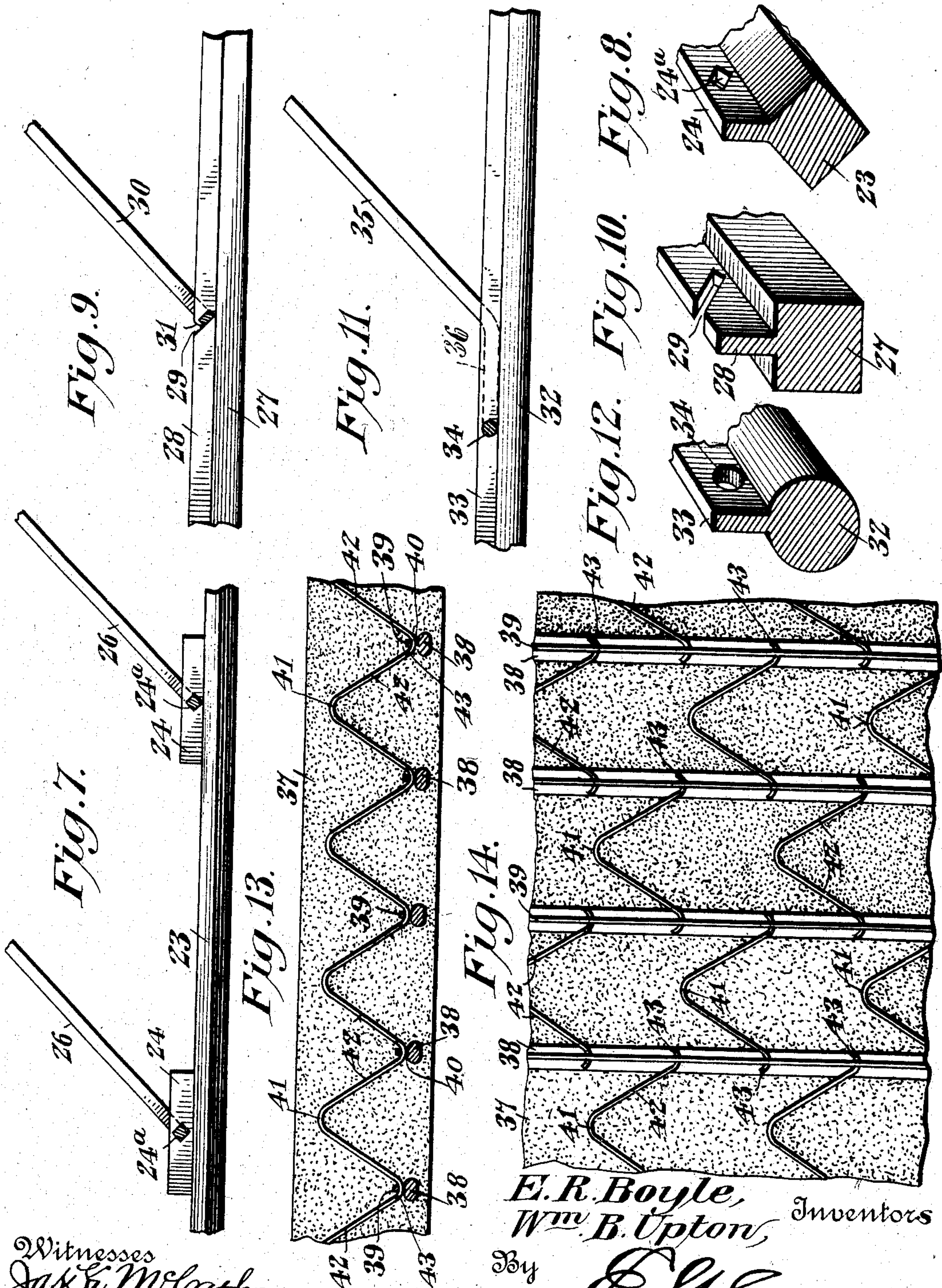
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UNITED STATES PATENT OFFICE.

ELDRIDGE R. BOYLE AND WILLIAM BAYLY UPTON, OF WASHINGTON, DISTRICT OF COLUMBIA.

REINFORCED CONCRETE STRUCTURE.

No. 865,231.

Specification of Letters Patent.

Patented Sept. 3, 1907.

