Feb. 22, 1927. 1,618,508

N. F. BROWN ET AL

CONCRETE RAILROAD TIE

Filed May 13, 1925 2 Sheets-Sheet 1

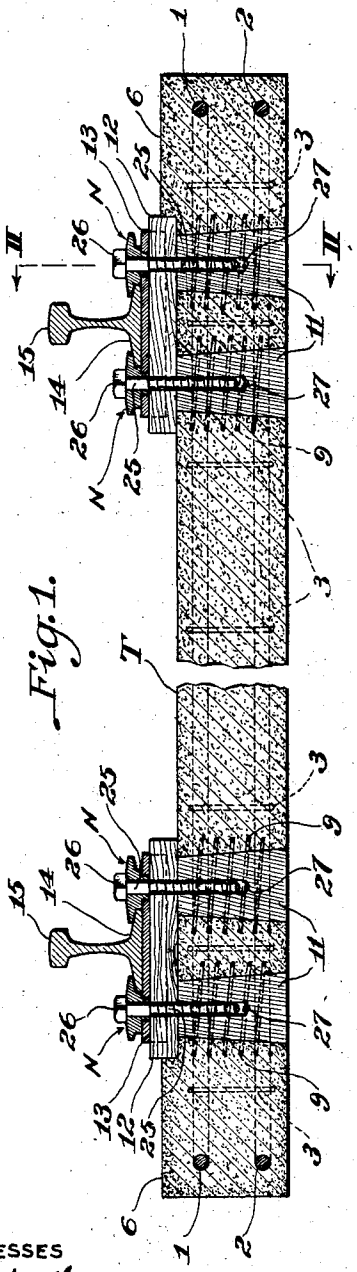


Fig. 1.

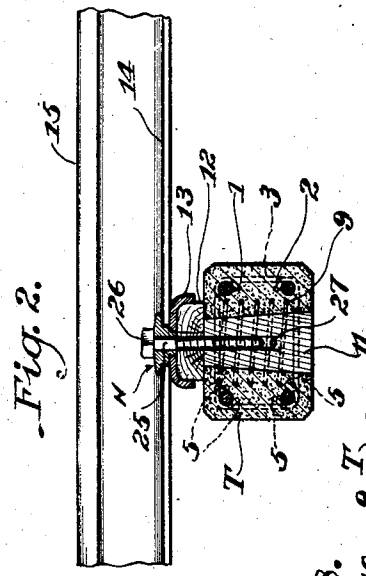


Fig. 2.

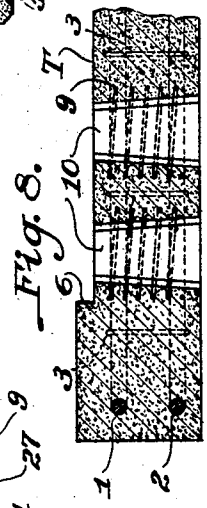


Fig. 8.

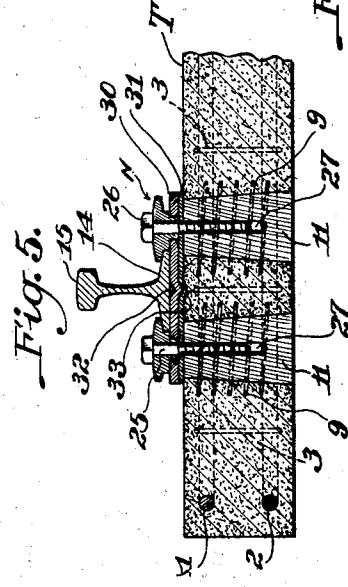


Fig. 5.

