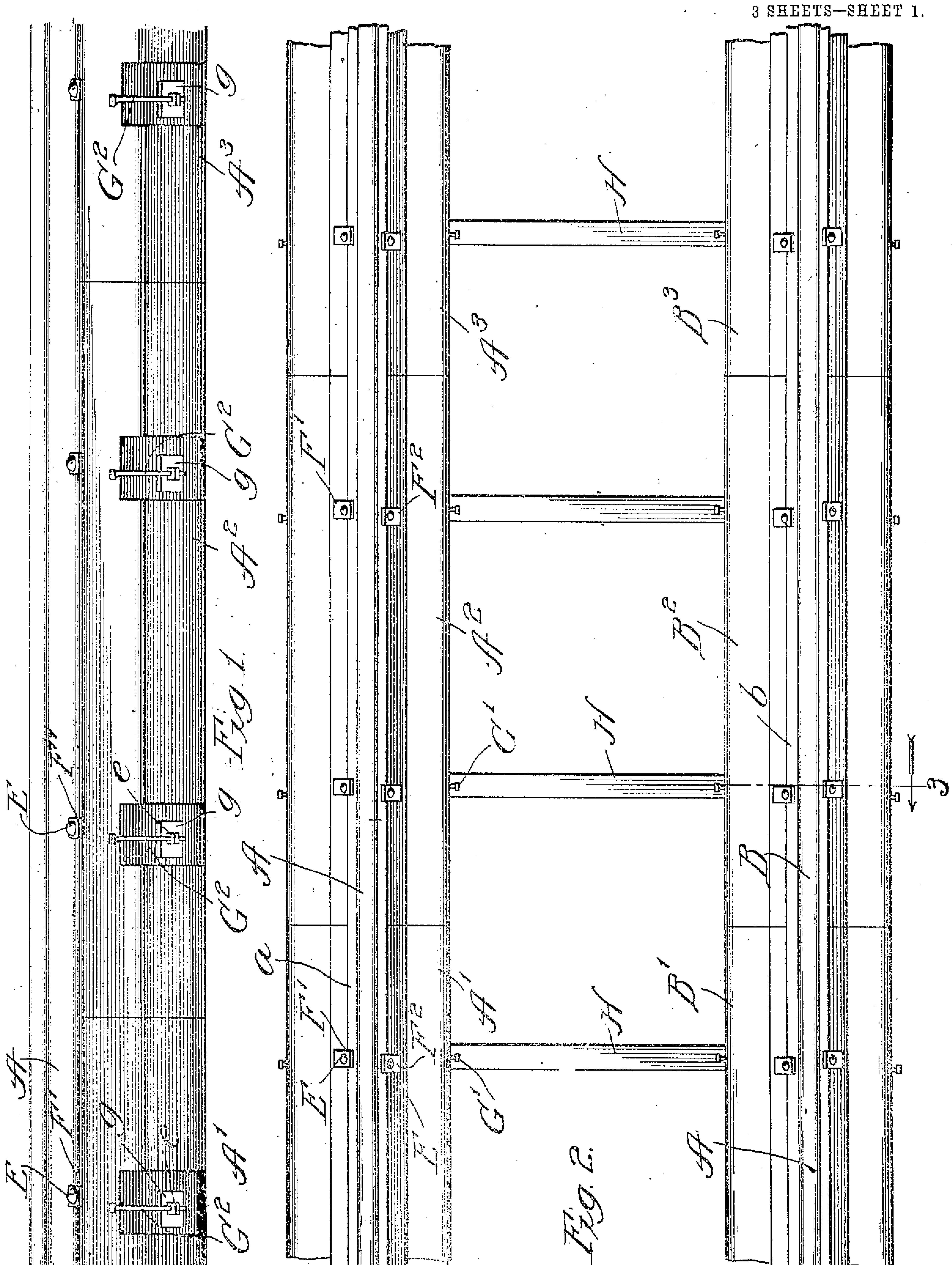
L. WHITE.

