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TIE PLATES FOR CONCRETE RAILROAD TIES

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FIG. 1

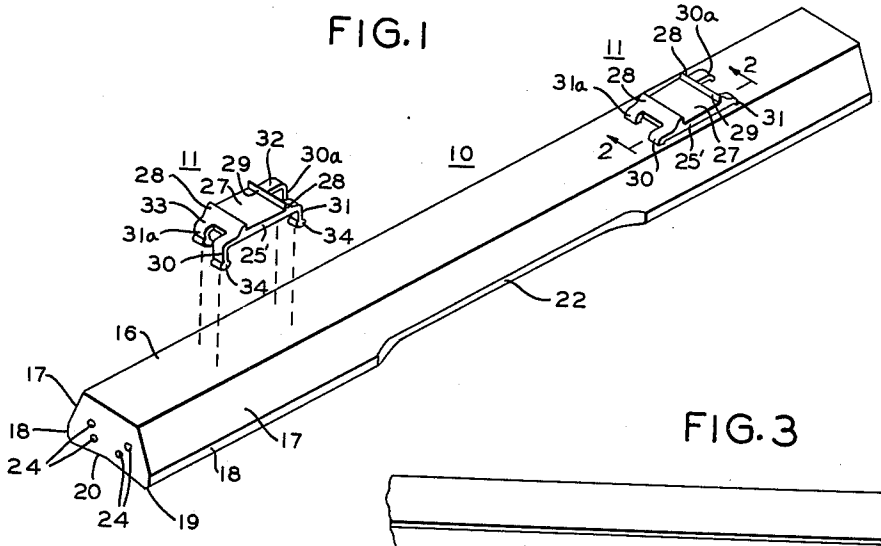


FIG. 3

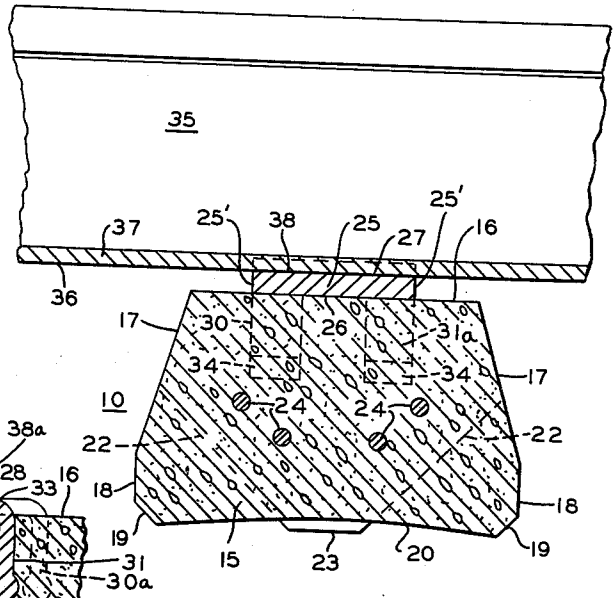
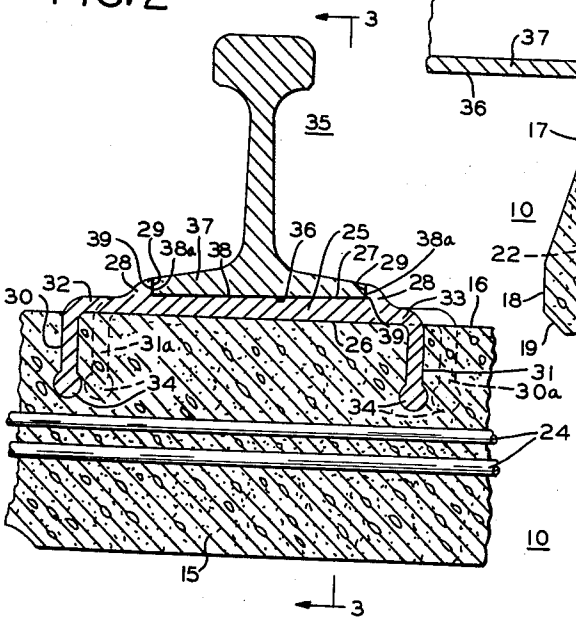


FIG. 2



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TIE PLATES FOR CONCRETE RAILROAD TIES

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This invention relates to tie plates for concrete railroad ties and more particularly to such tie plates which are particularly adapted for use with pre-stressed concrete cross ties.

Pre-stressed concrete railroad crossties have heretofore been proposed, and extensive investigations have been made under the auspices of the Association of American Railroads looking to the selection of a satisfactory crosstie of this character.

The provisions for securing the rails to the crossties heretofore proposed have not, however, proven wholly satisfactory.

In the crossties previously referred to, openings were cast in the crosstie from top to bottom and locking bolts were employed for holding the rails and the tie plates in position. Such openings add to the problems of manufacture and weaken the tie. The engagement of the bolts at the bottom of the ties was a source of trouble.