WITNESSES

A. B. Wallace.

Jo. Baily Brown

INVENTOR

Norman F. Brown

Charles M. Ruppert

by Winter, Brown & Critchlow

their attorneys

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N. F. BROWN ET AL

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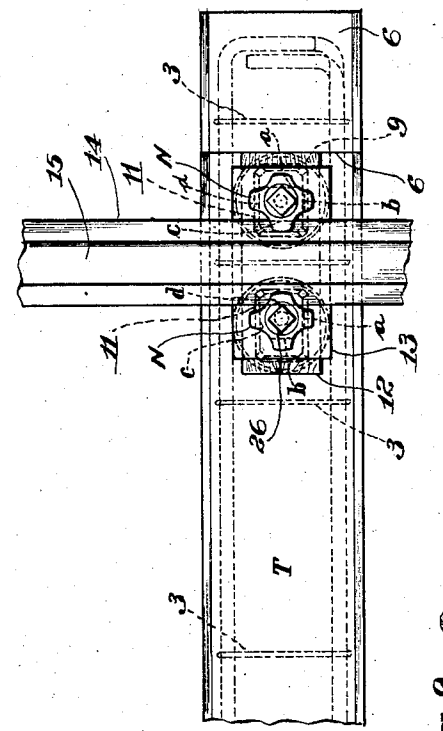
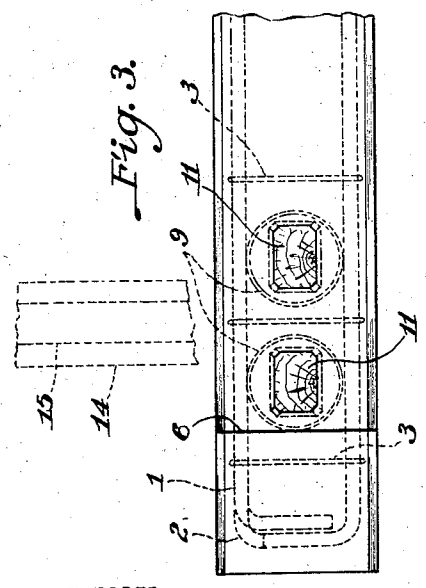


Fig. 3.



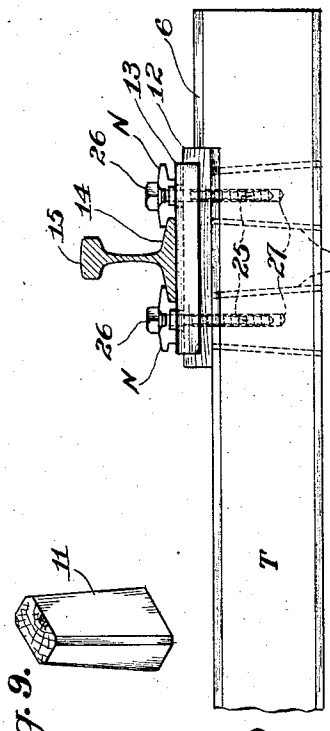


Fig. 4.

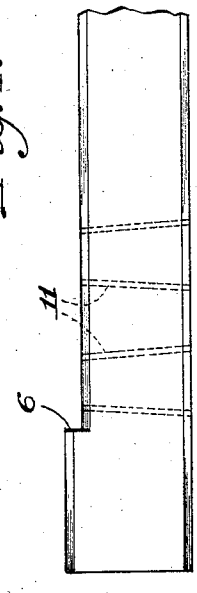


Fig. 9.

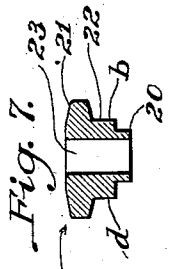


Fig. 7.

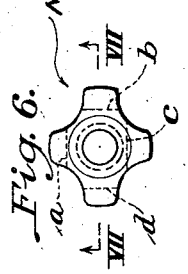


Fig. 6.

WITNESSES

A. B. Waddock.

Jas Baily Brown

INVENTOR

Norman F. Brown
Charles M. Repsert
by Winter, Brown & Critchlow
their Attorneys.