REINFORCED CONCRETE STRUCTURE.

APPLICATION FILED APR. 7, 1908.

912,219. Patented Feb. 9, 1909.

3 SHEETS—SHEET 1.



Witnesses:
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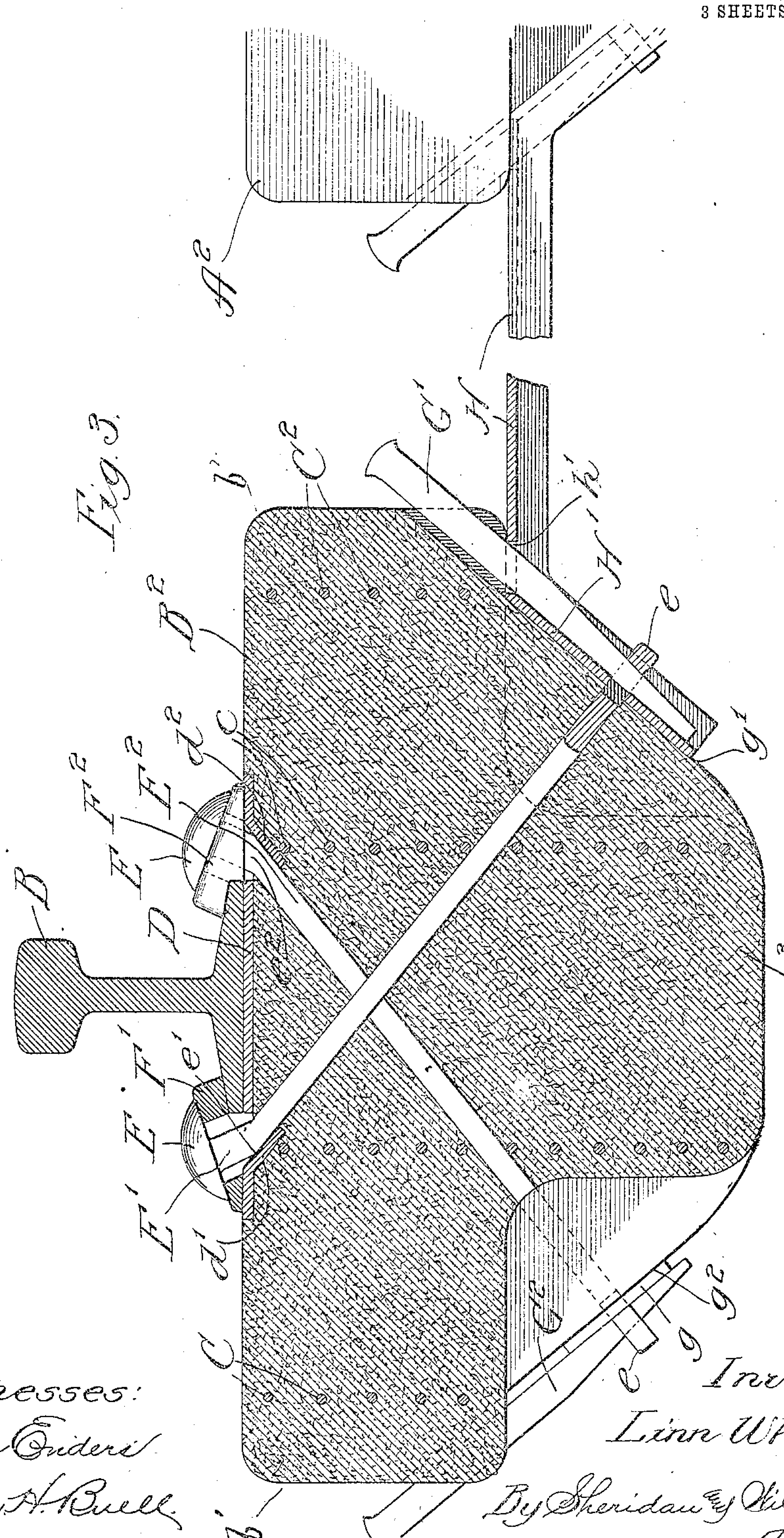
3 SHEETS—SHEET 2.

