A. STARK.

CONCRETE RAILWAY TIE.

APPLICATION FILED NOV. 2, 1910.

1,036,160.

Patented Aug. 20, 1912.

2 SHEETS—SHEET 1.

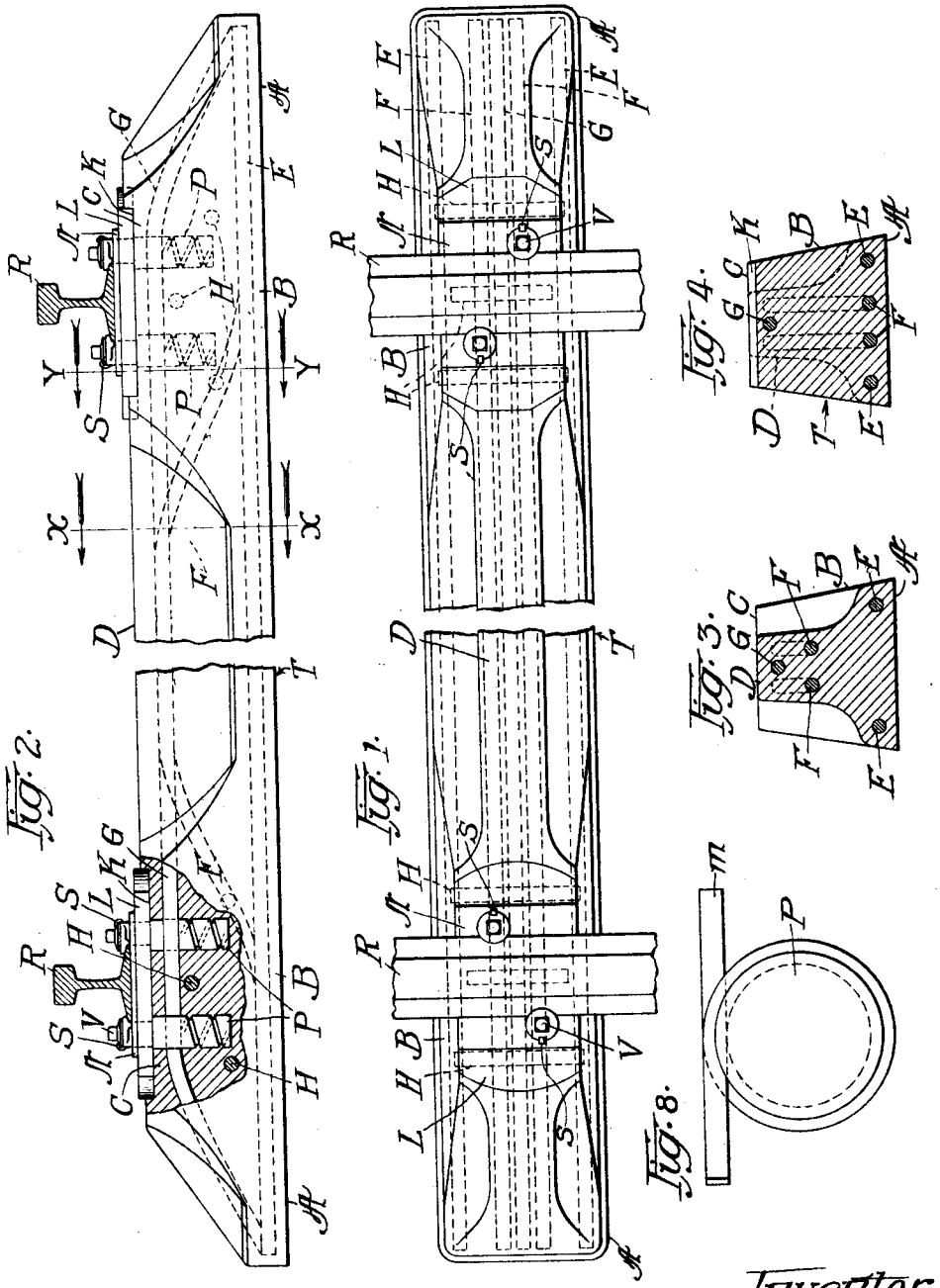

Fig. 2.

Fig. 1.

Fig. 4.

Fig. 3.

Fig. 8.

Witnesses:

J. N. Daggett.

Robt. H. Burton

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Audrey Stark

by Chas. D. Burton

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his Attys

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Fig. 7.

