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CONCRETE RAILROAD TIE

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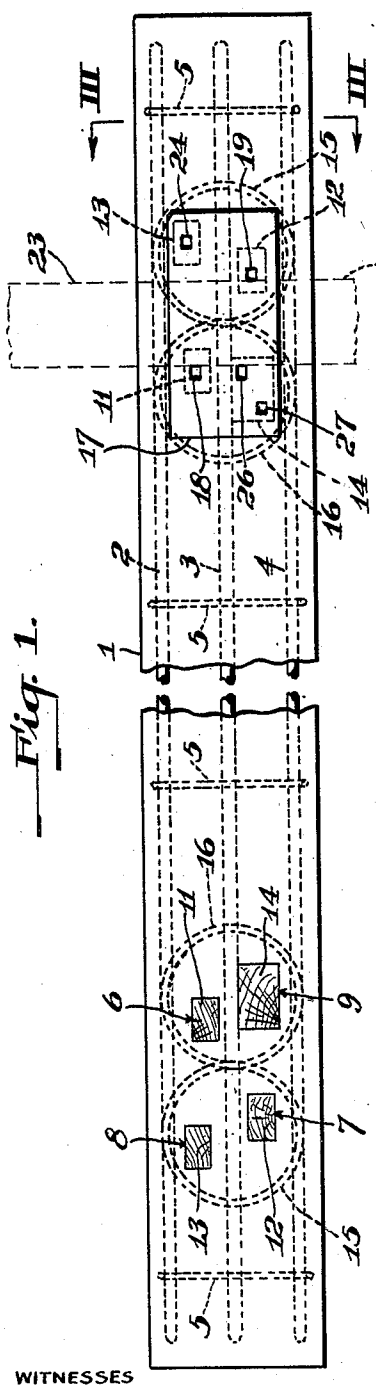


Fig. 1.

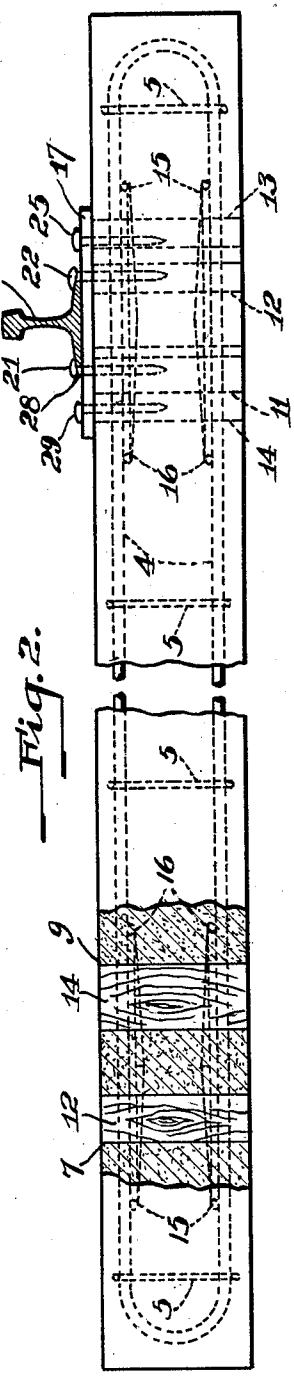


Fig. 2.

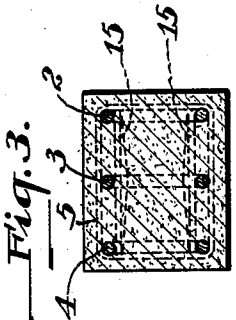


Fig. 3.

WITNESSES

A. B. Wallace

J. E. Dickinson

INVENTOR

Norman F. Brown

and Charles M. Reppert

by Brown & Critchlow

their attorneys

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UNITED STATES PATENT OFFICE

NORMAN F. BROWN AND CHARLES M. REPPERT, OF PITTSBURGH, PENNSYLVANIA, ASSIGNORS TO THE CONCRETE TIE COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF DELAWARE

CONCRETE RAILROAD TIE

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This invention relates to reinforced concrete ties.

For years efforts have been made to perfect a substitute for the perishable wooden ties now commonly used in railroad beds by practically all railroad companies. Many forms of concrete ties have been proposed and patented for this purpose, but very few of them however have proven to be practical, or have received any appreciable commercial success for various reasons. Many are impractical because they will not stand up under the continuous jars and shocks they are subjected to in service. Some fail because of their complicated and costly construction, while many others fail because of the undesirable non-resilient form of road bed they provide.

It is an object of this invention to provide an improved reinforced concrete tie of simple durable construction which is capable of resiliently and continually supporting rails mounted upon it in a highly satisfactory manner for an unlimited period without requiring other than minor repairs once the tie has been placed in service.