Fig. 3.



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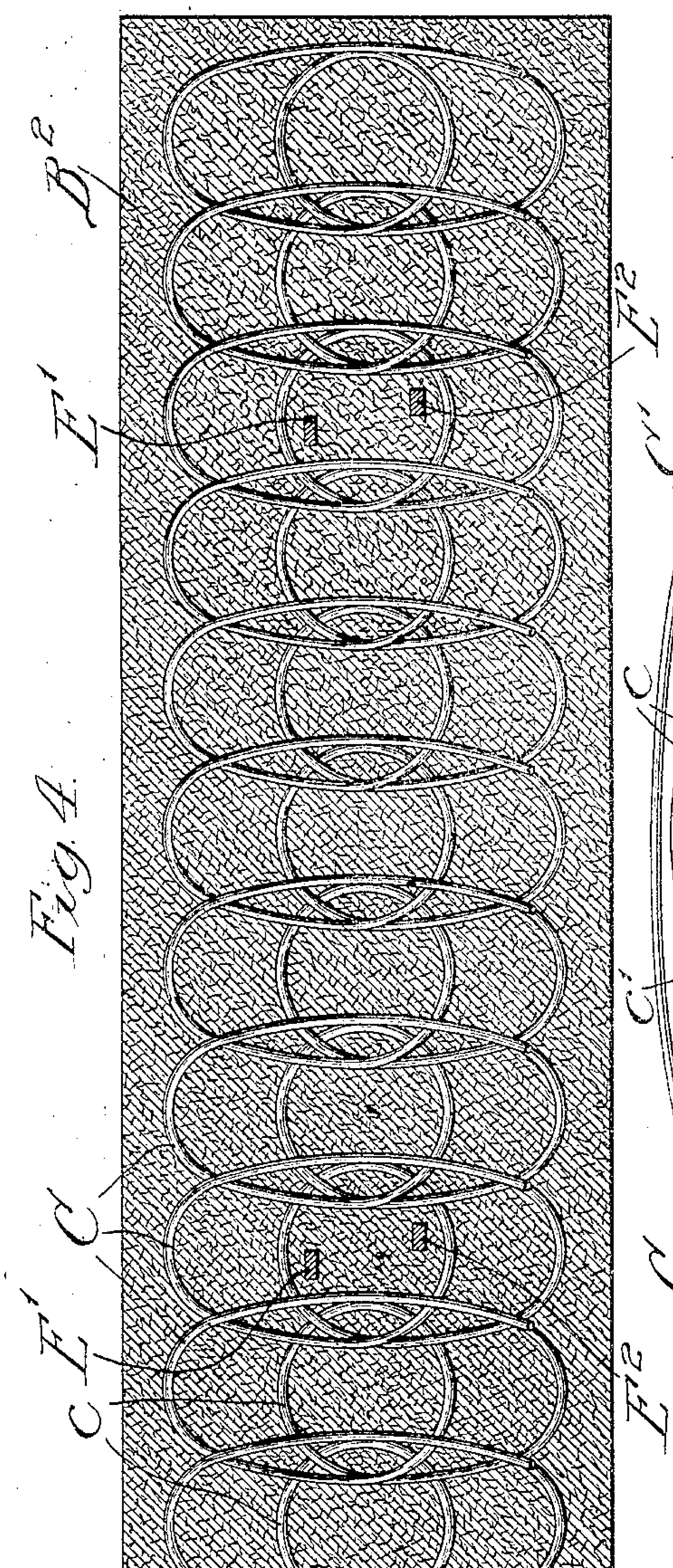

Fig. 4.