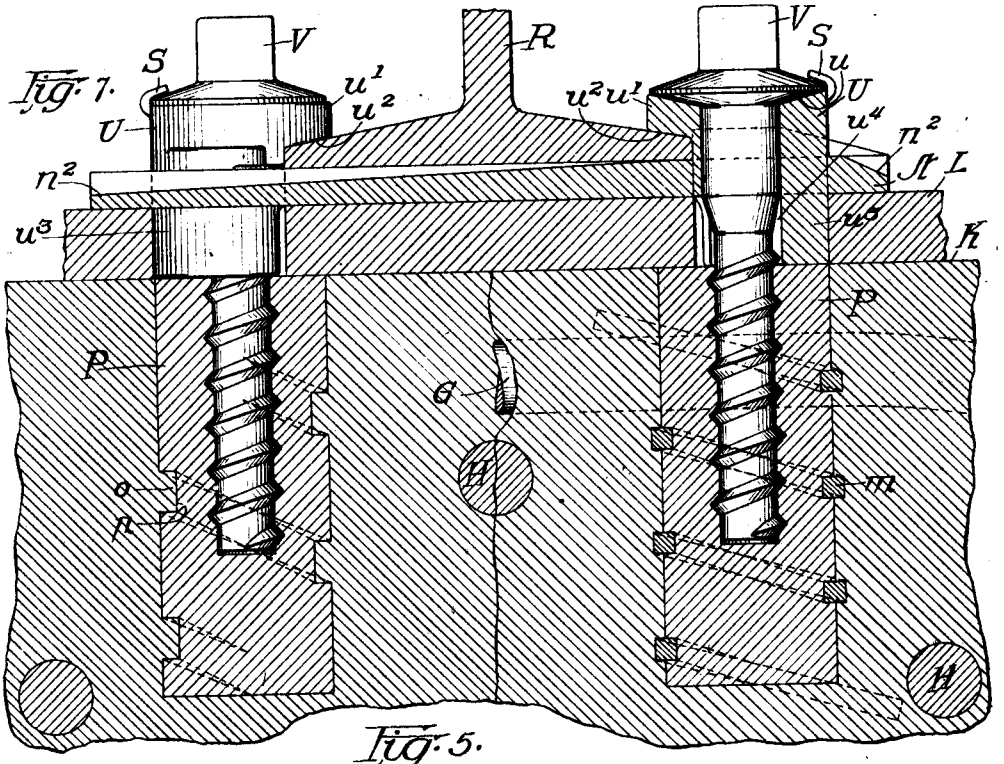

Fig. 5.

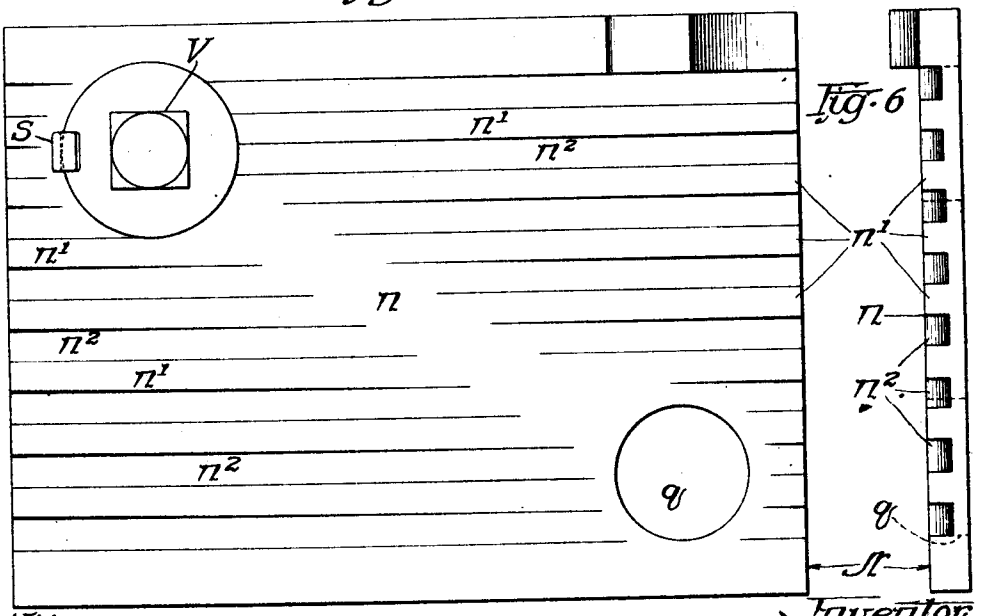

Fig. 6

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UNITED STATES PATENT OFFICE.