It is the principal object of the present invention to provide an improved construction for securing track rails with respect to the crossties without the necessity for employing bolts, spikes or similar fasteners, and which is particularly suitable for track constructions in which pre-stressed concrete crossties are employed.

It is a further object of the present invention to provide an improved tie plate for use with pre-stressed concrete crossties and with respect to which the track rails are secured by a suitable adhesive.

It is a further object of the present invention to provide an improved tie plate which is secured in position with respect to the crosstie in a simple but effective manner.

It is a further object of the present invention to provide an improved tie plate for use with pre-stressed concrete crossties which is simple in construction but is effectively secured in position on the crosstie.

It is a further object of the present invention to provide an improved tie plate for pre-stressed concrete crossties which may be and preferably is secured in position with respect to a concrete crosstie at the time of casting of the tie.

Other objects and advantageous features of the invention will be apparent from the description and claims.

The nature and characteristic features of the invention will be more readily understood from the following description, taken in connection with the accompanying drawings forming part thereof, in which:

FIGURE 1 is a view in perspective of a pre-stressed concrete crosstie showing one tie plate in accordance with the invention in position thereon and another tie plate elevated thereabove;

FIG. 2 is a longitudinal fragmentary sectional view of the crosstie and tie plate and taken approximately on the line 2—2 of FIG. 1; and

FIG. 3 is a fragmentary sectional view taken approximately on the line 3—3 of FIG. 2.

It should, of course, be understood that the description and drawings herein are illustrative merely, and that various modifications and changes can be made in the structure disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

In order that the invention may be more readily understood, reference will first be had to a pre-stressed concrete crosstie **10** of satisfactory design for which the tie plates **11** of the present invention are particularly suitable.

The crosstie **10**, of a type tested by the research laboratories of the Association of American Railroads, includes an elongated body **15** of concrete, of predetermined dimensions, of a length of the order of eight and one-half feet, a maximum width of the order of about twelve inches, and a total height of the order of seven inches.

A top face **16** is provided and downwardly inclined side faces **17** from which side margins **18** extend downwardly to chamfered edges **19**. The chamfered edges **19** are connected by a bottom face **20** which is dished inwardly from each end face **21**, preferably being elevated at the center about one-half inch.

The midportion of the crosstie **10**, and approximately the central third part thereof, has cutaway portions **22** on each side with a downward central extension **23**, the shaping at the cutaway portions **22** preventing binding of track ballast at this location.

Within the interior of the body portion **15** of the tie **10** four seven wire strands **24** of wire are longitudinally disposed in spaced relation, the strands **24** preferably being seven-sixteenth inch strands, the wire being uncoated and stressed relieved with a minimum breaking strength of twenty-seven thousand pounds. The initial pre-stress is of the order of 75% of the minimum breaking strength or 20,250 pounds per strand.

The concrete of the body **15** is of Portland cement, mineral (granite) aggregate, and water, with a minimum ultimate strength of 6000 p.s.i. in 28 days with a maximum water-cement ratio of 5 gallons of water per sack of cement.

A crosstie **10** of this type has increased stability due to added weight, maintains good bond with the ballast to prevent creeping, is free from variations that are encountered with wood ties and has an almost indefinite life, as well as other advantages.

Prior attempts to secure rails to concrete crossties have not been wholly satisfactory and the tie plate **11** of the present invention provides a solution to this heretofore vexing problem.

The tie plate **11** preferably includes a central body portion **25**, of a width between opposite side faces **25'** of about five inches, having a flat bottom **26** for engagement with the top face **16** of the tie **10**, a top face portion **27** with a slope between opposite shoulders **28**. The shoulders **28** have internal vertical faces **29**. The slope between the faces **29** is of the order of one to forty and the face portion **27** between the shoulders **29** can be in the range of about six and thirteen sixteenths inches to six and seven eights inches, dependent upon the size desired for a particular rail **35**.

The body portion **25** of the tie plate **11** has extending outwardly therefrom a pair of opposite legs **30** and **31** which include, for the leg **30**, a longer horizontal connecting portion **32**, and for the leg **31** a shorter horizontal connecting portion **33**.

The body portion **25** of the tie plate **11** also has extending therefrom an additional pair of legs **30***a* and **31***a* horizontally spaced with respect to the legs **30** and **31**, and of similar shape and construction.

Each of the legs **30**, **31**, **30***a* and **31***a*, at its lower margin, is provided with an enlarged cylindrical foot **34** for purposes of aiding the retention of the tie plate **11** with respect to the crosstie **10**. It will be noted that the feet **34** are in spaced relation to each other, horizontally considered, and that crosswise of the tie **11** the feet **34** at each side are offset with respect to each other.

The tie plates **11** are preferably initially placed on the

ties 10 with their legs 30, 31, 30*a* and 31*a* extending vertically while the tie 10 is being formed and in such manner that the concrete forming the body 15 of the tie 10 will be in engagement with the legs 30, 31, 30*a* and 31*a*, the feet 34 and the bottom face 26 of the tie plate 11.