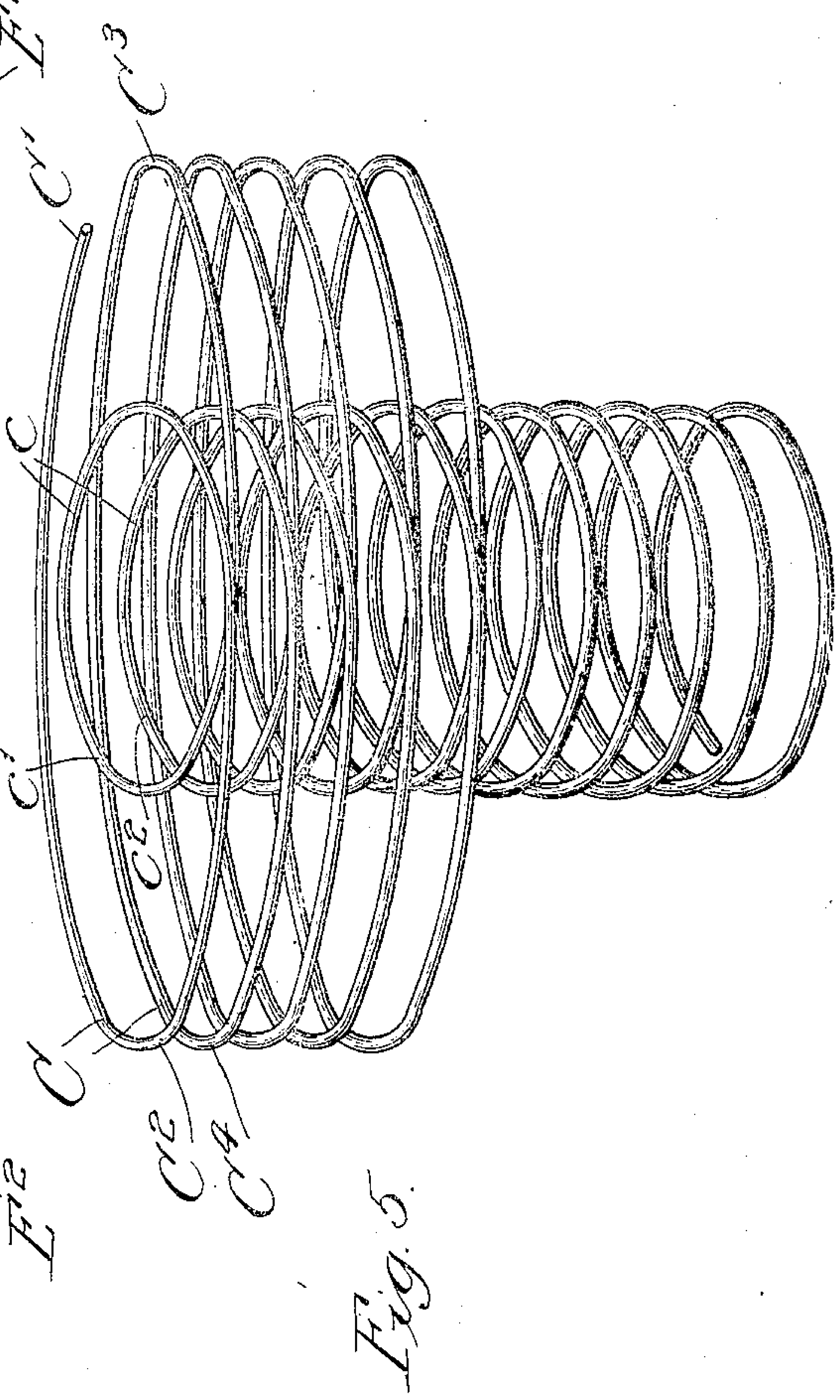

Fig. 5.

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UNITED STATES PATENT OFFICE.

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REINFORCED CONCRETE STRUCTURE.

No. 912,219. Specification of Letters Patent. Patented Feb. 9, 1909.

Application filed April 7, 1908. Serial No. 425,535.

To all whom it may concern:

Be it known that I, Linn White, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Reinforced Concrete Structures, of which the following is a specification.