ANDREW STARK, OF CHICAGO, ILLINOIS.

CONCRETE RAILWAY-TIE.

1,036,160. Specification of Letters Patent. Patented Aug. 20, 1912.

Application filed November 2, 1910. Serial No. 590,290.

To all whom it may concern:

Be it known that I, ANDREW STARK, 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 Concrete Railway-Ties, the purpose of which is to provide additional strength and security both for such ties and fastenings.

Said invention consists in an improved manner of locating the steel rods for reinforcing the concrete structure whereby such rods are more perfectly thrown in tension under the varying stress to which the tie is subjected in practical use.

It also consists in such combined form of the structure of concrete as will give largest area and greatest strength practicable for the given weight of concrete and steel-reinforcement.

Said invention is further designed to furnish an improved method of securing the rail to the tie by the use of wooden plugs of peculiar construction set in the concrete in such a manner as to make it practicable to renew such plugs if required.

The invention also consists in a new and improved form of tie plate for use between the tie and the rail, together with an improved fastening, which, combined with the screw spike, holds the rail to the tie.

The details of construction and application of said improvements are more fully set forth in the following specification, accompanying drawings and claims, in which—

Figure 1 is a plan view of the improved railroad tie, tie plate, fastening, etc. Fig. 2 is a side elevation of the same. Fig. 3 is a cross section of the tie at *x x*. Fig. 4 is a cross section of the tie at *y y*. Fig. 5 is a plan view of the tie plate. Fig. 6 is an end view of the tie plate. Fig. 7 is a sectional elevation showing the tie plate, cushion block, fastenings, spikes, etc., in position holding the rail to the tie. Fig. 8 is a detailed view of the metal thread on the spiking plug.

The same letters refer to similar parts in the various figures.

R R are the two railroad track rails of ordinary construction.

T T is the tie under the rails. The body of the concrete tie, T T, shown in the drawings is formed with a broad base, A A of uniform width the whole length of the tie. Under the rails and near the ends of the tie are rail-bearing sections which slope from the base toward the top; the face, C C, directly under the rail gives it about two-thirds of the width of the base. On each side of the rail-bearing sections, C C, is provided an upright rib of concrete, D D, integral with the base and rail-bearing sections. The sections upon which the rails rest, C C, and the upright rib, D D, between them are made higher than the ordinary depth of railroad ties in order to give increased efficiency to the truss combinations embodied in this construction, which will be more perfectly described.

In the plan view, Fig. 1, and side elevation, Fig. 2, also shown in detailed sections, Figs. 3, 4, are two steel rods, E E, placed longitudinally in the base near the sides, extending the entire length of the tie. Between these two rods at the ends and extending under the rail are two other rods, F F, which curve upward from a point inside of the rails to near the upper surface of the tie, thus constituting the upper chord extending over a truss of concrete between the rails, the base of which truss rests upon the ballast under the tie, and has for its lower chord the two longitudinal rods, E, E. The tie is further reinforced with a central rod, G, G, which starts from either end of the tie at the base and the ends of the rods, heretofore described, and extends upward and toward the rail-seat to a point near the surface of the concrete under the rail, thence in a nearly horizontal direction across the rail-seat and on to the other rail-seat near the upper surface of the central rib, D, D. This central rod G, G, thus connecting the two ends from the base upward and across and over the middle of the truss heretofore described, serves to prevent the tie from breaking at a point just inside or outside of the rails. It also serves to carry the load from the rail to the top of the truss between the rails, heretofore described. The rods, E, E, extending from the ends in the base under the rails, thence rising to the middle of the tie in the rib, D, D, to form the center of the truss, combined with the center rod, G, G, extending up to near the surface of the tie at the rail-seat and across the tie near its upper surface, as described, form the upper and lower chords of a reversed concrete truss

under each rail; thus this improved reinforced concrete tie may be described briefly as a triple truss of concrete so arranged, constructed, and reinforced as to throw the reinforcing rods in tension and the concrete in compression whatever may be the condition of the ballast and its relation to the load applied through the rails.