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UNITED STATES PATENT OFFICE.

NORMAN F. BROWN AND CHARLES M. REPPERT, OF PITTSBURGH, PENNSYLVANIA.

CONCRETE RAILROAD TIE.

Application filed May 13, 1925. Serial No. 29,929.

This invention relates to reinforced concrete railroad ties.

An object of the invention is to combine with such a tie resilient members adapted to engage and retain the screws or like members by which the rails are attached to the tie. Another object is to provide such resilient members in such form, and so retained in the tie, that they may be removed and replaced if and when that is desirable. Another object is to provide resilient members in the body of the tie, in such form and so placed therein that the pulling strains thereon from the rail retaining members will serve to tighten the resilient members in the tie rather than to dislodge them therefrom. In general the object is to provide means in combination with a reinforced concrete tie for resilient attachment of a rail thereto, and preferably resilient seating of the rail thereon, for the purpose of preventing destruction of the tie from excessive jars and shocks resulting from a non-resilient mounting and attachment of the rail to the tie.

Other objects and advantages will be apparent to those familiar with the art from an inspection of the drawings and a reading of the following specification.

Referring to the drawings, Fig. 1 is a central, vertical, longitudinal section through a preferred form of our tie and its associated parts, with ordinary railway rails attached thereto; Fig. 2 is a vertical cross section through the tie and rail attaching members associated therewith, on the line II—II of Fig. 1; Fig. 3 is a plan view of the tie with a rail attached at one end, the other rail and its attaching and seating members not having been applied to the other end of the tie; Fig. 4 is a side elevation of the tie, with a rail and its associated attaching members at one end as shown in Fig. 3; Fig. 5 is a partial, central, vertical, longitudinal section of the tie, showing a modified means of seating a rail on the tie; Fig. 6 is a plan view of a special rail-adjusting locking nut for use in attaching rails to the tie; Fig. 7 is a central vertical section on the line VII—VII of Fig. 6; Fig. 8 is a partial, central, vertical, longitudinal section of the tie, showing the holes cast in the ties; and Fig. 9 is a perspective view of a resilient plug adapted to be fitted into the holes in the ties shown in Fig. 8.

Attempts have heretofore been made to use railway ties formed of reinforced concrete. The increasing cost of wooden ties and their deterioration through exposure to weather condition, has long made it desirable to have ties of some more permanent material than wood. The concrete ties as heretofore made have usually failed because of lack of resiliency in their connection to the rails. The passage of heavy locomotives and cars have soon pounded the concrete to pieces.

We have overcome many of the difficulties heretofore incident to rigid, non-resilient ties, by providing resilient inserts adapted to be fitted into the tie body and to furnish yielding seats or anchor blocks for the rail-holding attachment members, and also by preferably providing resilient seating members between the rail and the tie body. At the same time we have made the resilient inserts for the tie, and the resilient rail supports to be seated upon it, in such form that they may be readily removed and replaced without change in the body of the tie itself. We have also made the resilient insert members in such form that the strains to which they are subjected tend to tighten them in their relation to the tie body, rather than to loosen and separate them therefrom.

Referring specifically to the drawings, our tie T is made up of a one-piece concrete body cast about upper and lower reinforcing members 1 and 2. These members are substantially rectangular loops, horizontally positioned near the upper and lower faces of the tie body, formed by bending two steel rods into the form shown in dotted lines in Fig. 3. The ends of both loops overlap, and the overlapped portions of the two loops are positioned at opposite ends of the tie, as illustrated in Fig. 3. At suitable intervals the longitudinal reinforcing members 1 and 2 are supported and surrounded by transverse vertically positioned reinforcing bands 3. These are formed from steel rods of suitable size bent into substantially rectangular form, and with each end turned inward in hook shape, the two hooks forming a U-shaped retaining yoke 5 inside one corner of the loop. By disposing these reinforcing bands so that the retaining yokes 5 formed by the bent ends of the bands occur at successively different corners, as illustrated in Fig. 2, these transverse reinforcing bands serve to support the longitudinal reinforcing members 1 and 2, and hold them

in properly spaced relation in a mold until after concrete has been poured and set around them. They also prevent the tie from splitting longitudinally.