My invention relates in general to reinforced concrete structures, so reinforced as to withstand impact or suddenly applied loads, and more particularly to a reinforced concrete support for railroad tracks.

The primary object of my invention is to provide a reinforced concrete structure which will be capable of resisting and absorbing the vibration or shock produced by a suddenly applied load, or by a blow, and in which the concrete will be so firmly bonded as to increase its strength under impact and compression.

A further object of my invention is to provide a reinforced support for railroad rails which will be capable of withstanding the shocks and vibrations to which rails are subjected by the passage of trains thereover.

My invention primarily consists of a concrete structure having therein metal reinforcement comprising a number of adjacent spirals or coils made of separate or connected convolutions in the form of rings, hooks, or bands of wire, or either rolled or drawn shapes, disposed about vertical axes, the distance between the vertical axes of adjacent coils being less than the diameter of the coils, so that the convolutions overlap or interlace.

My invention further consists of a concrete support having interlocked reinforcing coils for railroad rails, preferably in the form of sleepers having a T-shape cross section, or other cross section having a greater longitudinal depth at the center line than at the sides, but with the bottom supporting surface horizontal or inclined to the horizontal at an angle less than the angle of friction between the material of which the sleeper or tie is made and the ballast or other material supporting it.

My invention will be more fully described hereinafter with reference to the accompanying drawings, in which the same is illustrated as embodied in a support for railroad rails, and in which—

Figure 1 is a side elevation; Fig. 2 a plan view; Fig. 3 an enlarged cross section, taken on line 3 of Fig. 2; Fig. 4 a plan view of one of the sleeper sections showing the interlocked reinforcement; and Fig. 5 a perspective view of the spiral reinforcement before being embedded in a concrete structure.

The same reference characters are used to designate the same parts in the several figures of the drawings.

Reference characters A′, A² and A³ indicate alined sections forming a stringer or sleeper underlying and supporting a railroad rail A. Reference characters B′, B² and B³ designate alined sections forming a stringer or sleeper supporting a second rail B, which together with the rail A constitute a railroad track. The sections of the sleepers or stringers are made of any length convenient for handling, and are preferably formed T-shaped in cross section—as shown in Fig. 3—or a cross section deeper at its longitudinal center line than at the sides. The bottom supporting surfaces of the sleepers or stringers are, however, either horizontal or inclined to the horizontal at an angle less than the angle of friction between the material of which the sleeper is made and the ballast or material supporting it, thereby preventing the supported load from causing the sleepers to work downwardly below their normal plane.

C designates a metal reinforcement comprising elliptical convolutions extending transversely of the sleeper or stringer sections and projecting within the lateral portions *b′* and *b²* of the stringer sections.

c designates a metal reinforcement comprising a plurality of superimposed convolutions of substantially circular form, the reinforcement *c* lying within the reinforcement C and extending downwardly within the depending portion *b³* of the stringer sections.

The reinforcements C and *c* consist of spirals or coils made up of superposed convolutions, such as rings, hoops, bands of wire, or other suitable shapes, but preferably each reinforcement C is made integral with the corresponding reinforcement c by bending wire, as shown in Fig. 5. Starting at a point C′, the wire is bent to form one side C^2 of one of the convolutions of the reinforcement C, and is then bent to form the top convolution c' of the inner reinforcement c. The wire then continues to form the opposite side C^3 of one of the convolutions of the reinforcement C, and thence continues to form the other side C^4 of such convolution. A second convolution c^2 of the inner reinforcement c is then formed. The bending of the wire then continues in this manner until the desired number of outer convolutions are formed to constitute the reinforcement C, after which the wire is merely bent into a series of superposed substantially circular convolutions to form the downwardly extending portion of the inner reinforcement c, which extends within the depending central portion b^3 of the stringer sections.