Another object is to provide a tie of this character which may be used in the same way and has the same characteristics in service as a wooden tie except that it is not perishable.

A further object is to provide a reinforced concrete tie in which there are disposed dependable and durable resilient means for yieldably supporting the rails that are adapted in addition to forming a resilient seat for the rails and for functioning as a cushion to protect the concrete portion of the tie against injury from shocks and jars, to receive any form of rail retaining member such as spikes or screws in the same manner as wooden ties, and which may be renewed with ease when worn, at a minimum cost.

A still further object is to provide a tie which is capable of being manufactured and placed in service without special connections or appliances at a comparatively low cost and which may be repaired in case of wear in such a simple manner as to materially reduce the maintenance cost of road beds in which it is used.

These and other objects as well as the novel features and advantages of the invention will become apparent when the following detailed description is read in conjunction with the accompanying drawings, of which Fig. 1 is a plan view of a tie constructed in accordance with the invention; Fig. 2 is a side elevational view of the tie shown in Fig. 1 with a rail attached at one end and a portion at the outer end removed; and Fig. 3 a vertical cross section taken through the tie on the line III—III of Fig. 1.

Referring specifically to the drawings, the invention is illustrated as comprising a tie which is made up of a one piece concrete body 1 cast about three laterally spaced reinforcing members 2, 3 and 4. These members, which obviously may be more or less in number, consist of steel rods bent to the shape of elongate loops with ends joined together and arranged in the tie in a vertical manner with their upper and lower cords disposed adjacent to the upper and lower surface of the concrete as viewed in Figs. 2 and 3. At suitable intervals along the length of the longitudinally disposed reinforcing members 2, 3 and 4 there are transversely arranged reinforcing bands 5 which are adapted to surround the longitudinal reinforcing members. These bands are formed from suitable steel rods in substantially the same way as the elongated loops 2, 3 and 4, that is by bending them to a rectangular shape with their ends either placed in overlapping or abutting relation and then welding or otherwise joining them together.

When the skeleton reinforcement structure is being assembled, the bands 5 are preferably fastened to the elongate members 2, 3 and 4 by welding or other suitable means such as by pieces of readily manipulated lengths of wire, and when so attached they serve to support the longitudinal members to hold them in place in proper spaced relation in a mold until the concrete has been poured and set around them. They also serve to prevent the tie from splitting longitudinally.

In the bearing portions at either end of the tie where the rails are positioned there are provided a plurality of holes 6, 7, 8 and 9 which are systematically arranged in spaced

relation with respect to each other, the spacing depending upon the spacing of the retainer receiving holes in the structural tie plates employed on the tie, and which may be of different standard shapes for different roads. These holes extend from the upper to the lower face of the tie and have a uniform cross sectional area throughout their length. They may be square or other shape in cross section, but are preferably the former for the purpose of preventing plugs disposed in them from turning and for also permitting the plugs to be manufactured in the simplest and cheapest shape possible.

When the tie is made, plugs 11, 12, 13 and 14 of resilient material are either embedded directly in the concrete when the tie is molded in their proper positions and allowed to remain there until they are destroyed, at which time they may be removed and replaced by new ones, or cores are placed in the mold to form the holes and the plugs which are precut to shape are then driven into the holes, thus formed, after the concrete has set. Ordinarily and preferably these plugs or anchor blocks are made of wood, because that material is comparatively cheap and universally available, but other resilient materials such as fiber may be used.

To render the tie strong enough to withstand the strains produced when the plugs are driven into the holes and the spikes or other retainer members are driven or forced into the plugs as well as the subsequent pulling strains imposed thereon by the forces transmitted thereto from the rails when they are loaded, particularly on curves, the holes are surrounded by circumscribing reinforcing members 15 and 16. These members, comprising substantial bands of steel rod which are preferably made in the form of a ring or figure 8 whereby to provide better strength against radially extending forces projecting from the plugs, are tied to the upper and lower cords of the elongate reinforcing members 2, 3 and 4. A feature of the circumscribing hole reinforcing members is that they do not impair to any appreciable extent the pouring of the concrete into the molds like helical shaped reinforcement members or members of that type which have been commonly employed for this purpose in the past.

In manufacturing the tie the reinforcing members 2, 3, and 4 are properly positioned in a suitable mold, being held in spaced relation by means of the bands 5 as described hereinbefore. A suitable mixture of concrete of proper consistency is poured into the mold which is of such shape as to form the complete tie, and as referred to above, the plugs 11, 12, 13 and 14 are either embedded in the concrete when the tie is formed or the holes 6, 7, 8 and 9 are formed by cores fastened to one side of the mold. These cores as well as the mold are removed after the concrete is set. When the plugs are embedded in the concrete the concrete becomes somewhat impregnated in their surfaces and especially where they are of a porous nature. This forms a bond which assists in holding the plugs in place. To improve the bond the plugs are provided with a rough unfinished surface. In the case where the holes are formed by cores the plugs 11, 12, 13 and 14 are driven tightly into the holes 6, 7, 8 and 9, respectively, and if necessary cut off flush with the upper and lower surfaces of the tie. The tie is then ready for use.