The longitudinal edges of the concrete tie body are preferably beveled as shown in Fig. 2. The upper face of the preferred form of tie body is provided with terminal raised ledges 6 at each end, for purposes described below. Two holes 10 are provided at each end of the tie body in the middle portion thereof, positioned inside the ledges 6, and spaced apart as regards each other, and as regards a corresponding pair of holes at the other end of the tie, distances determined by the width of a rail flange, and the width of the track itself, respectively. The holes 10 extend from the upper to the lower face of the ties, in symmetrically decreasing cross section from bottom to top thereof. These holes are preferably in horizontal cross section in the form of rectangular parallelograms of unequal sides, with the corners cut off, the longer sides extending lengthwise with the tie. They may, however, be square or of other shape in cross section. Preferably they are non-circular, to prevent turning. The concrete surrounding the holes 10 is reinforced by spiral steel members 9, to prevent cracking or failure of the tie about the hole under load conditions.

Plugs 11 of resilient material are shaped to fit accurately into the holes 10, and in making up the tie, these plugs are driven in from the lower side of the tie until they are tightly fitted therein. This gives a much tighter fit than if the plugs were molded in the tie. Ordinarily and preferably the plugs or anchor blocks 11 are made of wood, because that material is comparatively cheap, and universally available, but other resilient materials such as fibre may be used.

A resilient block 12, preferably of wood, is adapted to seat on the upper face of the tie and to have its outer end abut against the ledge 6, which effectually prevents any outward lateral movement of the blocks. A U-shaped steel tie plate 13 fits over the top of the block 12, and furnishes the actual seat for the flange 14 of the rails 15. The edges of the plate 13 are turned down and embrace the sides of block 12, reinforcing it against crushing and splitting strains. The plates 13 have holes adapted to receive circular terminal necks 20 of special locking clip members N. These comprise a non-circular head 21, and a non-circular body portion 22 having four oppositely parallel straight sides, *a*, *b*, *c*, *d*, the corners being cut away. A central bore 23 through these special clips is unsymmetrically positioned with respect to the sides of the body portion 22, as shown in Fig. 6. That is to say, each of the straight sides *a*, *b*, *c*, and *d* of the body portion 22 is at a different distance from the center of the bore 23. By means of these special clips a rail may be shifted laterally and locked in each of four different positions between a pair of the clips, without changing the position of the axes of the clips. These clips are not per se a part of our invention, their use is well understood in railway construction, and no further description is necessary.

Screws 25 having non-circular heads 26 are adapted to pass through the bore 23 of the locking clips N above described, and to extend into holes 27 bored in the plugs 11. These holes are of a diameter less than that of the screw shank, so that the threads of the screw firmly engage the plugs 11.

In Fig. 5 a modification is illustrated in that the seating block 12 is omitted. A steel tie plate 30 rests upon an insulating member 31, made of some such material as fibre, rubber composition, or the like. The middle portion of this tie plate has a downwardly extending bead 32, adapted to engage a corresponding transverse groove 33 in the upper face of the tie. This interfitting bead and groove arrangement is intended to prevent lateral slipping of the tie plate upon the tie. With this form of attachment it is not necessary to have the ledge 6 on the upper tie face, since the bead forms an abutment with the groove in the tie.

In manufacturing this tie, the reinforcing members 1 and 2 are properly positioned in a suitable mold, and are held in spaced relation by means of the bands 3 as above described. A suitable mixture of concrete of proper consistency is poured into the mold, which is of such shape as to form the complete tie. The holes 10 are formed by blocks fastened to one side of the mold. After the concrete is set the mold is removed. The plugs 11 are then driven tightly into the holes 10, and if necessary cut off flush with the upper and lower surfaces thereof. The tie is then ready for use.