A plurality of outer and inner reinforcements C and c are placed within a mold, and are so relatively located that the distance between the axes of the convolutions of adjacent reinforcements is less than the diameter of the convolutions of the inner reinforcement, so that the convolutions of adjacent reinforcements overlap or interlace, as clearly shown in Fig. 4. The concrete while in a plastic condition is then molded solidly in and around the coils of the reinforcements, so that they are all embedded within the concrete. By reason of the overlapping and interlacing of the convolutions of the adjacent reinforcements, all the particles of concrete, except a comparatively thin outer layer, are within the circumference of one or more of the convolutions. The effect of this interlacing of the convolutions of the reinforcements is to resist and absorb the vibrations or shocks produced by the passage of trains over the tracks, when the invention is applied as a support for railroad tracks, and to more firmly bind the concrete together, thereby increasing its strength under impact and compression.

When the concrete is molded around the reinforcement, a bearing plate D is molded upon the upper surface of each stringer or sleeper section, upon which the rail base rests. This bearing plate may be continuous for the whole length of the sleeper section, or it may be made in any number of short sections. Holes are punched through the bearing plate D, spaced apart a distance conforming to the width of the rail base, through which the fastening pins or bolts E′ and E^2 extend. The holes in the bearing plate are preferably punched with a chisel-shaped tool, so that none of the metal is removed, but remains attached to one side of the holes and is bent downwardly at the proper angle to form supports d' and d^2 for the pins or bolts, as clearly shown in Fig. 3. The pins E′ and E^2 are provided with heads E which overlie clamps F′ and F^2. The pins are offset near their heads to form shoulders e' and e^2 which rest upon the supports d and d^2 of the bearing plate D. The clamps F′ and F^2 engage and overlie the opposite edges of the rail base. The top surfaces of the clamps are inclined to the horizontal at an angle greater than the angle made by the upper surfaces of the rail base, so that by bending the pins E′ and E^2 a short distance below their heads, the heads will fit squarely upon the upper surfaces of the clamps. The clamps are provided with oblong holes, through which the pins pass so as to permit the gage of the road to be adjusted by shifting the rail to the right or to the left within certain limits.

The securing pins E′ and E^2 extend in inclined directions through the sleeper sections and are slotted at their outer ends to receive wedge keys G′ and G^2. In order to form an extended bearing against which the keys rest, inclined surfaces g' and g^2 are formed upon the opposite sides of the sleeper sections. A metallic washer g is preferably interposed between each key G^2 and the adjacent bearing surface g^2 to prevent wearing away of the concrete through engagement of the key therewith. In lieu of providing a similar washer between each key G′ and its adjacent bearing surface g', the ends of the channel ties H are bent in an inclined direction conforming to the surfaces g' on the inner sides of the sleeper sections underlying the two rails.

H′ indicates the bent portion at one end of each tie H which is interposed between a key G′ and the adjacent inclined surface g'. h' designates a hole through the web portion of the tie for permitting the insertion of the key G′.

The ties H are located at any desired distance apart, preferably two ties being provided between each opposing pair of sleeper sections. The pins E′ and E^2 do not aline transversely, but are staggered so as to extend past each other where they pass through the sleeper sections.

From the foregoing description, the manner of constructing the sleeper sections and of laying and uniting such sections to support the rails will be clear. The sections are laid in alinement to form continuous stringers or sleepers, upon which the bases of the rails are placed. The pins are then extended through the clamping blocks and through the underlying sleeper sections, after which the keys are inserted through the ends e of the pins, thereby tightly drawing the clamps against the rail bases.

From the above description it will be seen that I have invented an improved reinforced concrete structure adapted to withstand vibration or shock produced by suddenly applied loads or by blows, which is adapted for the various uses, such, for instance, as a support for railroad rails.

While I have illustrated my invention as embodied in a railroad track support, yet it will of course be understood that it is capable of other uses; and while I have described more or less precisely details of construction I do not wish to be understood as limiting myself thereto, as I contemplate changes in form and in proportion of parts, and the substitution of equivalents, as circumstances may suggest or render expedient, without departing from the spirit of my invention.