It is well known to all those familiar with track construction and maintenance that the tendency of load borne by the rails in practice is to crush or fracture the tie directly under the rails, or if the ballast is harder under the center than the ends, to break the tie in the middle. The material of which the tie is constructed, being thrown in tension on the bottom of the tie immediately under the rails, and in compression at the point where the rails rest, or upper surface of the rail; while this is reversed in the center of the tie—the tension being at the top and compression at the bottom of the tie. By arrangement of the triple truss, as shown, the four rods passing from the ends of the tie at the bottom under the rail-seats, are thrown in tension at the point which marks the apex of the concrete truss under the rail and the center rod, G, G, passing from the ends upward and under the rail seats near the surface across the top of the tie, and the two rods, F, F, passing from the ends near the bottom curving upward and over the truss in the middle of the tie, bring the three rods together and in tension at the point of greatest strain in the middle of the tie. The upper rod, G, G, reaching from the end of the tie upward under the rail-seat also prevents any tendency of the end of the tie being broken down from any cause. In order to resist the tendency to crush or crack the concrete under the rails, I have inserted cross-rods, H, H, H, in the rail-bearing sections, B, B. One of these is preferably placed between the spiking plugs directly under the rail and the other two midway between the base and the top.

The seat of the rail on the top of the tie, K, K, consists of a depressed space the width of the tie; the outside and inside ends of which are curved or made to correspond to the angles say of an octagon. The purpose of this space is to receive wooden cushion blocks, L, L, which are prevented from splitting and working loose by being fitted to the specific shaped space in the concrete, as shown. In the upper portion of the concrete tie I have placed plugs, P, P, of wood for receiving the spikes which hold the rail in position on the tie. It has been found desirable to so construct and position these plugs, P, P, as to make it practicable to renew them in case their efficiency is reduced by decay or otherwise. To meet this requirement I have provided two forms of plugs, either of which is practicable for use in concrete construction. In Figs. 2 and 7 is shown an ordinary round plug, upon the outer surface of which, from the bottom to near the top, there is cut a smooth spiral groove, p, preferably about three-sixteenths of an inch deep and one-half an inch wide. The plugs are placed in position in the mold in constructing the tie and the concrete as it forms around it fills the groove, and forms the thread, o, of concrete. Later when it becomes necessary to renew the plugs they are readily split out and others with similar grooves inserted. I have also shown as an alternative form, Fig. 7, a round plug, as heretofore described, also grooved on its outer surface and to fit this groove, p, I have wound a spiral of metal, m, Figs. 7 and 8, preferably of square rod, which spiral when placed upon the plug, P, P, as shown, protrudes from the surface. The ends of this spiral rod, top and bottom, are bent away from the plug in construction. The plug placed in its proper position in the mold and the concrete as it forms around it permanently locates the spiral coil and later the plug can be removed leaving the coil or thread, m, Fig. 8, in position and a new plug with the proper thread or groove is inserted.

As all the strain tending to displace the rails must be resisted by the spiking plugs, it has been found desirable to so locate them, in relation to the reinforcement, as to secure the greatest strength possible. I have therefore placed these plugs in the rail-bearing sections on each side of the central reinforcing rod and have also placed a transverse reinforcing rod between them, thus securing against cracking of the concrete.

The improved tie plate, N, Figs. 1, 2, 5, and 6, consists of a piece of metal of suitable size to receive the rail resting on the tie and extending on each side of the rail sufficiently as to permit the spikes and fastenings to pass through it into the cushion block and tie or plugs below. Its peculiar form may be described as having a diagonal spine or rib, n, running from corner to corner through which the holes, q, q, are placed for receiving the spikes or fastenings. Extending longitudinally from this rib, n, on the upper surface and extending toward the end of the plate are series of alternate ribs, n^1, and grooves, n^2. The ribs being throughout their length of the height of this diagonal spine, n, and the grooves, n^2, of such depth at the ends as will leave sufficient metal at the under surface of the plate, inclining upward and vanishing in the diagonal spine, n. On one corner of the plate at the line corresponding to the flange of the rail when in position is an upward projecting boss against which the flange of the rail rests. This combination contemplates the use of the ordinary screw spike, V, V, for