In different railway systems different standard forms of tie plates are used. To accommodate for these various forms of tie plates the plugs 11, 12, 13 and 14 are arranged in the tie in such a manner as to register with the retainer receiving openings in the plates. One form of such a plate is shown at 17 in Figs. 1 and 2. In this plate a pair of holes 18 and 19 are provided in opposite corners thereof in such spaced relation as to permit a pair of spikes 21 and 22 or other retaining members to be passed through them to engage the flanges of a rail 23 mounted on the plate. In another corner there is arranged a hole 24 which is spaced from the rail flange and in which a retainer member 25 is placed for anchoring the plate to the tie. In the other corner two holes 26 and 27 are arranged for the reception of two retainer members 28 and 29, hole 26 being arranged to permit retainer member 28 to engage the flange of the rail and hole 27 spaced therefrom so that retainer 29 like retainer 25 functions only to anchor the plate to the tie. With this form of plate, with the exception of retainers 28 and 29, individual plugs are provided for the reception of each of the retainers, plug 14 being made sufficiently large to accommodate both retainers 28 and 29. This makes for a better tie and one which may be repaired in part with ease, and as referred to above, the arrangement may be varied to adapt the plugs for various forms of plates. Contrary to previous belief plugs arranged in the tie in this way have been found to provide a very secure and satisfactory anchoring means for the retainer members in spite of their straight sides, and this feature in itself is a real advance since it permits the plugs to be made as well as replaced at a comparatively lower cost than plugs of an irregular shape, or plugs not extending all the way through the tie.

By spacing the plugs in the manner described, the additional retainer members 25 and 29 which do not engage the flange of the rail firmly hold the tie plate in place, permitting it to act as a part of the tie with the result that abrasion between the plates and the ties is eliminated.

In laying track the tie is positioned in the

same manner as an ordinary wooden tie. Plugs 11, 12, 13 and 14, if not molded therein, are placed in the tie. If desired, cushion plates of rubber, fiber or other materials are placed on the tie under the tie plates. The tie plates 17 are then placed thereon and the rails positioned and properly placed and spaced apart, and then the retainer members or spikes driven to place with their heads drawn down tight on the plate or rail flanges. The plugs 11, 12, 13 and 14 and the cushion plates referred to if used, 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. As will be clear, the reinforcing members 2, 3 and 4 are so arranged on the tie body that a maximum amount of reinforcing is provided. These bars are of such size as to give abundant strength to the tie, being preferably made of about ¾″ to 1″ steel rods.

The tie described provides a durable resilient renewable structure having obvious advantages. It will be observed that the rails and tie plates are entirely spaced away from the current-conducting parts of the tie by insulating material. Consequently, the arrangements described furnish a well insulated rail, a result that is very desirable when signal systems are operated by current passed through the rails.

According to the provisions of the patent statutes, we have explained the principle and mode of operation of our invention, and have illustrated and described what we now consider to be its best embodiment. However, we desire to have it understood that, within the scope of the appended claims the invention may be practiced otherwise than as specifically illustrated and described.

We claim:

1. A railroad tie comprising a concrete body having a plurality of resilient plugs embedded in it in a vertical manner in systematically spaced relation and in groups adjacent its opposite ends, said plugs being of uniform cross section throughout their entire length and extended all the way through the body of the tie and adapted to receive the ordinary forms of rail engaging members employed to fasten a tie to a rail a plurality of reinforcing rods arranged lengthwise in said body in spaced transverse relation, and figure-8-shaped reinforcing members disposed near the top and bottom of the tie in circumscribed radially spaced relation about said plugs.

2. A railroad tie comprising a concrete body, a reinforcing frame formed of a plurality of connected loop-shaped rods arranged within and spaced from the walls of said body, a plurality of resilient plugs adapted for the reception of the ordinary rail engaging members employed to fasten a rail to a tie embedded in said concrete, said plugs being of uniform cross section throughout their length and extended all the way through the tie in vertically disposed spaced parallel relation, and a plurality of vertically spaced figure-8-shaped reinforcing members attached to said reinforcing frame and arranged with their loops extending in radially spaced circumscribing relation about said plugs.

In testimony whereof we hereunto sign our names.

NORMAN F. BROWN.
CHARLES M. REPPERT.