I claim:—

1. In a railroad track structure, a rail-supporting stringer composed of a concrete body and a metal reinforcement, comprising a plurality of superposed convolutions, the axis of which coincides with the direction of the load imposed upon the stringer.

2. In a reinforced concrete structure, the combination with a concrete body portion, of a metal reinforcement embedded in the concrete and comprising a plurality of series of superposed convolutions, the distance between the axes of adjacent series being less than the diameters of the convolutions.

3. In a reinforced concrete structure, the combination with a concrete body portion, of a metal reinforcement embedded in the concrete and comprising adjacent overlapping convolutions having axes coinciding with the direction of the strain imposed upon the structure.

4. In a reinforced concrete structure, the combination with a concrete body portion, of a reinforcement embedded in the concrete and comprising an outer and an inner series of superposed convolutions formed of a single continuous strip of metal.

5. In a reinforced concrete structure, the combination with a concrete body portion having a cross section deeper at its longitudinal center than at its sides, of a metal reinforcement embedded in the concrete and comprising a plurality of series of superposed convolutions, the distances between the axes of adjacent series being less than the diameters of the convolutions.

6. In a reinforced concrete structure, the combination with a concrete body portion having a cross section deeper at its longitudinal center than at its sides, of a metal reinforcement embedded in the concrete and comprising outer and inner series of superposed convolutions, the axes of which coincide with the direction of the strain imposed upon the structure.

7. In a reinforced concrete structure, the combination with a concrete body portion having a cross section deeper at its longitudinal center than at its sides, of a metal reinforcement embedded in the concrete and comprising outer and inner series of superposed convolutions, the convolutions in each pair of series being formed of a single continuous strip of metal.

8. In a reinforced concrete structure, the combination with a concrete body portion, of a reinforcement embedded in the concrete and comprising outer and inner series of superposed convolutions, the convolutions in each pair of series being formed of a single continuous strip of metal, the convolutions of adjacent pairs of series overlapping and having axes coinciding with the direction of the strain imposed upon the structure.

9. In a railroad track structure, a rail supporting stringer composed of a concrete body portion and a metal reinforcement embedded therein, comprising an outer and an inner series of superposed convolutions.

10. In a railroad track structure, the combination with a series of reinforced concrete beams comprising overlapping metallic convolutions embedded in the concrete and having axes coinciding with the direction of strain on the structure, the under surface of said beams being inclined to the horizontal at an angle less than the angle of friction between the material of the bottom and the underlying material, and means for rigidly connecting said beams.

11. In a railroad track structure, the combination with parallel rail-supporting stringers formed of alined sections of concrete reinforced by interlocking metallic convolutions having axes coinciding with the direction of strain upon the stringer sections, means for securing the rail bases upon said stringer sections, transverse ties interposed between said stringer sections, and means for rigidly securing the ends of said ties to the inner surfaces of said stringers.

12. In a railroad track structure, the combination with parallel rail-supporting stringers, of pins engaging the opposite sides of the rail bases and extending in inclined directions through the stringers, and fastening means engaging the ends of said pins which project through the sides of the stringers for retaining said pins tightly in engagement with the rail bases.

13. In a railroad track structure, the combination with parallel rail-supporting stringers, of pins engaging the opposite sides of the rail bases and extending in inclined directions through the stringers, ties connecting the stringers and engaging at their ends with said pins, and fastening means for said pins to retain them tightly in engagement with the rail bases and to connect the ties therewith.

14. In a railroad track structure, the combination with parallel rail-supporting stringers composed of reinforced concrete,

of base plates secured to the upper surfaces of said stringers upon which the rail bases are supported, pins engaging the opposite sides of the rail bases and extending in inclined directions through said base plates and the underlying stringers, and fastening means engaging the ends of said pins which project through the sides of the stringers for fastening said pins tightly in engagement with the rail bases.

In testimony whereof, I have subscribed my name.

LINN WHITE.

Witnesses:
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ANNIE C. COURTENAY.