Application filed October 9, 1906. Serial No. 338,141.

To all whom it may concern:

Be it known that we, ELDRIDGE R. BOYLE and WILLIAM BAYLY UPTON, citizens of the United States, residing at Washington, District of Columbia, have invented a new and useful Reinforced Concrete Structure, of which the following is a specification.

This invention relates to means for reinforcing concrete structures, and the primary object is to provide a novel and exceedingly simple construction, the parts of which can be readily manufactured and assembled, will constitute an effective reinforcement for the concrete, and will permit the latter to be properly packed in and around it.

Several embodiments of the invention are illustrated in the accompanying drawings, wherein:—

Figure 1 is a sectional view through a concrete floor structure, showing the improved reinforcing means therein. Fig. 2 is a sectional view at right angles to Fig. 1. Fig. 3 is a detail sectional view on an enlarged scale, through the reinforcing structure. Fig. 4 is a sectional view at right angles to Fig. 3. Fig. 5 is a detail perspective view of one of the reinforcing yokes. Fig. 6 is a detail perspective view of a portion of one of the reinforcing bars. Fig. 7 is a detail sectional view of a slightly modified form of construction. Fig. 8 is a perspective view of the form of reinforcing bar illustrated in Fig. 7. Fig. 9 is a detail view of another modification. Fig. 10 is a perspective view of a portion of the reinforcing bar shown in Fig. 9. Fig. 11 is still another modification of the invention. Fig. 12 is a perspective view of a portion of the reinforcing bar illustrated in Fig. 11. Fig. 13 is a sectional view through a floor structure, showing a modified reinforcing structure therefor. Fig. 14 is a plan view of the same, with the concrete that covers the reinforcing structure removed.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

Referring first to the embodiment illustrated in Figs. 1 to 6 inclusive, a portion of a concrete floor structure is illustrated, showing a beam 15 and a floor body 16. The beam is reinforced by a series of longitudinally disposed bars 16, which may be of any desired cross sectional area, preferably substantially elliptical, as illustrated. These bars are provided on their upper sides with single longitudinally disposed fins 17, having openings 18 therethrough, which openings are angular. The fins, as shown, are of substantially the same thickness throughout their width and their upper edges constitute the upper edges of the bars. In other words, there are no flanges along the upper edges of the fins that will prevent the proper packing of the concrete therearound. Moreover while it is desirable that the fins be of exactly the same thickness throughout in order that the openings 18 may be accurately produced, it will be under-

stood that the statement "substantially the same thickness" comprehends the slight variations due to the methods of manufacture. For instance in rolling the bars, said fins usually have a slight taper. Reinforcing yokes in the form of rods or bars are passed through the openings, and fit snugly therein, having a cross sectional shape corresponding to the shapes of the openings, and being disposed at an inclination to the bars, as clearly shown in Fig. 2. The yokes comprise a series of reversely curved loops, and serve to connect all of said bars. The upper ends of the yokes extend well into the floor body 16, and said yokes, as shown, are entirely above the bars. The floor body 16 is likewise reinforced by similar bars 19, each having a narrow single upstanding fin 20 provided with angularly disposed openings. Substantially U-shaped yokes 21, located at an inclination to the bars, have their intermediate portions snugly fitted in the openings. The side arms 22 of said yokes terminate short of the upper surface of the floor. There are many advantages for this particular structure. In the first place, it will be observed that it can be very cheaply manufactured, and the parts easily assembled. Furthermore by employing the upstanding fins, which are comparatively thin, the concrete can be packed closely upon and around the bars, and the yoke-receiving openings being in the fins, the bars are not weakened. This arrangement furthermore permits the bars being placed very close to the lower surface of the concrete structure, for the reason that the yokes do not pass around the same, and it is a well known fact that the lower said bars can be placed, the greater will be their efficiency.

In Figs. 7 and 8, a slight modification is shown. In this case, the bar 23 is substantially diamond shaped, and the fin 24 projects from its upper corner. The fin comprises a series of separated sections; though a continuous fin may be employed if desired. The said fins are provided with angular openings 24 that snugly receive the intermediate portions of intermediate yokes 26, being formed of rods that are angular in cross section, and being disposed at an inclination to the bar.