holding the rail to the tie. In this case I have not extended the bushing, U, U, into the tie, and therefore only bore the holes to receive the eccentric bushing in the cushion blocks, L, L, between the tie plate, N, and tie, T. The holes in the plugs, P, P, are bored for the spikes, V, V, in the usual manner. The bushing fastening, U, U, consists of a seat, u, of suitable shape to form a bearing for the under side of the head of the spike, V, on one side of which is a clip, u^1, which is intended to bear on the rail-flange under the spike-head, and under the inside of this clip, u^1, is a shoulder, u^2, which rests against the edge of the rail-flange. From this combined spike-head seat, u, clip, u^1, and shoulder, u^2, there is projected a round bushing or thimble, u^3, of such length as conditions may require. From the center of this spike-head seat, u, eccentric to the bushing center and on the side next to the rail clip is the hole, u^4, through which the spike passes down into the tie. When in position the bushing, U, with its clip, u^1, over the flange of the rail and its eccentric portion in the tie plate, N, and cushion block, L, and the spike, V, passing through the hole, u^4, when screwed down, draws the clip, u^1, of the fastening, U, under the head of the spike directly upon the rail and firmly holds the entire combination in place. The same combination of screw spike, V, with the fastening, U, having the seat for the spike-head clip, u^1, overhanging the rail, and the eccentric bushing, u^3, and shoulder, u^2, may be adapted to use where it is not desirable to pass the bushing into the cushion block, L. Sometimes it may be used on top of the tie plate, N, in which case the hole, q, in the tie plate, N, in the cushion block, L, and tie, T, will only be sufficient for the spike, V, to pass through. It is also found desirable in some instances, especially in bridges and elevated work, to have the fastening, U, attached to the spike, V, in such a manner as to allow the spike to revolve freely and yet prevent the two becoming detached in handling. For this purpose I have formed a loop, S, S, shown in Figs. 5–7, which passes over the top of the spike head and may be made integral with the fastening, if of malleable iron, or, if of common gray iron casting, it is necessary to make this loop of a separate piece and it may be cast in or attached by any well-known means preferred, substantially as desired.

Having thus described my invention, I desire to claim and secure by Letters Patent, the following:

1. A reinforced concrete railroad tie having in combination a base of uniform surface and width on its under side, upright sections thereon under the rail tapering toward the top upon which the rail is seated, said sections being connected between the rail-seats by a vertical rib extending across between the rails and buttressed on the outside by similar vertical triangular ribs between the ends of the base and rail-seats, the upper surface of such rail-bearing sections having a depressed space for receiving a cushion block, the inside and outside ends of such space being approximately circular in form, as and for the purposes described.

2. A concrete railroad tie having in its construction a combination of reinforcing rods extending horizontally from end to end near the bottom of the tie, a rod extending from one rail-bearing section to the other near the top of the tie and the ends depressed from a point outside of the rail-seat at the top to the end and bottom of the tie, having transverse reinforcing rods in the sections under the rail-seats between said upper and lower reinforcing rods, and with diagonal reinforcing rods extending from the middle of the vertical portion near the top to the base inside of the rail-seat.

3. A concrete railroad tie having in its construction a combination of reinforcing rods extending horizontally from end to end near the bottom of the tie, a rod extending from one rail-bearing section to the other near the top of the tie and the ends depressed from a point outside of the rail-seat at the top to the end and bottom of the tie, having transverse reinforcing rods in the sections under the rail-seats between said upper and lower reinforcing rods, with diagonal reinforcing rods extending to the base of the tie under the rail-seat, thence to the end of the tie.

4. A concrete railroad tie having in its construction extending from end to end deflected or bow-shaped rods near its upper surface, combined with plugs positioned in the concrete to receive the spikes holding the rail located on each side of such reinforcing rod and a transverse reinforcing rod crossing the vertical line of the same between the plugs.

5. A concrete railroad tie having suitable rail-bearing sections at each end combined with spiking plugs located in such sections constructed with spiral grooves on the outer surface, adapted to form corresponding spiral projections in the molded concrete.

6. In combination with a concrete railroad tie plugs embedded in the concrete adjacent to the rail-seats for the reception of suitable fastening devices for holding the rails in place, such plugs being constructed and formed with grooves around the outer surface in spiral form, which in the molding of the tie are filled with concrete.

7. In combination with a concrete railroad tie plugs embedded in the concrete adjacent to the rail-seats for the reception of suitable fastening devices for holding the rails in

place, such plugs being constructed and formed with grooves around the outer surface and metal coils fitting such grooves, adapted to be placed in and held in position by the molded concrete.

8. A concrete railroad tie having on its upper side rail-bearing surfaces combined with spiking plugs embedded therein, such plugs being provided with spiral grooves on their outer surface, and when in position adapted to be filled with the concrete in molding the tie, and corresponding threads formed in the concrete surrounding the plugs.