The legs 30, 31, 30*a* and 31*a* can initially be formed from flat plate material and bent to their positions for use. The legs 30, 31, 30*a* and 31*a*, and their feet 34 preferably extend into the body 16 of the tie 10 and below the top face 16 of the tie 10 a distance of the order of two and five eighths inches.

The feet 34 are also preferably located with a clearance of the order of three quarters of an inch with respect to the pre-stressing strands 24 so that no aggregate employed in the concrete can fill the space between any foot 34 and any strand 24 thereby facilitating the proper location of the legs 30, 31, 30*a* and 31*a* and feet 34 within the body 15 of the tie 10.

The tie plate 11 of the present invention is particularly suited for mounting a track rail 35 thereon, and with the bottom face 36 of the bottom flange 37 held in position by an adhesive layer 38 interposed between the bottom face 36 and the top face portion 27 of the plate 11. The adhesive layer can have upward extensions 38*a* between the faces 29 and the side faces 39 of the bottom flange 37.

One suitable adhesive for the layer 38 is an epoxy resin and its curing agent by which the resin is converted to a thermoset polymer and is described in the American Railway Engineering Association Bulletin, volume 62, No. 562, January 1961, and referred to therein particularly as Formulation 991–67.

This formulation is as follows:

Resin portion:

Pounds	Gallons	Material	Same Formula Based on 100 parts by Weight of Resin
64.51	6.65	Epi-Rez 510	100
25.81	1.21	Asbestos 7–TF–1	40
9.68	0.31	Alumina T–60	15
100.00	8.17		

Converter:

Pounds	Gallons	Material	Same Formula Based on 100 parts by Weight of Resin
32.26	4.08	Epi-Cure 855	50
6.45	0.37	Asbestos 7–TF–1	10
6.45	0.21	Alumina T–60	10

Constants:

Wt./gal. ---- 11.31 lb., including converter portion.
Pot life ---- 2½ hr. at 77° F.—1 lb. batch.
Viscosity ---- Brookfield, No. 6 spindle, at 77° F.

R.p.m.	Cps.
5	56,000
10	34,000
15	22,500

Mixing:

Blend the Epi-Rez 510, 7–TF–1 asbestos, and T–60 alumina to a smooth texture.

Blend the Epi-Cure 855, 7–TF–1 asbestos, and T–60 alumina to a smooth texture.

When ready to use combine the resin and converter compositions and blend thoroughly.

Curing schedule: This adhesive will reach its maximum strength at 77° F. after 2 days. At 250° F. the maximum strength is obtained in 10 min.

Physical properties: The shear strength of steel to steel after five days at room temperature is 2,739 p.s.i.

Surface preparation: The steel surfaces to be adhered are cleaned by mechanical steel brushing to remove all scale, paint and dirt.

Material sources:

Epi-Rez 510 ----- Jones-Dabney Co.
Asbestos 7–TF–1 --- Johns-Manville Products Corp.
Alumina T–60 ---- Aluminum Co. of America.
Epi-Cure 855 ----- Jones-Dabney Co.

The adhesive described above can be applied by brushing or in any other desired manner to both surfaces to be bonded together.

I claim:

1. A railroad track construction comprising a concrete cross tie having longitudinally disposed prestressing members therein, a track rail, a tie plate interposed between said cross tie and said rail, said tie plate having a body portion with an upwardly disposed face with which the base of the rail is in direct adherent engagement, said tie plate having a downwardly disposed face in engagement with the top of the tie, said tie plate having at each side marginal edge thereof a plurality of integral vertically downwardly extending legs enclosed within the tie, the legs at each side having horizontal connecting portions of different lengths extending to the tie plate to laterally offset said legs with respect to each other transverse to the rail, said legs being terminated in spaced relation above the prestressing members, the lower terminals of said legs being of enlarged cross section.

2. A tie plate adapted to be directly interposed between a concrete cross tie having interiorly disposed longitudinally extending prestressing members and a track rail, said tie plate having a body portion with an upwardly facing horizontal rail base engaging face and an opposite downwardly disposed tie engaging face for engagement with the top of the tie, said tie plate having at each side marginal edge thereof a plurality of integral vertically downwardly extending legs with enlarged terminal portions at the lower ends thereof, said legs at each side having horizontal connecting portions of different lengths extending to said tie plate to laterally offset said legs with respect to each other transverse to the rail, and said legs being in spaced relation above the prestressing members of the cross tie.

3. A railroad track construction as defined in claim 1 in which the upwardly disposed face of the tie plate has spaced shoulders extending therealong with upright faces for positioning the base of the rail.

4. A tie plate as defined in claim 2, in which said rail base engaging face has spaced parallel shoulders extending therealong with upright faces for positioning the base of the rail.

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