In Figs. 9 and 10, another modified form of construction is illustrated. In this embodiment, the bar 27 is square, and has an upstanding fin 28 provided with inclined slots 29, the yokes, one of which is shown at 30 are constructed of rods or strips that will fit snugly in the slots, after which the corners formed by said slots are bent in, as shown at 31, and serve to retain the yokes in place, thereby forming the openings.

In Figs. 11 and 12, still another embodiment is disclosed. In this instance, the bar 32 is circular in cross section, and has an upstanding fin 33 that is provided with circular openings 34. The yokes 35 are formed of round rods, which snugly pass through the openings 34, and the side arms of these yokes have offsets 36, which

rest upon the bar on opposite sides of the fin, thus serving to support the main portions of said side arms at an inclination to the bar.

It will be noted by reference to Figs. 6, 8 and 12 that the greatest width of the bars 16, 23 and 32 is above their bottom edges or faces. This permits the concrete to be effectively packed beneath the bars and around their lower portions, and is an important feature in the structure. In the claim covering this particular and very important feature, I do not wish to be understood as covering the ordinary T-shaped beams which would have their greatest widths at the lowermost edges, and which cannot therefore have the concrete packed about them as advantageously as with the above described bars.

Still another embodiment of the invention is illustrated in Figs. 13 and 14. The concrete structure 37 is reinforced by bars 38, having fins 39 provided with angular openings 40. The reinforcing yokes 41, in this form of construction, bridge the spaces between the bars, and their side arms 42 have terminals 43 that snugly engage in the openings and serve to support the yokes at an inclination to the bars, as clearly shown in Fig. 14. These yokes are disposed in staggered relation.

From the foregoing, it is thought that the construction, operation, and many advantages of the herein described invention, will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is:—

1. In a structure of the character described, the combination with a reinforcing bar having a single fin along one side only, said fin being of substantially the same thickness throughout its width, the free edge of the fin constituting the corresponding edge of the bar, said fin being provided with openings therethrough, of reinforcing arms passing through the openings and being of a size in cross section substantially equal to the area of the openings, said arms thus fitting snugly in and substantially filling the openings and being disposed at an inclination to said bar.

2. In a structure of the character described, the combination with a reinforcing bar having a thin narrow fin on

its upper side, said fin being of substantially the same thickness throughout its width, and having its upper thin edge forming the corresponding edge of the bar, said fin being provided with openings therethrough, of reinforcing arms passing through the openings and being of a size in cross section substantially equal to the area thereof, said arms thus fitting snugly in and substantially filling the openings and being disposed at an inclination to and wholly above the bar.

3. In a structure of the character described, the combination with a reinforcing bar having a thin outstanding fin along one side, said fin being provided with angular openings therethrough, of reinforcing arms snugly passing through the openings and having the portions in said openings, also angular in cross section, to prevent the swinging of the arms.

4. In a structure of the character described, the combination with spaced reinforcing bars, each having a longitudinal fin along its upper side, said fin being provided with openings, of yokes connecting the fins and disposed wholly above the bars, said yokes having arms that are disposed at an inclination to the bars and snugly engage in the openings of the fins.

5. In a structure of the character described, the combination with spaced reinforcing bars, each having a longitudinal fin along one side, said fin being provided with angular openings, of yokes connecting the bars, said yokes having arms, the terminal portions of which are angular in cross section and snugly engage in the openings in the fins.

6. In a structure of the character described, the combination with a reinforcing bar having an outstanding fin upon its upper side, said fin being provided with an angular opening therethrough, of a reinforcing yoke snugly passing through the opening and having the portion therein angular in cross section, said yoke being disposed wholly above the bar and being held by its engagement in the opening at an inclination to said bar.

7. In a structure of the character described, the combination with a reinforcing bar having its greatest width above its bottom edge or face and furthermore having a single central integral fin projecting from its top face, said fin being thinner than the bar throughout its entire extent and having its upper edge constituting the upper edge of the bar, of a reinforcing arm passing through the fin and extending at an inclination above the bar and above said fin, said arm being located wholly above the widest portion of the bar.

In testimony, that we claim the foregoing as our own, we have hereto affixed our signatures in the presence of two witnesses

ELDRIDGE R. BOYLE.
WILLIAM BAYLY UPTON.

Witnesses:

JOHN H. SIGGERS,
B. G. FOSTER.