9. A concrete railroad tie adapted to seat a rail on its upper surface combined with plugs embedded in the concrete adapted to receive fastening devices for holding the rail in position, and having grooves on the outer surface coöperating with threads formed in molding the tie to retain the plugs in position in the tie.

10. A concrete railroad tie having on its upper side depressed rail-bearing sections with approximately semicircular ends and cushion blocks fitted to such rail-seat spaces, plugs located in the concrete under the cushion blocks, the spike holes in the plugs being eccentric to those in the block and eccentric bushing fastenings located in the cushion blocks, combined with screw spikes passing therethrough into the plugs in the concrete, adapted to hold the rail to the tie.

11. A concrete railroad tie having on its upper surface depressed rail-bearing sections with approximately semicircular ends and cushion blocks for the rails fitted to such rail-seat spaces, plugs located in the concrete under the cushion blocks, the spike holes in the plugs being eccentric to those in the block and a tie plate on the top of the cushion block with fastener holes corresponding to the holes in the cushion block, combined with screw spikes passing therethrough into the plug in the concrete, adapted to hold the rail to the tie.

12. In combination with a screw spike for holding the track rail in place a fastening having a seat adapted to fit the under side of the head of the spike and formed with a clip on one side to extend over the flange of the rail, a shoulder to rest against the side of the flange of the rail and a round boss or bushing under the spike-head seat through which the spike hole is bored eccentric and near to the face of the shoulder.

13. In combination with a screw spike for holding the track rail in place, a fastening having a seat adapted to fit the under side of the head of the spike and formed with a clip on one side to extend over the flange of the rail, a shoulder to rest against the side of the flange of the rail and a round boss or bushing under the spike-head seat through which the spike hole is bored eccentric and near to the face of the shoulder, combined with means for holding such fastening on the spike when not in use.

14. In combination with a railroad screw spike, the under side of the head of which is convexed, a concave seat for such head, and integral therewith a clip on one side of the seat, a shoulder under the clip, an eccentric bushing under the seat, and a loop overhanging the side of the spike head.

15. In combination a screw railroad spike, the under side of the head of which is convexed, a concave seat for such head, and integral therewith a clip on one side of the seat, a shoulder under the clip, an eccentric bushing under the seat, and a loop overhanging the side of the spike head.

16. A concrete railroad tie with plugs adapted to receive screw spikes for holding the rail in position, a cushion block upon which the rail rests, a fastener consisting of a clip resting on top of the rail flange, a seat on the upper surface adapted to receive the head of the screw spike and a bushing under the spike-head and extending into the cushion block, having a shoulder seat against the edge of the flange of the rail under the clip, and a hole to receive the spike eccentric to the bushing and on the side next to the shoulder, combined with the screw spike positioned and adapted to pass through the fastening into the tie for holding the rail.

17. A concrete railroad tie provided with plugs to receive screw spikes for holding the rail in position, a tie plate upon which the rail rests, a fastener consisting of a clip resting on top of the rail flange, a seat on the upper surface adapted to receive the head of the screw spike and a bushing under the spike-head and extending into the tie plate, a shoulder seat against the edge of the flange of the rail under the clip, and a hole to receive the spike eccentric to the bushing and on the side next to the shoulder combined with the screw spike positioned and adapted to pass through the fastening into the tie for holding the rail.

18. A concrete railroad tie provided with plugs to receive screw spikes for holding the rail in position, a tie plate upon which the rail rests, a fastener consisting of a clip resting on top of the rail flange, a seat on the upper surface adapted to receive the head of the screw spike and a bushing under the spike-head and extending into the tie plate, having a shoulder-seat against the edge of the flange of the rail under the clip, and a hole to receive the spike eccentric to the bushing and on the side next to the shoulder, combined with the screw spike positioned and adapted to pass through the fastening into the tie for holding the rail.

19. A railroad tie, a railroad track rail, a tie plate under the rail and a cushion block between the tie plate and rail, a rail fastener

having a clip extending over the flange of the rail and a shoulder against the flange, a seat for the screw spike on the top and a round bushing through which the spike passes, such bushing being of larger diameter than the spike and eccentric to it and adapted to pass through the tie plate into the cushion block to retain the plate in position on said block, combined with a screw spike fastening through the bushing and cushion block into the tie, substantially as shown.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 31st day of October, 1910.

ANDREW STARK.

Witnesses:
ROBT. N. BURTON,
J. ELLIOTT.