In laying track, the tie is positioned as with an ordinary wooden tie. Blocks 12 are then placed on the upper face of the tie with their outer ends in abutment with the ledges 6, tie plates 13 are placed thereon, the rails positioned and properly spaced apart, and then holes bored through blocks 12 into the plugs 11, for receiving the shanks of the screws 25. The screws are then driven into the blocks 11 and their heads drawn down tight on the retaining clips N, previously positioned. Proper cooperating faces of the body portion 22 of these clips are turned to bear against the edge of the flange of the rail to bring it into the desired initial position. Later it may be shifted laterally to four different positions, without requiring any change of position of the

screws 25, to compensate for wear of the rail head and maintain the gauge of the track.

The blocks 11 and 12 provide resiliency of connection between the rails and ties, and prevent the pounding to pieces of the ties that would result from absolutely rigid connection thereof with the rails. Obviously the blocks 11 can not work loose in the ties, since they are in wedged relation, and are driven in very tightly before any strain is placed upon them. The holes into which the blocks are driven are surrounded by the spiral reinforcing members, which render the tie strong enough to withstand the strains due to this driving of the blocks into the hole, and the subsequent pulling strains imposed thereon due to strains transmitted from the rails under loads, particularly on curves.

As will be clear the reinforcing members 1 and 2 extend from end to end of the tie, positioned near each corner, so that a maximum amount of reinforcing is provided. These bars are of such a size as to give abundant strength to the tie, being preferably made of about 7/8 inch steel rods.

The combination described gives a durable, resilient, renewable tie having obvious and valuable advantages.

The tie plates 13 may be formed by bending plate sections to suitable shape, or they may be rolled as special shapes and cut to length. It is desirable to have the upper surface of the plate on which the rail actually seats as narrow transversely as possible, so that turning movement of the tie resulting from train loads may be minimized. See Fig. 2. In other words a roller contact of rail and tie would be desirable in the longitudinal line of the tie, and this is approached as much as may be in the shape of member 13. When rolled sections are used it is practicable and desirable to accentuate this convex back of plate 13 even more than shown in Fig. 2.

It will be observed that the rails and tie plates are entirely spaced away from the ties by insulating material. Consequently the arrangements described furnish a well insulated rail, a result that is very desirable where signal systems, etc., are operated by currents passed through the rails.

We claim:

1. The combination in a railroad track of a reinforced concrete tie having resilient anchor blocks incorporated therein and positioned to receive rail-engaging means, the tie body about said anchor blocks being reinforced by helical bars, a resilient rail-supporting block seated on the tie above the anchor blocks, a ledge on the upper face of the tie forming an outer abutment for the supporting block, a cover plate extending substantially over the supporting block and having its edges turned down along the sides thereof, and rail-engaging members extending through the said plate and supporting block and embedded in the said anchor blocks.

2. A concrete railroad tie having holes therethrough positioned to receive rail-anchoring members, resilient plugs driven in said holes, reinforcing members in the ties surrounding said holes, a resilient rail-seating block positioned on top of the tie over said plugs in position to support a rail, and rail-engaging members extending through said block and retained by being embedded in said plugs.

3. The combination set forth in claim 2 characterized by the fact that the holes in the tie are tapered from bottom to top thereof, and the plugs are driven in said holes from the underside of the tie and extend from bottom to top thereof.

4. The combination set forth in claim 2 characterized by the additional element of a cover plate adapted to distribute the rail load over the upper surface of the block and to reinforce the sides thereof.

5. The combination as set forth in claim 2 characterized by the additional element of a ledge on the face of the tie adapted to form an abutment for the outer end of said block.

In testimony whereof, we hereunto sign our names.

NORMAN F. BROWN.
CHARLES M. REPPERT.